Race to the Top
New Hampshire Participating Local Education Agency
Memorandum of Understanding

By signing this Memorandum of Understanding, the Superintendent of Schools of _____ ("Participating LEA") assures the New Hampshire Commissioner of Education ("State") that the LEA will participate in implementing all or a significant portion of the State's proposed reform plans.

I. SCOPE OF WORK

Exhibit I, the Preliminary Scope of Work, indicates which portions of the State's proposed reform plans ("State Plan") the Participating LEA is agreeing to implement.

II. PROJECT ADMINISTRATION

A. PARTICIPATING LEA RESPONSIBILITIES

In assisting New Hampshire in implementing the tasks and activities described in the State's Race to the Top application, the _____("LEA") will:

1) Implement the LEA plan as identified in Exhibits I and II of this agreement;
2) ***Assure that Race to the Top funds will not be used to supplant other federal, state, or local funds;***
3) Actively participate in all relevant convenings or practice-sharing events that are organized or sponsored by the State or the U.S. Department of Education ("ED");
4) Post to any website specified by the State or ED, in a timely manner, all non-proprietary products and lessons learned and developed using funds associated with the Race to the Top grant;
5) Participate, as requested, in any evaluations of this grant conducted by the State or ED;
6) Be responsive to State and ED requests for information, e.g., status of project, project implementation, outcomes, and any challenges anticipated or encountered;
7) Participate in meetings, webinars, and telephone conferences with the State to discuss (a) progress of project; (b) potential dissemination of resulting non-proprietary products and lessons learned; (c) sustainability plans for subsequent years of the Race to the Top grant period; and (d) other matters related to the Race to the Top grant and associated plans.

B. STATE RESPONSIBILITIES

In assisting Participating LEAs in implementing their tasks and activities described in the State's Race to the Top application, the State grantee will:

1) Work collaboratively with, and support the Participating LEA in carrying out the LEA Plan as identified in Exhibits I and II of this agreement;
2) Timely distribute the LEA's portion of Race to the Top funds during the course of the project period and in accordance with the LEA Plan identified in Exhibit II;
3) Provide feedback on the LEA's status updates, annual reports, and project plans and products; and
4) Identify sources of technical assistance for the project.

C. JOINT RESPONSIBILITIES

1) The State and the Participating LEA will each appoint a key contact person for the Race to the Top grant.

2) These key contacts from the State and the Participating LEA will maintain frequent communication to facilitate cooperation under this MOU.
3) State and Participating LEA grant personnel will work together to determine appropriate timelines for project updates and status reports throughout the whole grant period.
4) State and Participating LEA grant personnel will negotiate in good faith to continue to achieve the overall goals of the State's Race to the Top grant, even when the State Plan requires modifications that affect the Participating LEA, or when the LEA Plan requires modifications.

D. STATE RECOURSE FOR LEA NON-PERFORMANCE

If the State determines that the LEA is not meeting its goals, timelines, budget, or annual targets, or is not fulfilling other applicable requirements, the State grantee will take appropriate enforcement action, which could include a collaborative process between the State and the LEA, or any of the enforcement measures that are detailed in 34 CFR section 80.43 including putting the LEA on reimbursement payment status, temporarily withholding funds, or disallowing costs.

III. ASSURANCES

The Participating LEA hereby certifies and represents that it:

1) Has all requisite power and authority to execute this MOU;
2) Is familiar with the State's Race to the Top grant application and is supportive of and committed to working on all or significant portions of the State Plan;
3) Agrees to be a Participating LEA and will implement those portions of the State Plan indicated in Exhibit I, if the State application is funded;
4) Will provide a Final Scope of Work to be attached to this MOU as Exhibit II only if the State's application is funded; will do so no later than 90 days after a grant is awarded; and will describe in Exhibit II the LEA's specific goals, activities, timelines, budgets, key personnel, and annual targets for key performance measures ("LEA Plan") in a manner that is consistent with the Preliminary Scope of Work (Exhibit I) and with the State Plan; and
5) Will comply with all of the terms of the Grant, the State's subgrant, and all applicable Federal and State laws and regulations, including laws and regulations applicable to the Program, and the applicable provisions of EDGAR (34 CFR Parts 75, 77, 79, 80, 82, 84, 85, 86, 97, 98 and 99).

IV. MODIFICATIONS

This Memorandum of Understanding may be amended only by written agreement signed by each of the parties involved, and in consultation with ED.

V. DURATION/TERMINATION

This Memorandum of Understanding shall be effective, beginning with the date of the last signature hereon and, if a grant is received, ending upon the expiration of the grant project period, or upon mutual agreement of the parties, which ever occurs first.

Nothing in this Memorandum of Understanding shall be construed to alter or otherwise affect the rights, remedies, and procedures afforded school or school district employees under Federal, State, or local laws (including applicable regulations or court orders) or under the terms of collective bargaining agreements, memoranda of understanding, or other agreements between such employers and their employees.

VI. SIGNATURES

LEA Superintendent (or equivalent authorized signatory) - required:

_____
Signature/Date

_____
Print Name/Title

President of Local School Board (or equivalent, if applicable):

_____
Signature/Date

_____
Print Name/Title

Local Teachers' Union Leader (if applicable):

_____
Signature/Date

_____
Print Name/Title

Local Administrators' Union Leader (if applicable):

_____
Signature/Date

_____
Print Name/Title

Authorized State Official - required
By its signature below, the State hereby accepts the LEA as a Participating LEA:

_____
Signature/Date

_____
Print Name/Title

EXHIBIT I – PRELIMINARY SCOPE OF WORK

LEA hereby agrees to participate in implementing the State Plan in each of the areas identified below:

Elements of State Reform Plans	LEA Participation (Y/N)	Comments from LEA (optional)
Standards and Assessments		
• Supporting the transition to enhanced standards, when Common Core is adopted by State Board, and high-quality assessments		
Data Systems to Support Instruction		
Using data to improve instruction:		
• Use of local instructional improvement systems, e.g., Performance Plus/Tracker		
• Professional development on use of data		
• Availability and accessibility of data to researchers		
Great Teachers and Leaders		
Improving teacher and principal effectiveness based on performance:		
• Measure student growth		
• Design and implement evaluation systems		
• Conduct annual evaluations		
• Use evaluations to inform professional development		
• Use evaluations to inform compensation, promotion, and retention		
• Use evaluations to inform tenure and/or full certification		
• Use evaluations to inform removal		
Ensuring equitable distribution of effective teachers and principals:		
• High-poverty and/or high-minority schools		
• Hard-to-staff subjects and specialty areas		
Providing effective support to teachers and principals:		
• Quality professional development		
• Measure effectiveness of professional development		
Turning Around the Lowest-Achieving Schools		
• Turning around the lowest-achieving schools		

For the Participating LEA:

Authorized LEA Signature/Date

Print Name/Title

For the State:

Authorized State Signature/Date

Print Name/Title

Appendix 2A
New Hampshire Struggling Schools Turnaround Model
Memorandum of Understanding

By signing this memorandum of understanding, the _____Local Educational Agency assures the N.H. Commissioner of Education that the _____ school has selected the identified Race to the Top school intervention model and agrees to the following criteria if N.H. is awarded a Race to the Top grant:

Turnaround Model

The Local Educational Agency (LEA) and school will:

- Replace the principal (unless already replaced within the past two years for the purpose of transformation) and grant the principal sufficient operational flexibility (including in staffing, calendars/time, and budgeting) to implement fully a comprehensive approach in order to substantially improve student achievement outcomes and increase high school graduation rates;
- Use locally adopted competencies to measure the effectiveness of staff who can work within the turnaround environment to meet the needs of students,
    - Screen all existing staff and rehire no more than 50 percent; and
    - Select new staff;
    - Implement such strategies as financial incentives, increased opportunities for promotion and career growth, and more flexible work conditions that are designed to recruit, place, and retain staff with the skills necessary to meet the needs of the students in the turnaround school;
- Design and implement an annual teacher and principal evaluation system that:
    - Measures student growth and uses data to directs plans for improving and measuring teacher and principal effectiveness; and
    - Use evaluations to inform professional development, compensation, promotion, retention, tenure/full certification, and removal;
- Ensure equitable distribution of effective teachers and principals, considering:
    - High poverty and/or high minority schools; and
    - Hard-to-staff subjects and specialty areas
- Provide staff with ongoing, high-quality, job-embedded professional development that is aligned with the school's comprehensive instructional program and designed with school staff to ensure that they are equipped to facilitate effective teaching and learning and have the capacity to successfully implement school reform strategies;
- Measure the effectiveness of teacher and administrative professional development and adjust professional development plans accordingly;
- Adopt a new governance structure, which may include, but is not limited to, requiring the school to report to a new "turnaround office" in the LEA or State Educational Agency (SEA), hire a "turnaround leader" who reports directly to the Superintendent or Chief Academic Officer, or enter into a multi-year contract with the LEA or SEA to obtain added flexibility in exchange for greater accountability;
- Use data to identify and implement an instructional program that is research-based and "vertically aligned" from one grade to the next as well as aligned with State academic standards;
- Promote the continuous use of student data (such as from formative, interim, and summative assessments) to inform and differentiate instruction in order to meet the academic needs of each individual student;
- Establish schedules and implement strategies that provide increased learning time (as defined in the Race to the Top notice); and
- Provide appropriate social-emotional and community-oriented services and supports for students.

Appendix 2A
New Hampshire Struggling Schools Turnaround Model
Memorandum of Understanding

Turnaround Model (continued)

- Ensure that the funds provided through the Race to the Top grant and all other federally funded programs will be used to supplement the educational services (including staffing) provided through local and state funds in the school. Therefore no local funding to this school will be reduced due to the addition of Race to the Top funds, avoiding supplanting issues; and
- Agree to meet the School Approval Minimum Standards and New Hampshire Rules for the Education of Children with Disabilities, with any non-compliance corrected to the satisfaction of the Commissioner and Administrator of the Bureau of Special Education within six months of Race to the Top grant approval.
- Upon approval of the New Hampshire Department of Education's Race to the Top application/grant, the LEA/school agrees to work with the Department to develop a more specific memorandum of understanding that includes a specific turnaround plan for the school.

Nothing in this Memorandum of Understanding shall be construed to alter or otherwise affect the rights, remedies, and procedures afforded school or school district employees under Federal, State, or local laws (including applicable regulations or court orders) or under the terms of collective bargaining agreements, memoranda of understanding, or other agreements between such employers or employees.

_____	_____	_____
SAU #	**LEA Superintendent Signature**	**Date**
	_____	_____
	President of the LEA School Board	**Date**
	_____	_____
	President of the LEA Teacher Union	**Date**
	_____	_____
	President of the LEA Administrative Union (optional)	**Date**

Appendix A-2 b: Race to the Top
New Hampshire Struggling Schools Restart Model
Memorandum of Understanding

By signing this memorandum of understanding, the _____Local Educational Agency assures the N.H. Commissioner of Education that the _____ school has selected the identified Race to the Top school intervention model and agrees to the following criteria if N.H. is awarded a Race to the Top grant:

Restart Model

The Local Educational Agency (LEA) and school will:

- Convert the school or close and reopen the school under a charter school operator, a charter management organization (CMO), or an education management organization (EMO) that has been selected through a rigorous review process. (A CMO is a non-profit organization that operates or manages charter schools by centralizing or sharing certain functions and resources among schools. An EMO is a for-profit or non-profit organization that provides "whole-school operation" services to an LEA); and

- The restart model will enroll, within the grades it serves, any former student who wishes to attend the school: and

- The LEA agrees to follow the appropriate New Hampshire guidance and policy concerning the chosen new school model (ex. Complete a Charter School Application, General Assurances and Vendor Application); and

- Ensure that the funds provided through the Race to the Top grant and all other federally funded programs will be used to supplement the educational services (including staffing) provided through local and state funds in the LEA/school. Therefore no local funding to this LEA/school will be reduced due to the addition of Race to the Top funds, avoiding supplanting issues; and

- Agree to meet the School Approval Minimum Standards and New Hampshire Rules for the Education of Children with Disabilities, with any non-compliance corrected to the satisfaction of the Commissioner and Administrator of the Bureau of Special Education within six months of Race to the Top grant approval; and

- Upon approval of the New Hampshire Department of Education's Race to the Top application/grant, the LEA/school agrees to work with the Department to develop a more specific memorandum of understanding that includes a specific restart plan for the school.

Nothing in this Memorandum of Understanding shall be construed to alter or otherwise affect the rights, remedies, and procedures afforded school or school district employees under Federal, State, or local laws (including applicable regulations or court orders) or under the terms of collective bargaining agreements, memoranda of understanding, or other agreements between such employers and their employees.

Appendix A-2 b: Race to the Top
New Hampshire Struggling Schools Restart Model
Memorandum of Understanding

_____	_____	_____
SAU #	**LEA Superintendent Signature**	**Date**
	_____	_____
	President of the LEA School Board	**Date**
	_____	_____
	President of the LEA Teacher Union	**Date**
	_____	_____
	President of the LEA Administrative Union (optional)	**Date**

Appendix A-2d: Race to the Top
New Hampshire Struggling Schools School Closure
Memorandum of Understanding

By signing this memorandum of understanding, the _____Local Educational Agency assures the N.H. Commissioner of Education that the _____ school has selected the identified Race to the Top school intervention model and agrees to the following criteria if N.H. is awarded a Race to the Top grant:

School Closure Model

The LEA will:

- Close the school and enroll the students who attended the school in other schools within the LEA that are higher achieving. These other schools (may include, but are not limited to, charter schools or new schools for which achievement data are not yet available) are within reasonable proximity to the closed school; and

- Upon approval of the New Hampshire Department of Education's Race to the Top application/grant, the LEA/school agrees to work with the Department to develop a more specific memorandum of understanding that includes a specific school closure plan.

Nothing in this Memorandum of Understanding shall be construed to alter or otherwise affect the rights, remedies, and procedures afforded school or school district employees under Federal, State, or local laws (including applicable regulations or court orders) or under the terms of collective bargaining agreements, memoranda of understanding, or other agreements between such employers or employees.

_____	_____	_____
SAU #	**LEA Superintendent Signature**	**Date**
	_____	_____
	President of the LEA School Board	**Date**
	_____	_____
	President of the LEA Teacher Union	**Date**
	_____	_____
	President of the LEA Administrative Union (optional)	**Date**

Appendix A-2d: Race to the Top
New Hampshire Struggling Schools Transformation Model
Memorandum of Understanding

By signing this memorandum of understanding, the _____Local Educational Agency assures the N.H. Commissioner of Education that the _____ school has selected the identified Race to the Top school intervention model and agrees to the following criteria if N.H. is awarded a Race to the Top grant:

Transformation Model
The Local Educational Agency (LEA) will implement each of the following strategies:

- Develop and increase teacher and school leader effectiveness.
  - Replace the principal who led the school prior to commencement of the transformation model (unless already replaced within the past two years for the purpose of transformation);
  - Use rigorous, transparent, and equitable evaluation systems for teachers and principals that—
    - Are designed and developed with teacher and principal involvement;
    - Utilize multiple observation-based assessments of performance and ongoing collections of professional practice reflective of student achievement and increased high-school graduations rates, taking into account data on student growth (as defined in the Race to the Top final notice) as a significant factor; and
  - Identify and reward school leaders, teachers, and other staff who, in implementing this model, have increased student academic growth and high-school graduation rates and identify and remove those who, after ample opportunities have been provided for them to improve their professional practice, have not done so;
  - Provide staff with ongoing, high-quality, job-embedded professional development (*e.g.*, regarding subject-specific pedagogy, instruction that reflects a deeper understanding of the community served by the school, or differentiated instruction) that is aligned with the school's comprehensive instructional program and designed with school staff to ensure they are equipped to facilitate effective teaching and learning and have the capacity to successfully implement school reform strategies; and
  - Implement such strategies as increased opportunities for promotion and career growth, financial incentives, and more flexible work conditions that are designed to recruit, place, and retain staff with the skills necessary to meet the needs of the students in a transformation school.
  - Ensure equitable distribution of effective teachers and principals, considering:
    - High poverty and/or high minority schools; and
    - Hard-to-staff subjects and specialty areas;
  - Measure the effectiveness of teacher and administrator professional development and adjust professional development plans accordingly;
- Comprehensive instructional reform strategies.
  - Use data to identify and implement an instructional program that is research-based and "vertically aligned" from one grade to the next as well as aligned with State academic standards; and
  - Promote the continuous use of student data (such as from formative, interim, and summative assessments) to inform and differentiate instruction in order to meet the academic needs of individual students.
- Increasing learning time and creating community-oriented schools.
  - Establish schedules and implement strategies that provide increased learning time (as defined in this notice); and
  - Provide ongoing mechanisms for family and community engagement.

Transformation Model (continued)

- Providing operational flexibility and sustained support.
  - Give the school sufficient operational flexibility (such as staffing, calendars/time, and budgeting) to implement fully a comprehensive approach to substantially improve student achievement outcomes and increase high school graduation rates; and
  - Ensure that the school receives ongoing, intensive technical assistance and related support from the LEA, the State Educational Agency (SEA), or a designated external lead partner organization, such as a school turnaround organization or an education management organization (EMO).
- Maintaining appropriate local support and compliance.
  - Ensure that the funds provided through the Race to the Top grant and all other federally funded programs will be used to supplement the educational services (including staffing) provided through local and state funds in the school. Therefore no local funding to this school will be reduced due to the addition of Race to the Top funds, avoiding supplanting issues; and
  - Agree to meet the School Approval Minimum Standards and New Hampshire Rules for the Education of Children with Disabilities, with any non-compliance corrected to the satisfaction of the Commissioner and Administrator of the Bureau of Special Education within six months of Race to the Top grant approval.
- Any other school transformation efforts planned by the LEA/school (please refer to the "permissible activities" document provided by the New Hampshire Department of Education that includes excerpts from the Race to the Top final notice-pages 72-74).

Nothing in this Memorandum of Understanding shall be construed to alter or otherwise affect the rights, remedies, and procedures afforded school or school district employees under Federal, State, or local laws (including applicable regulations or court orders) or under the terms of collective bargaining agreements, memoranda of understanding, or other agreements between such employers and their employees.

Upon approval of the New Hampshire Department of Education's Race to the Top application/grant, the LEA/school agrees to work with the Department to develop a more specific memorandum of understanding that includes a specific transformation plan for the school.

_____	_____	_____
SAU #	**LEA Superintendent Signature**	**Date**
	_____	_____
	President of the LEA School Board	**Date**
	_____	_____
	President of the LEA Teacher Union	**Date**
	_____	_____
	President of the LEA Administrative Union (optional)	**Date**

Appendix A-3: First Tier of Engagement – Persistently Lowest-Achieving LEA's and Schools in New Hampshire

LEA	School	Grades	Type of Community
Milton School District	Nute High School Milton Elementary School	9-12 K-5	Rural
Farmington School District	Farmington High School Henry Wilson Memorial Middle School	9-12 4-8	Rural Rural
Pittsfield School District	Pittsfield High School	9-12	Rural
Franklin School District	Franklin High School	9-12	Rural
Epping School District	Epping High School	9-12	Rural
Hinsdale School District	Hinsdale Elementary School	K-6	Rural
Manchester School District	Gossler Park School	K-5	Urban
Nashua School District	Ledge Street School	K-5	Urban
Winchester School District	Winchester Elementary School	K-8	Rural
Somersworth School District	Somersworth Middle School	5-8	Urban

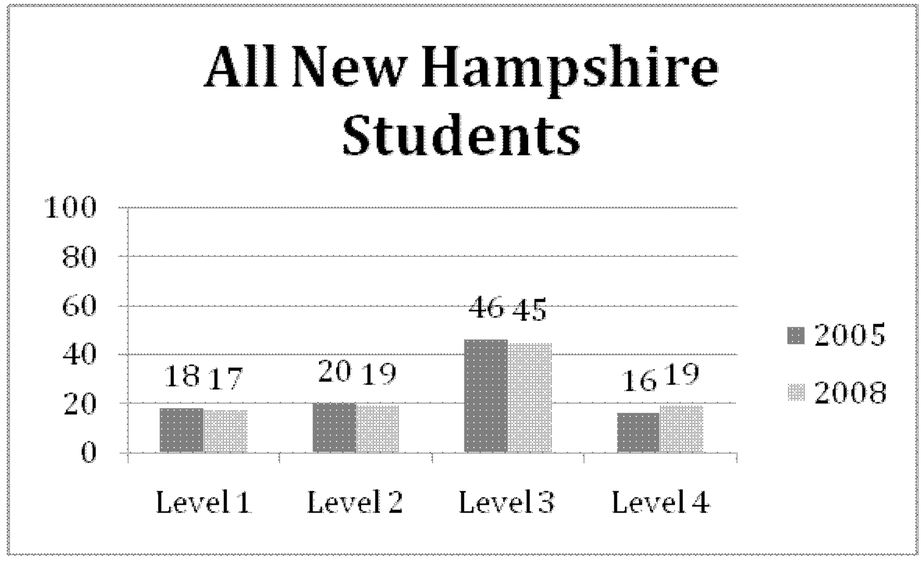
Appendix A-4: Second Tier of Engagement – LEA's and Consortia Supporting State's Reform Plan

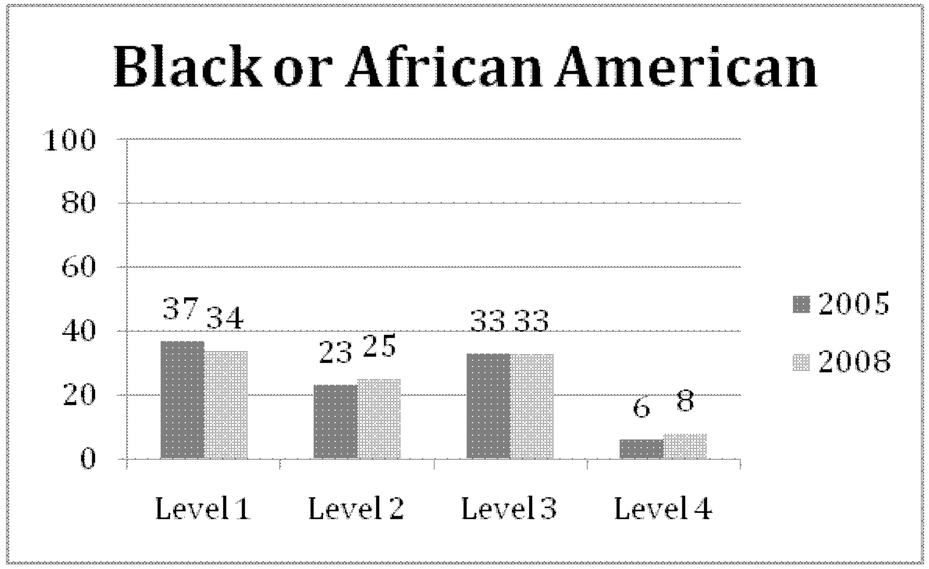
LEA/Organization	Focus of Proposed Work	Grade Levels	Community Type or Scope
High School Transformation Network			
External provider with consortia of districts	Develop multiple assessment measures for extended learning opportunities with consortia of districts	9-12	Statewide
Littleton School District and North Country Charter School	Develop a non-traditional, evening school that uses competency-based assessments	9-12	
Mascenic Regional School District	Support high school transformation	9-12	
Portsmouth School District	Implement a dropout prevention program in a CTE school	9-12	Urban
High School Transformation Network: Franklin, Granite State College, Hopkinton, Hudson, Jaffrey-Rindge; Kearsarge, Littleton, Mascenic Regional School District, Merrimack Valley, Oyster River, Portsmouth, and SAU #41	Pilot elements of high school transformation plans; assess impact of elements on student achievement; implement elements that work	9-12	Statewide
Board Exam/Move On When Ready Network			
Bedford School District and Windham School District	Partnership to improve and enhance quality of program in respective high school: International Baccalaureate and Technology Integration	9-12	
Governor Wentworth Regional District	Develop a model for aligning curriculum with Common Core that can be adopted statewide, use Performance Plus tools to aid instructional decision making, and adopt International Baccalaureate Program	K-12	
Kearsarge Regional School District, lead, with four other districts (Franklin, Sunapee, Claremont, and Newport)	Establish a regional CTE charter school that uses a teacher evaluation system based on student performance and adopt Board Exam/Move On When Ready System as well as offer multiple, personalized pathways to graduation	9-12	
Merrimack Valley and CSI Charter School	Adopt International Baccalaureate Program in grades K-10 and optional in grades 11-12; enhance STEM program in high school	K-12	
Board Exam/Move On When Ready Network: Claremont, Franklin, Governor Wentworth, Hudson, Kearsarge, Newport, Portsmouth, Raymond, and SAU # 41	Pilot and assess effectiveness, based on student achievement, of Board Exam System/Move On When Ready to raise student achievement levels across all subgroups	5-12	Statewide

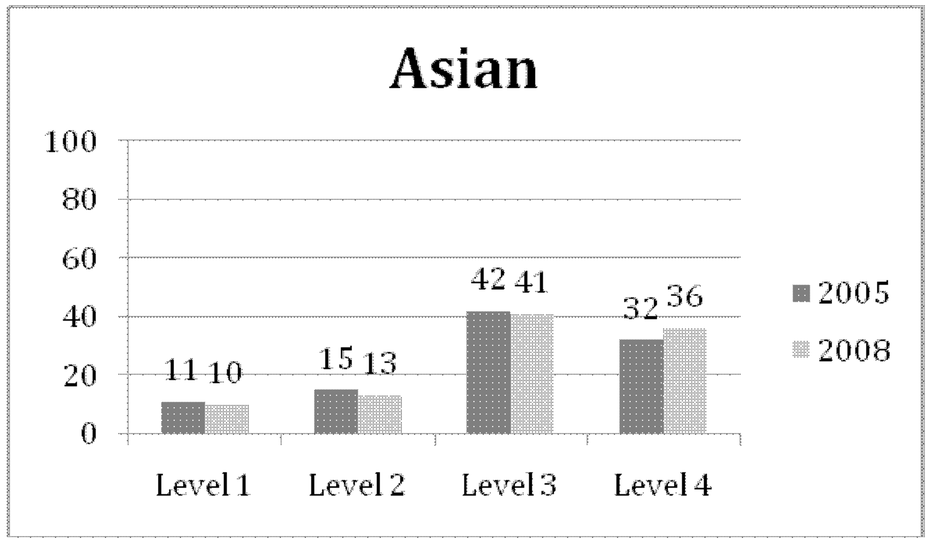
Teacher Effectiveness Network			
Concord School District	Refine induction, mentoring, and evaluation of teachers as model for statewide adoption	K-12	Urban
Pembroke School District, lead, with 13 school districts	Expand implementation of a student and teacher electronic portfolio project	K-12	
Souhegan, Mont Vernon, and Amherst School Districts	Focus on student growth in all subject areas, using literacy as founding practice, through Career Growth Process— inquiry-based action research	K-12	
Winnisquam School District	Implementation of coaching model, based on data, for classroom instruction and leadership	K-12	
Lincoln-Woodstock	Co-design and implement Teacher Improvement Centers for struggling teachers in Department's regional professional development centers statewide; focus on job-embedded professional learning	K-12	Statewide
Induction/Mentoring Network: Concord, Granite State College, Hudson, Lincoln-Woodstock, Merrimack Valley, Oyster River, SAU#41, and Winnisquam	Explore and pilot induction/mentoring models; collaborate with Research Group to assess effectiveness of models	K-12	Statewide
External provider	Refine a three-year induction and mentoring program, based on student outcome data, with initial focus on lowest-achieving schools; scale up to statewide program	K-12	Statewide
Leadership Consortium			
New Hampshire Association of School Principals	Expand and refine newly inaugurated principal mentoring program	K-12	Statewide
Leadership Network: Alton, Granite State College; Hollis, Hudson, Merrimack Valley, Nashua, NHASP, NH NSDC, Raymond, Tamworth, and Winnisquam	Pilot leadership models; collaborate with Research Group to assess effectiveness of models	K-12	Statewide
External provider	Pilot 18-month leadership academy in persistently lowest-performing schools; conduct a train-the-trainers process; certify trainers	K-12	Statewide
Standards and Assessment			
Hollis, Brookline, and Brookline Cooperative School District	Implement a data management system that provides timely information on student achievement, develop curriculum maps aligned to standards, create a system of formative and summative assessments, and use data to inform instructional decisions.	K-12	
New Hampshire Public Charter Schools Association	Develop performance-based assessments		
Pembroke, lead, with 8 districts	Develop a technical environment that	Middle	

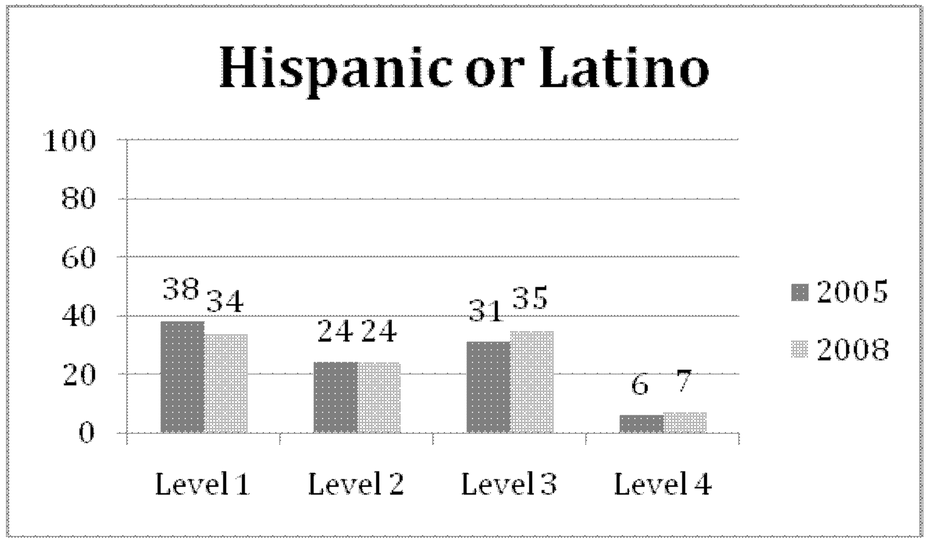
	helps to organize teaching and learning material to tailor individual learning plans for students	school	
Raymond School District	Develop an evaluation system for teachers to make decisions regarding tenure, certification, professional development, and removal	K-12	
STEM			
Merrimack Valley	Implement K-12 engineering pathway (pre-engineering Gateway Program in elementary/middle schools and Project Lead the Way in high school)	K-12	
Granite State College	Implement STEM preparation programs	K-12	
Laconia/Plymouth State College	Focus on increasing skills of STEM teachers in North Country	K-12	
Marlborough/Keene State College	Demonstrate enhanced student learning and teacher quality in science, technology, engineering, mathematics and world language disciplines	K-6	
Rochester, Milton, Barrington	Increase content and pedagogical skills of K-12 teachers in math; collaboration with NH Impact Center	K-12	
University of New Hampshire	Prepare teachers with rigorous STEM content and pedagogy	K-12	

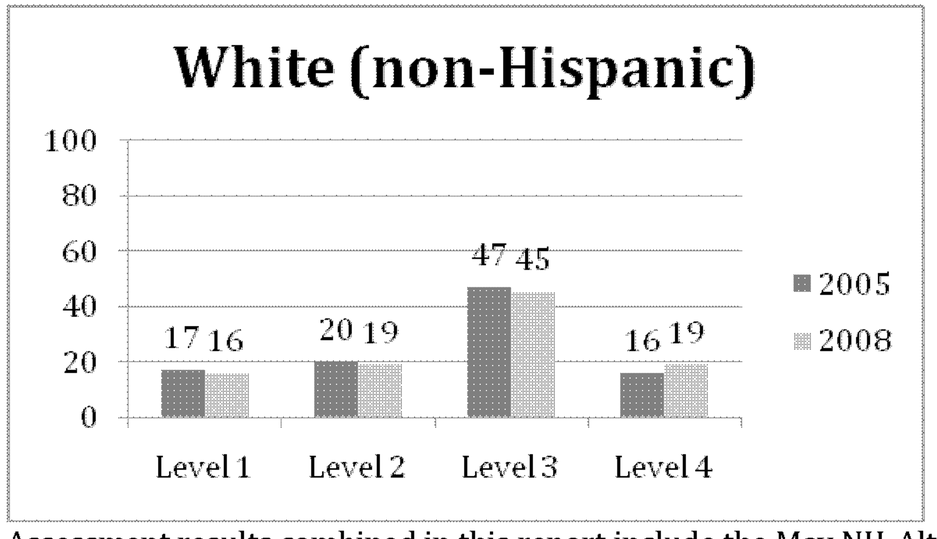
New Hampshire Statewide Assessment Results
2005 to 2008 Disaggregated Mathematics Results by Race and Ethnicity
Level 4 = Proficient with Distinction; 3 = Proficient; 2 = Partially Proficient; 1 = Substantially Below Proficient





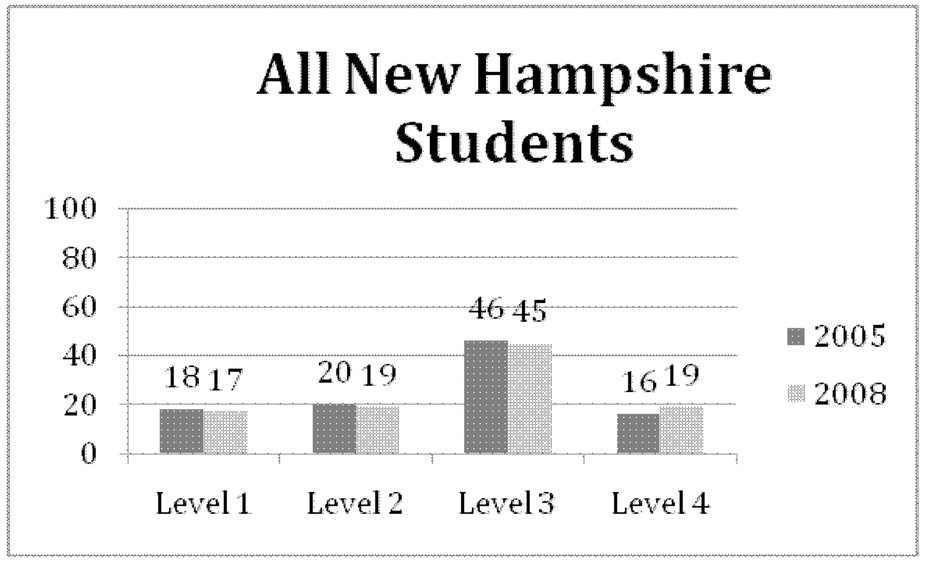


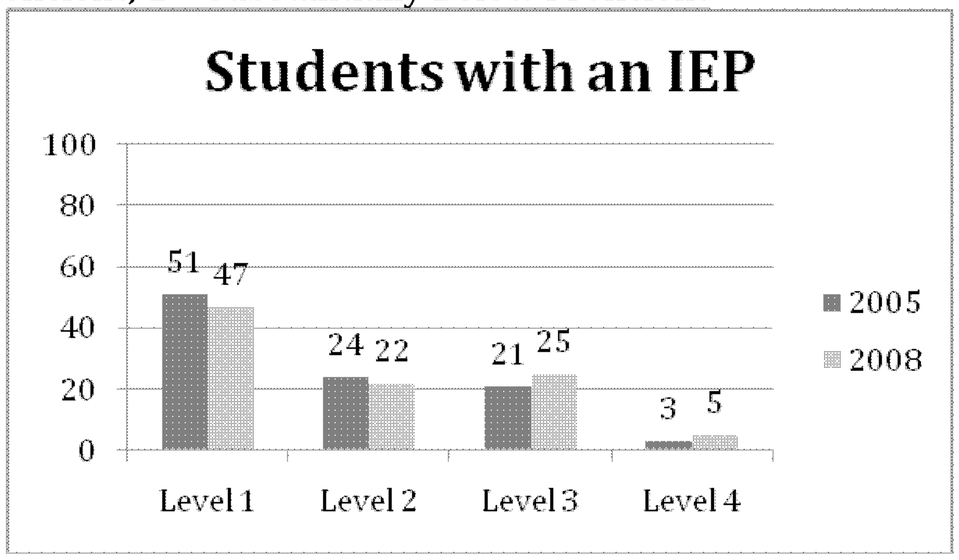


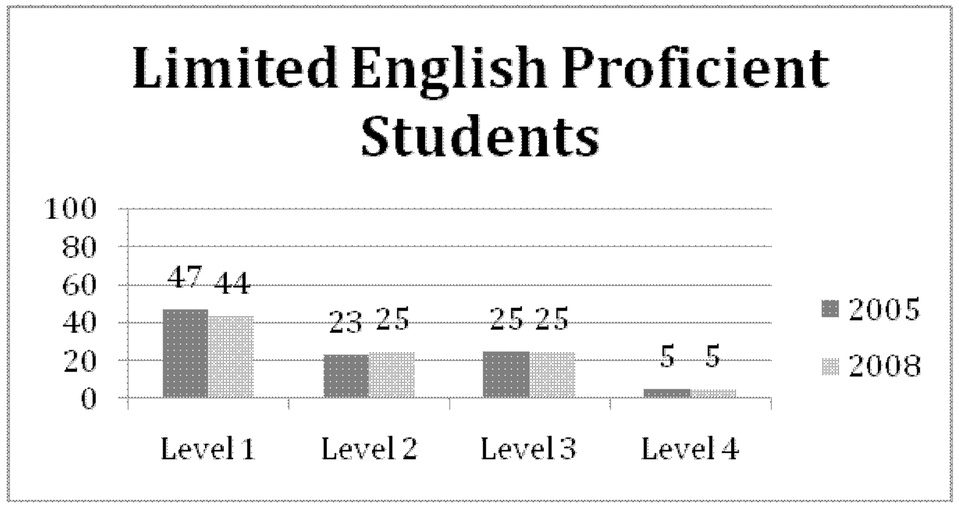


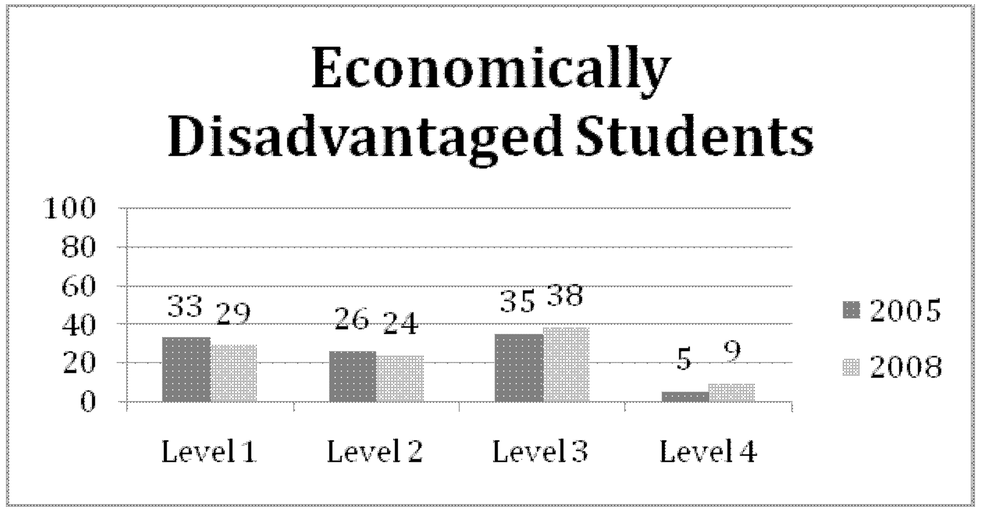
Assessment results combined in this report include the May NH-Alternate portfolio submission (grades 2-7) and NECAP (beginning-of-grades 3-8). Beginning in 2007, results combined in report include the May NH-Alternate portfolio submission (grades 2-7 and 10) and NECAP (beginning-of-grades 3-8 and 11). Schools and districts were expected to administer either the NECAP or NH-Alternate Assessment to every enrolled student with the following expectations; students who were first year LEP students (Reading and Writing only), students who withdrew from the school after testing began, students who enrolled in the school after testing began, and students for whom a special consideration due to medical emergency was granted by the Department of Education.

New Hampshire Statewide Assessment Results
2005 to 2008 Disaggregated Mathematics Results by Special Populations
Level 4 = Proficient with Distinction; 3 = Proficient; 2 = Partially Proficient; 1 = Substantially Below Proficient

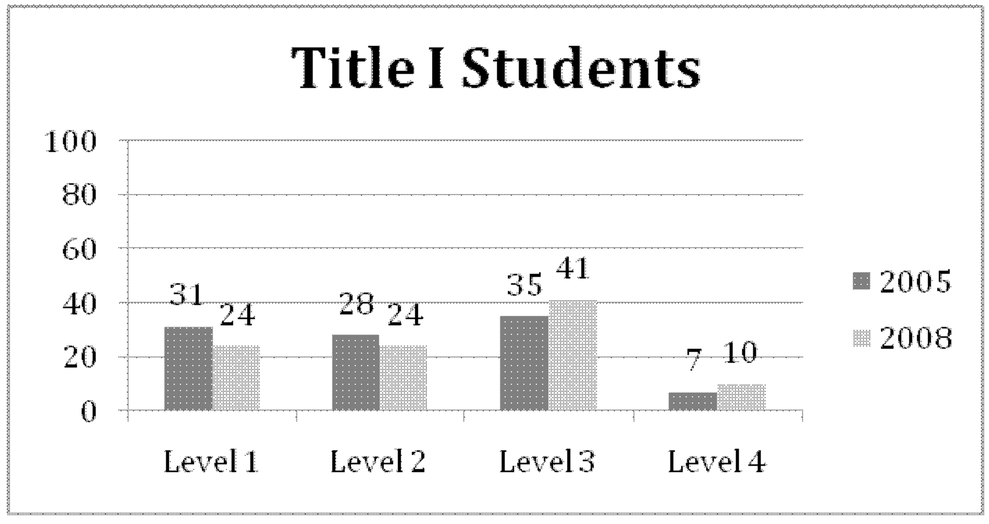






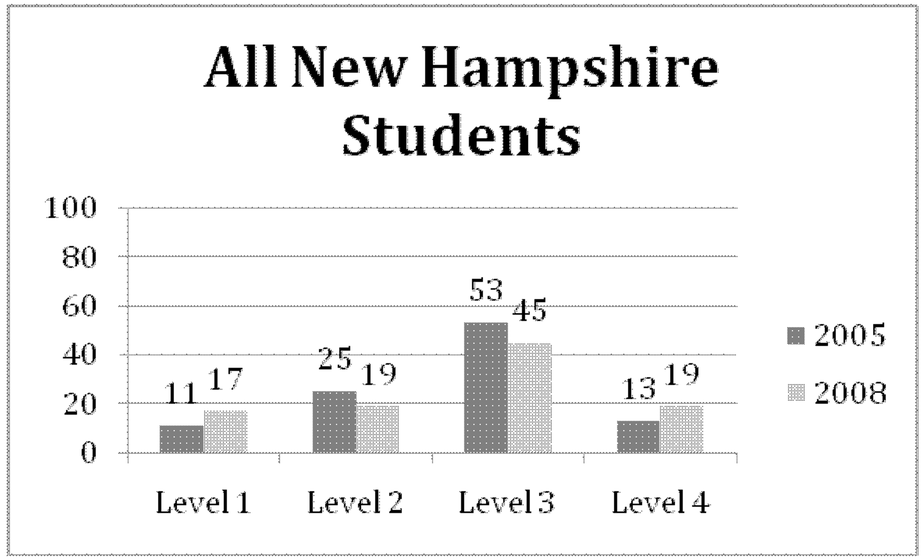


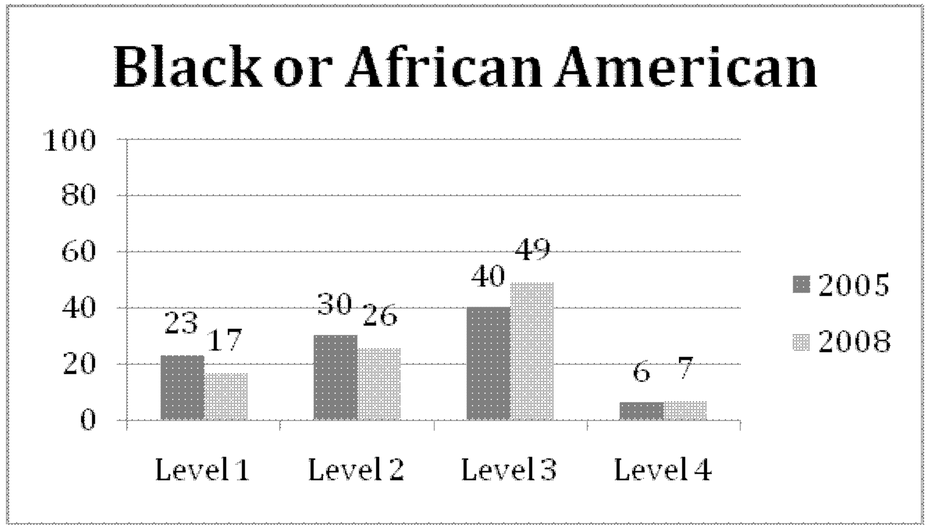
Appendix A-5

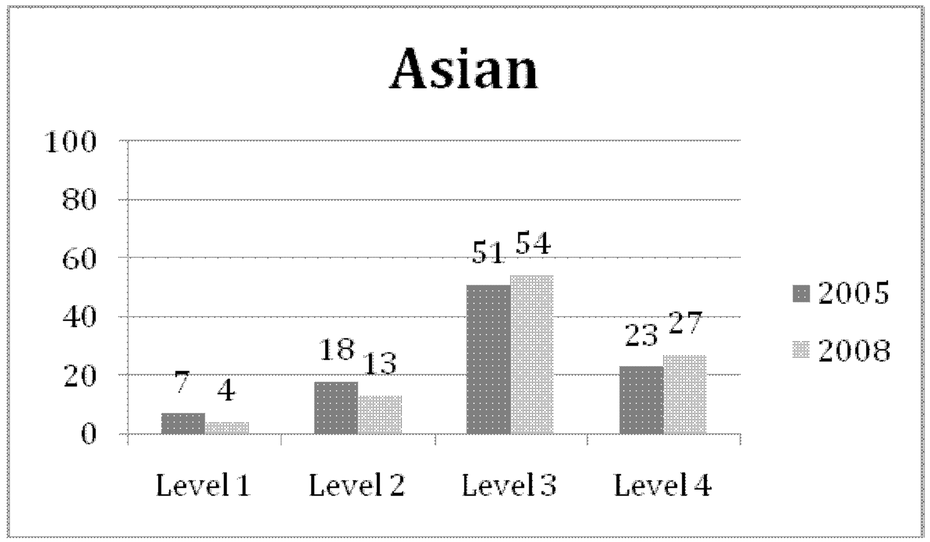


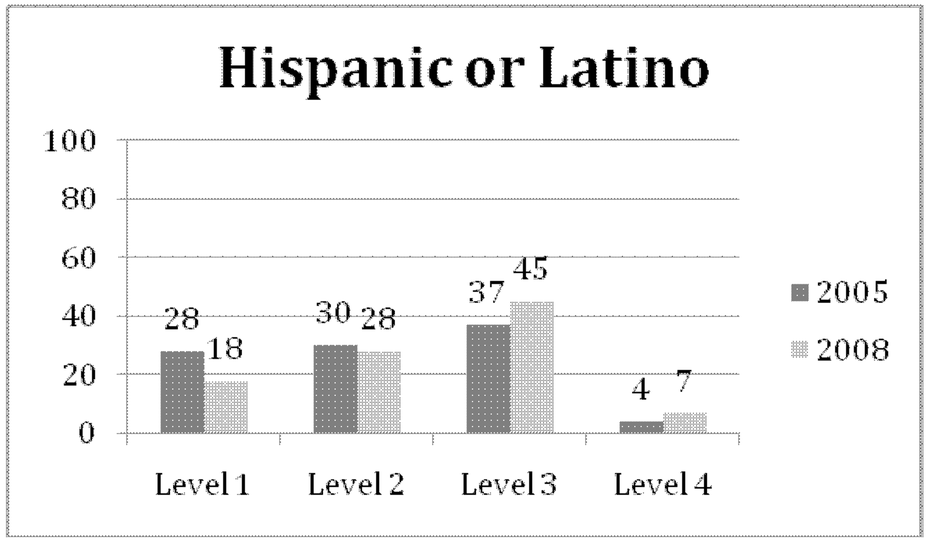
Assessment results combined in this report include the May NH-Alternate portfolio submission (grades 2-7) and NECAP (beginning-of-grades 3-8). Beginning in 2007, results combined in report include the May NH-Alternate portfolio submission (grades 2-7 and 10) and NECAP (beginning-of-grades 3-8 and 11). Schools and districts were expected to administer either the NECAP or NH-Alternate Assessment to every enrolled student with the following expectations; students who were first year LEP students (Reading and Writing only), students who withdrew from the school after testing began, students who enrolled in the school after testing began, and students for whom a special consideration due to medical emergency was granted by the Department of Education.

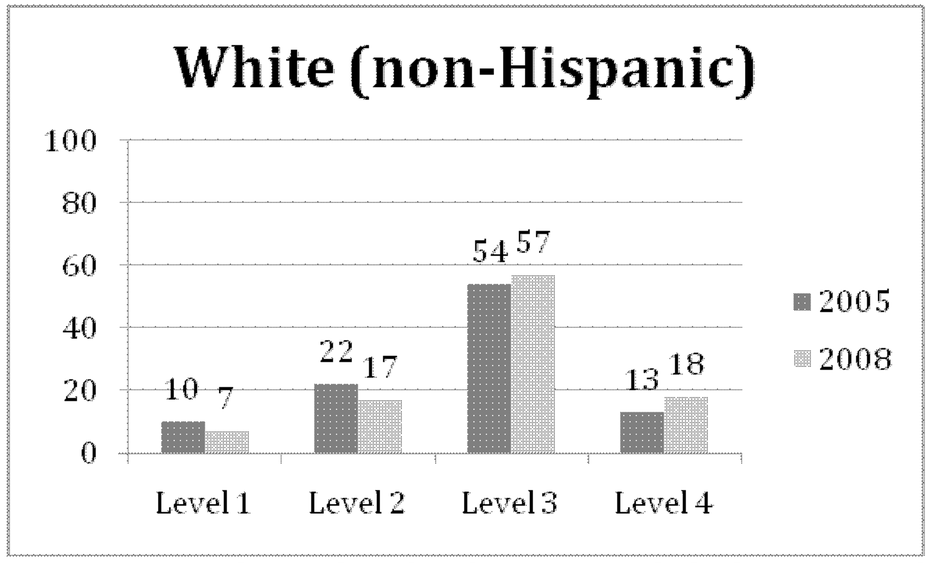
New Hampshire Statewide Assessment Results
2005 to 2008 Disaggregated Reading Results by Race and Ethnicity
Level 4 = Proficient with Distinction; 3 = Proficient; 2 = Partially Proficient; 1 = Substantially Below Proficient











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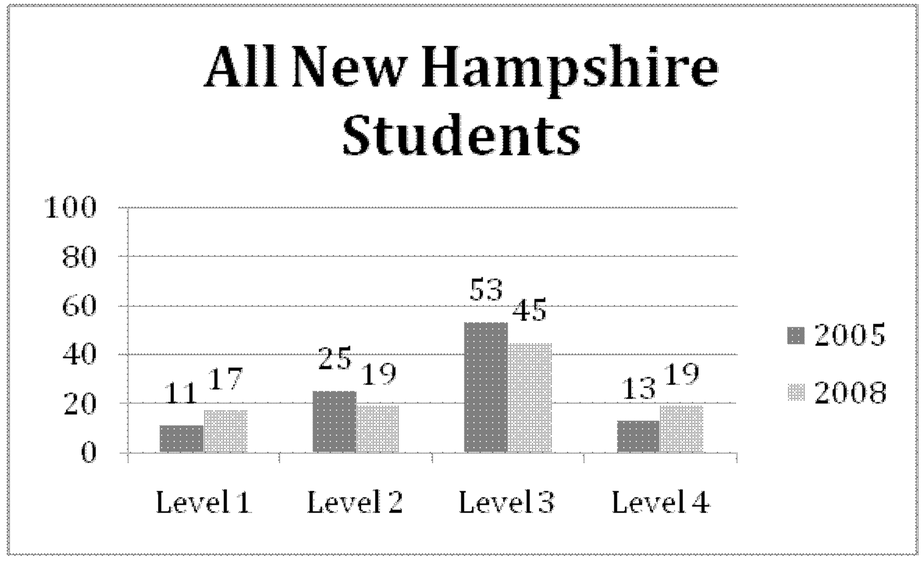
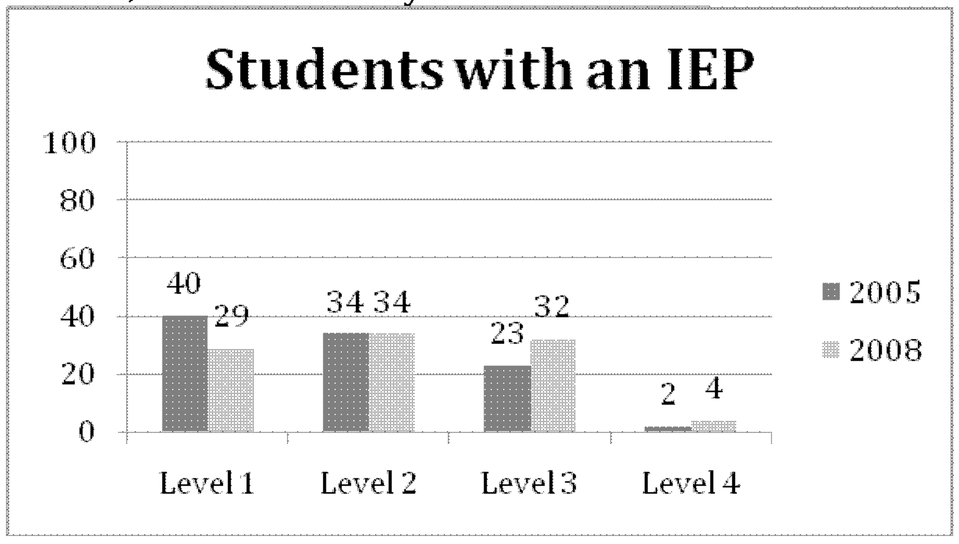
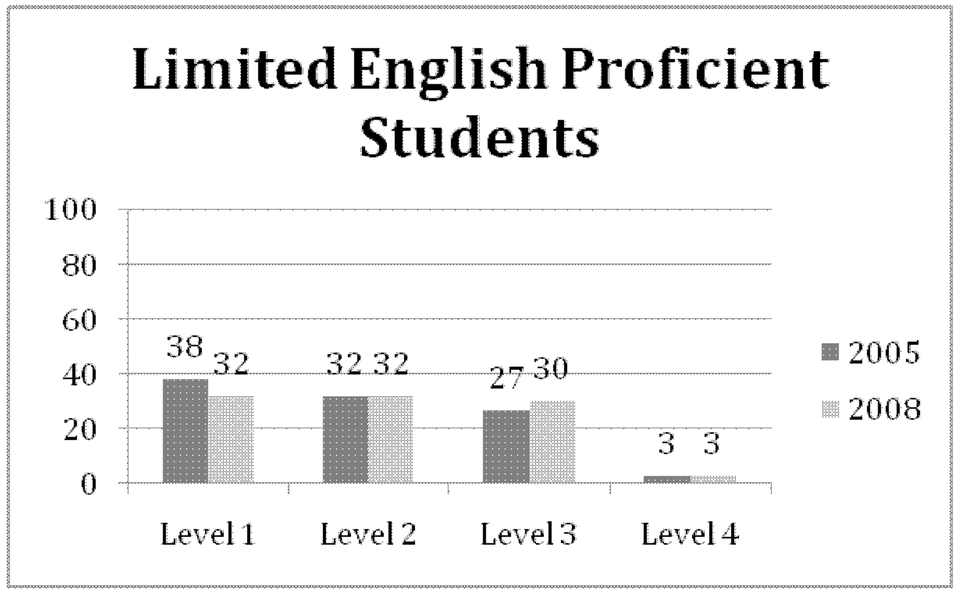
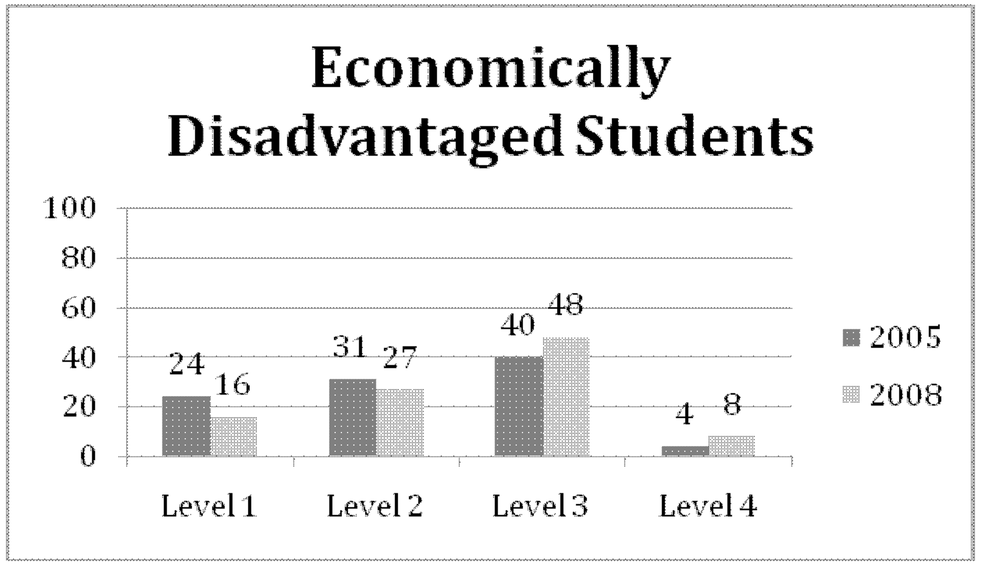
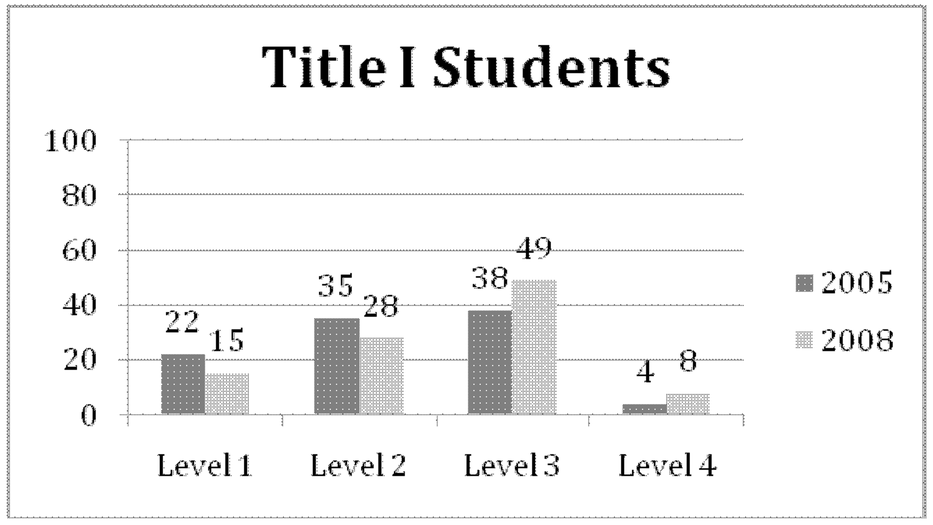
New Hampshire Statewide Assessment Results
2005 to 2008 Disaggregated Reading Results by Special Populations
Level 4 = Proficient with Distinction; 3 = Proficient; 2 = Partially Proficient; 1 = Substantially Below Proficient











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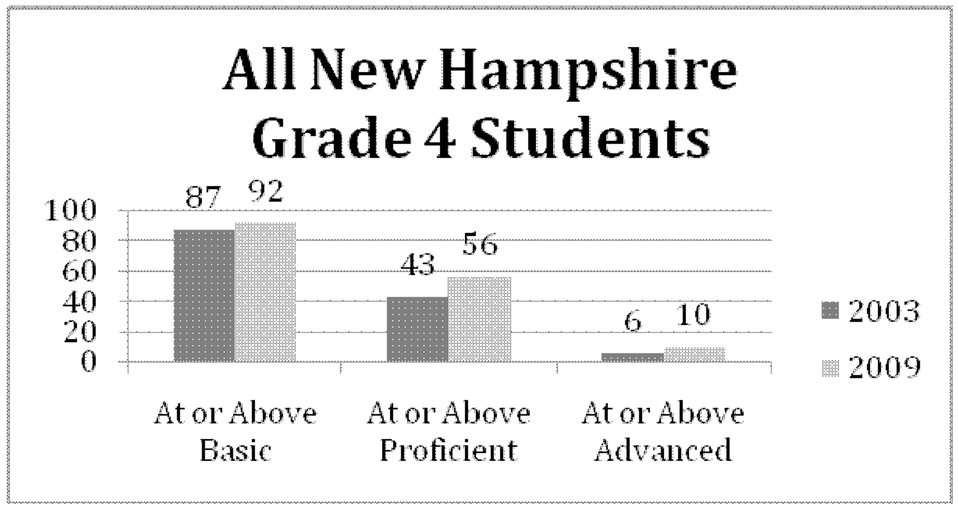
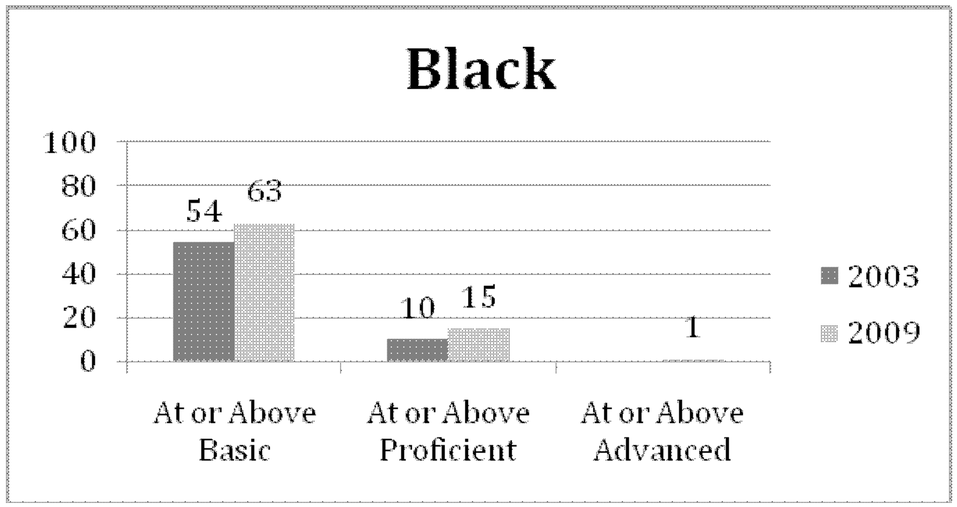
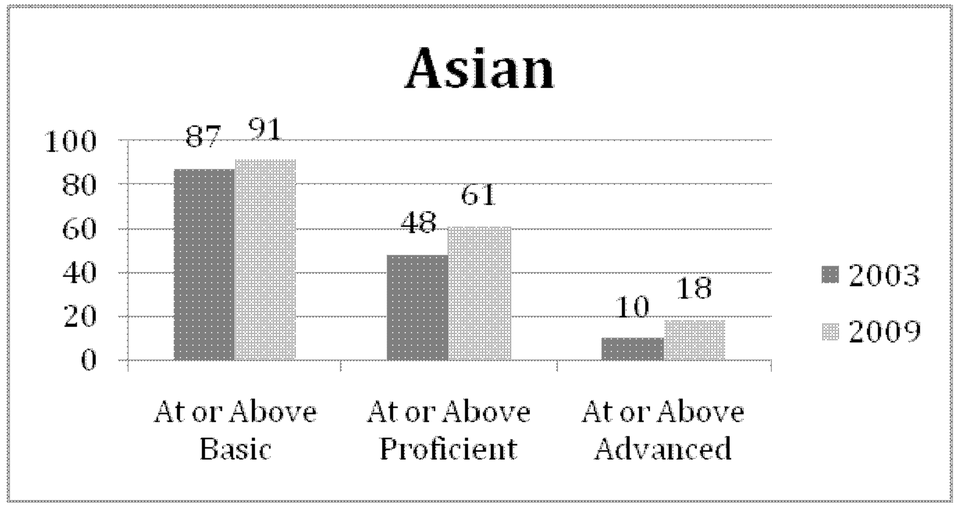
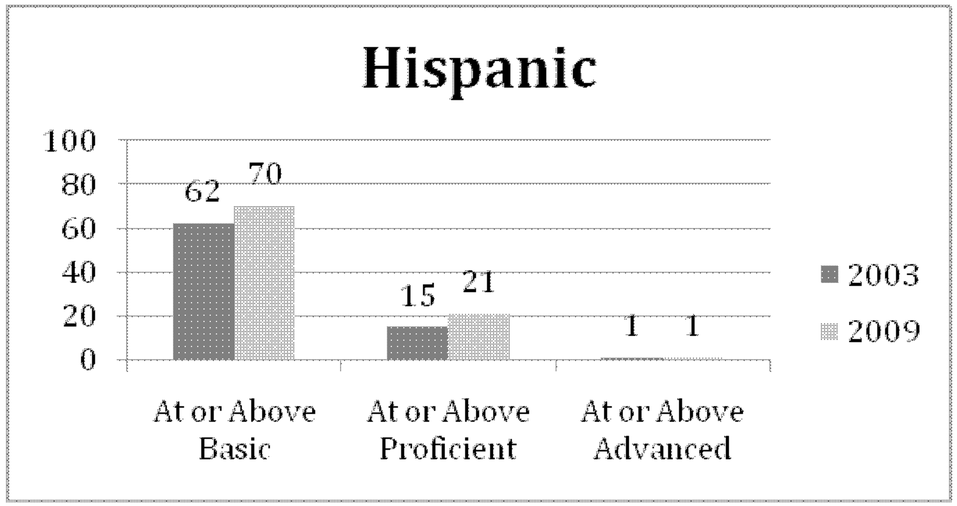
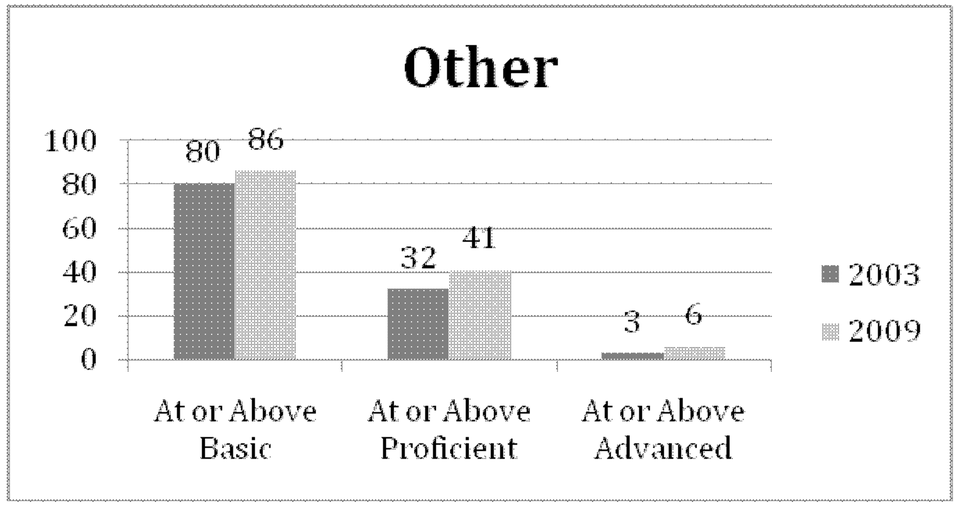
New Hampshire NAEP Results for Mathematics, Grade 4
By Race and Ethnicity from 2003-2009










Other
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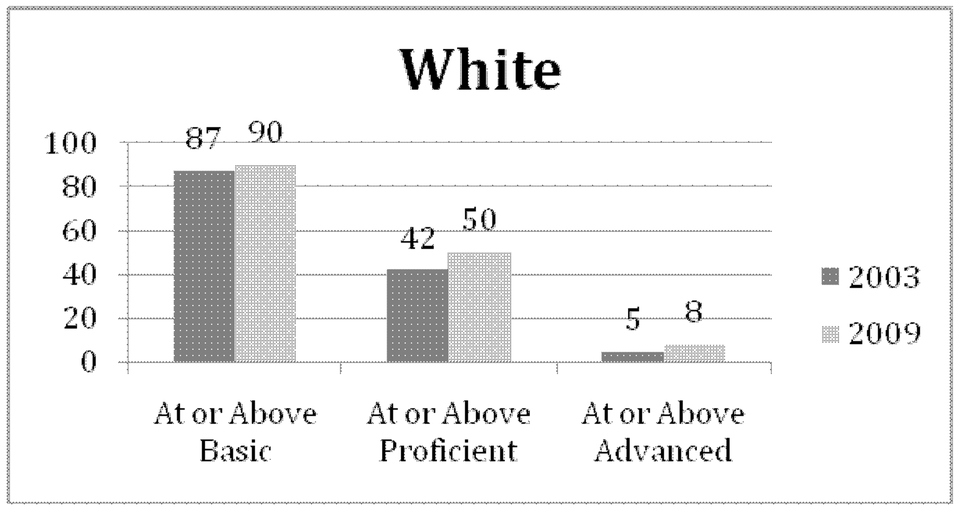
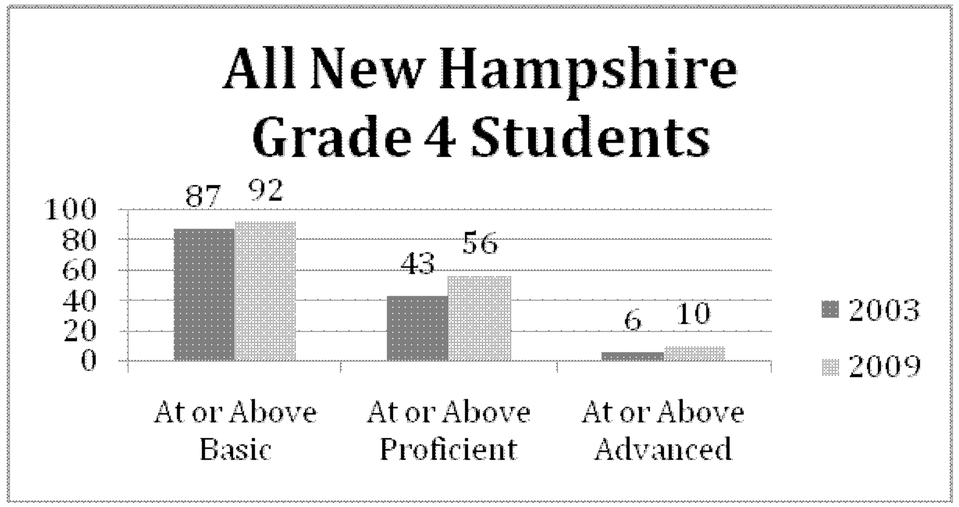
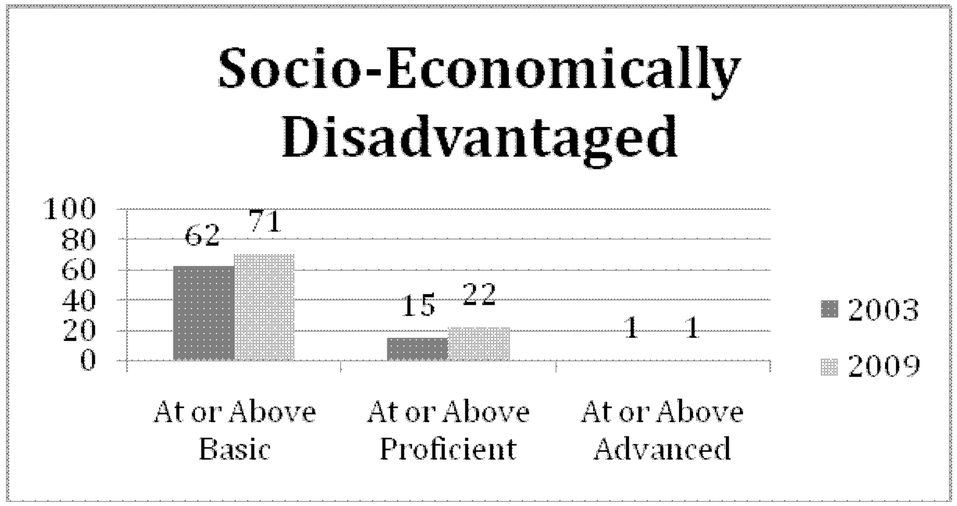
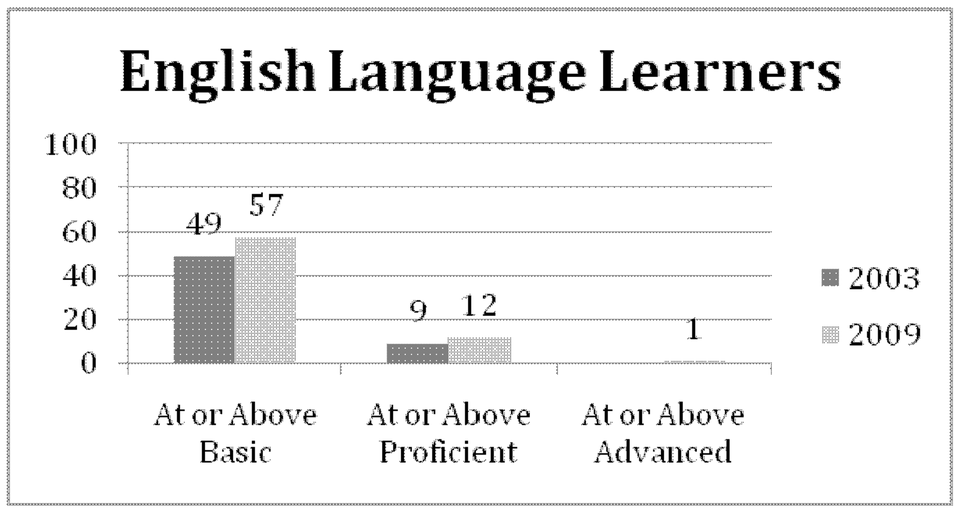
80
60
40
20
0
80
86
32
41
3
6
2003
2009
At or Above Basic
At or Above Proficient
At or Above Advanced

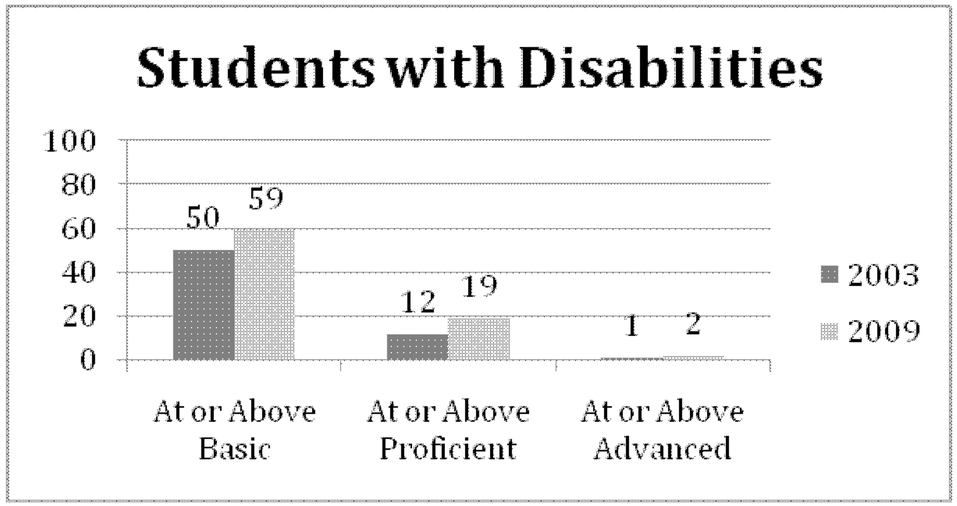

White
100
80
60
40
20
0
87
90
42
50
5
8
2003
2009
At or Above Basic
At or Above Proficient
At or Above Advanced

New Hampshire NAEP Results for Mathematics, Grade 4
By Special Populations from 2003-2009

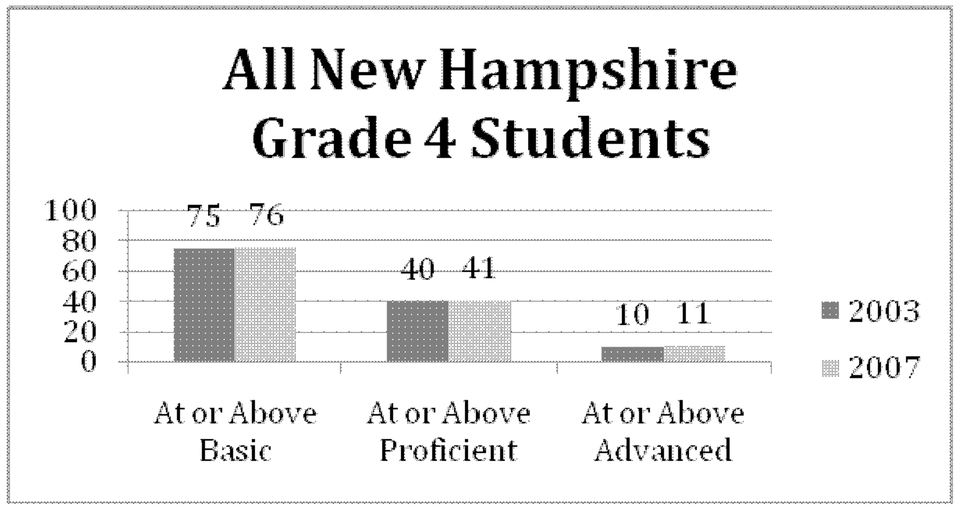


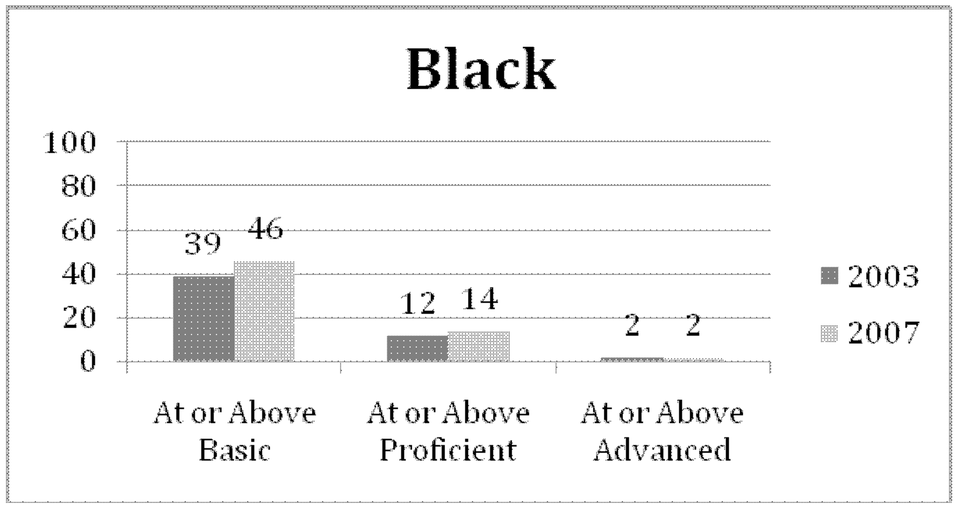


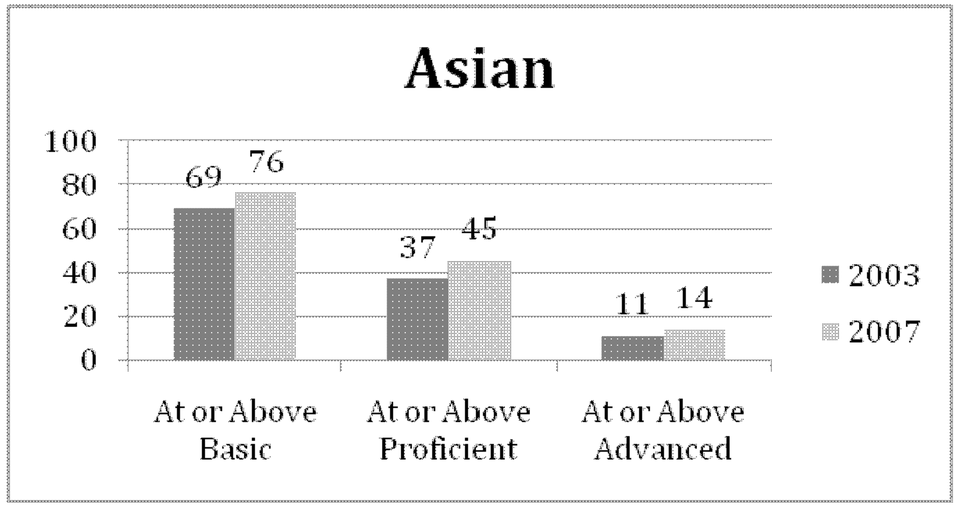


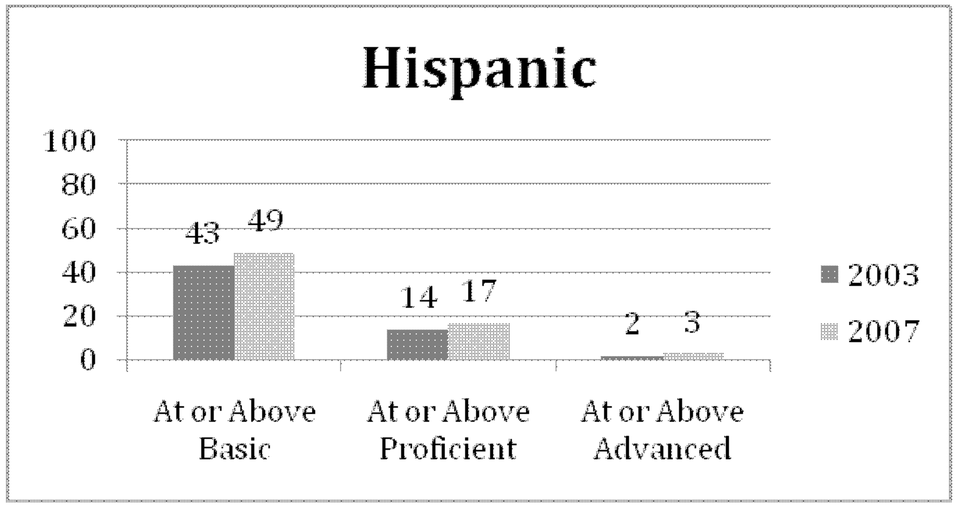


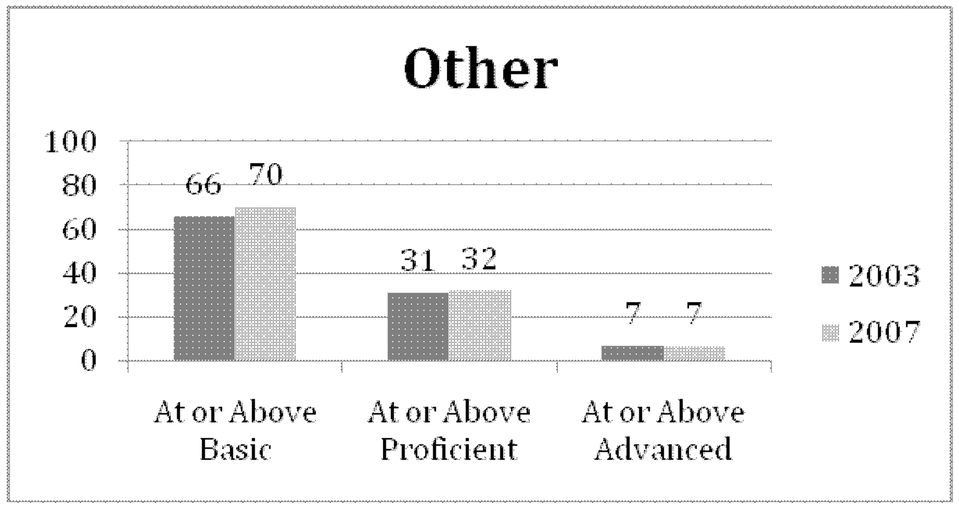
New Hampshire NAEP Results for Reading, Grade 4
By Race and Ethnicity from 2003-2009

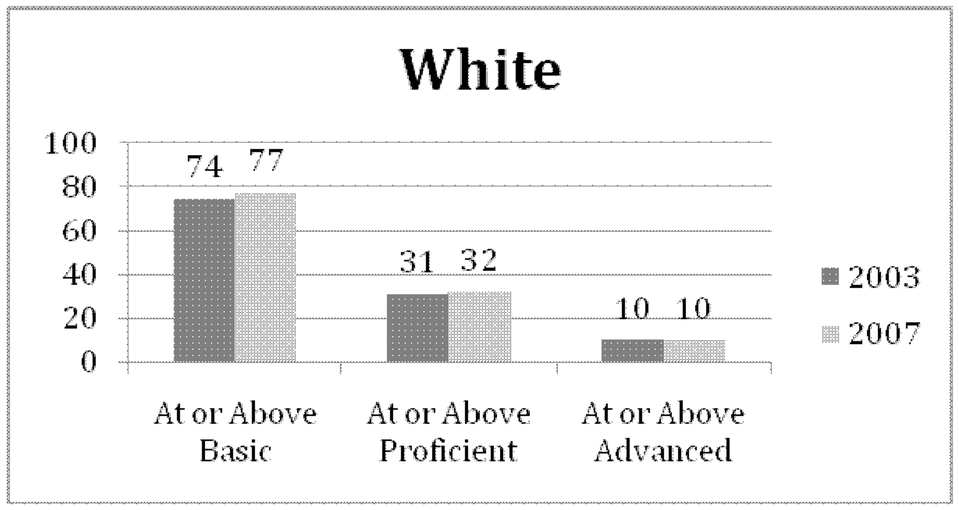




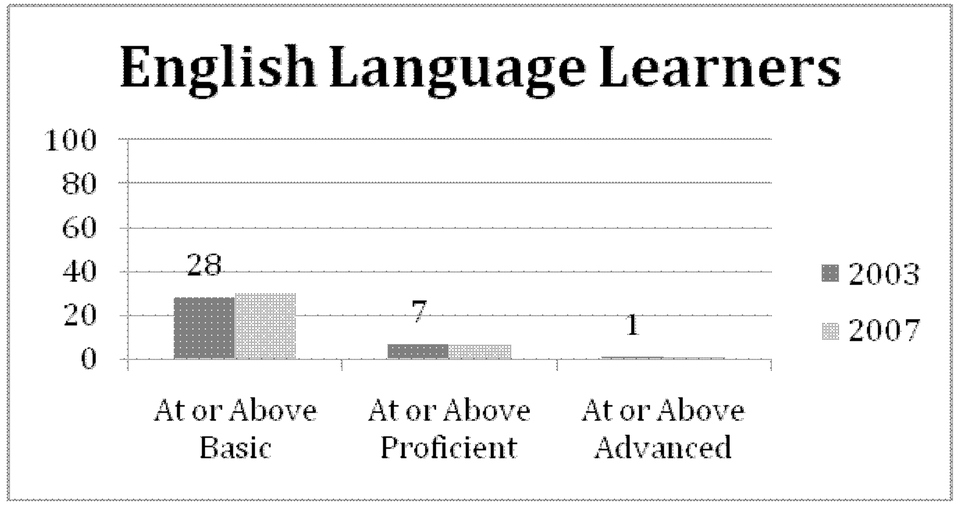


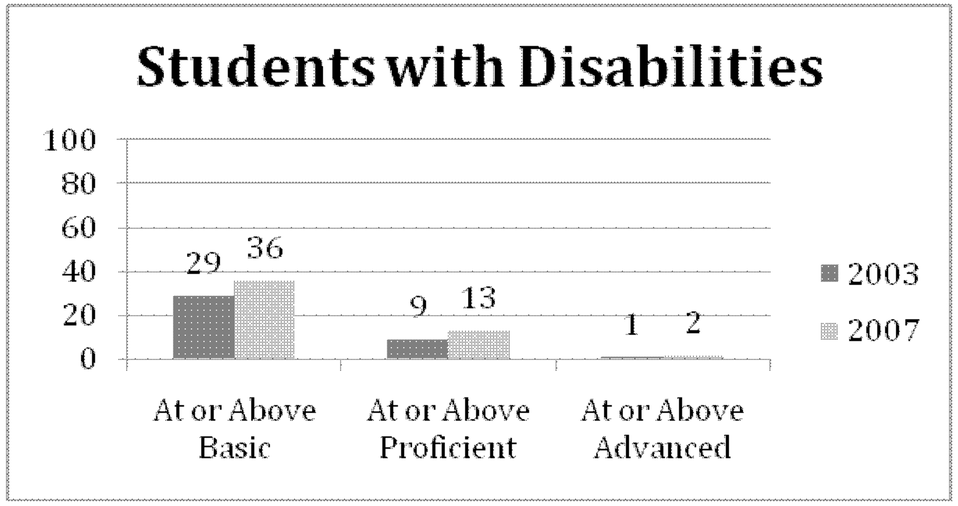


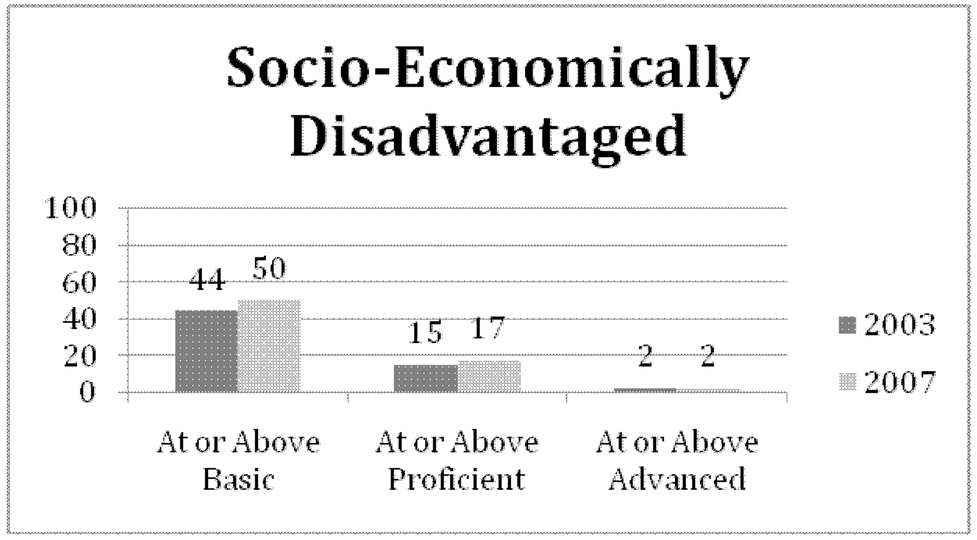

Other
100
80
60
40
20
0
66
70
31
32
7
7
2003
2007
At or Above Basic
At or Above Proficient
At or Above Advanced


White
100
80
60
40
20
0
74
77
31
32
10
10
2003
2007
At or Above Basic
At or Above Proficient
At or Above Advanced

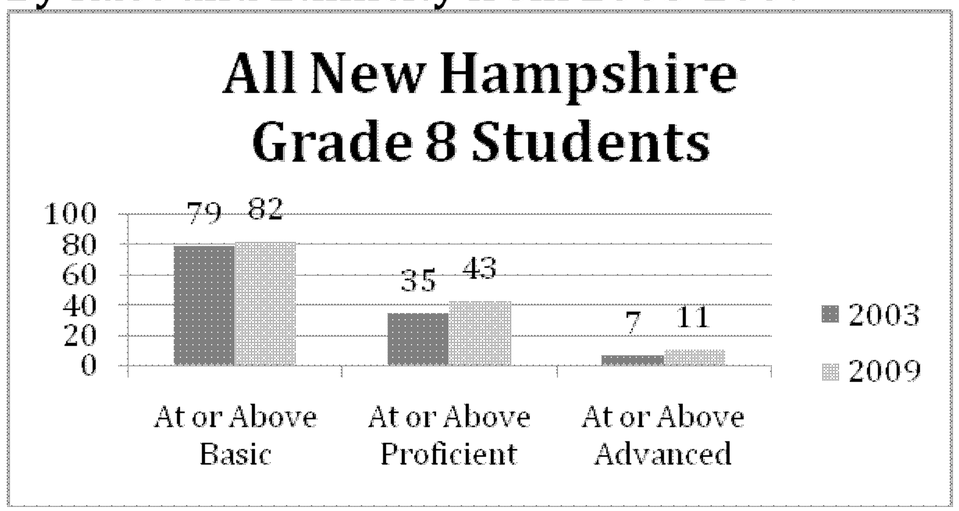
New Hampshire NAEP Results for Reading, Grade 4
By Special Populations from 2003-2009

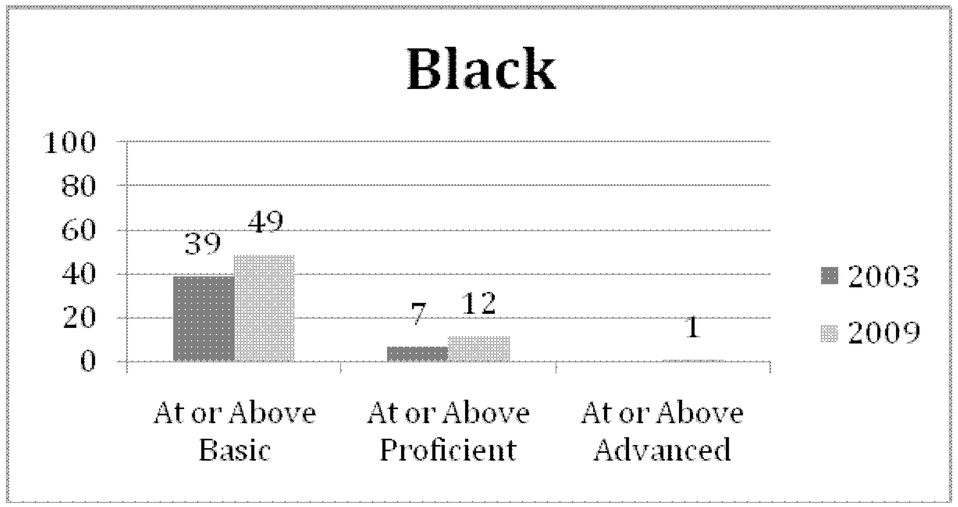


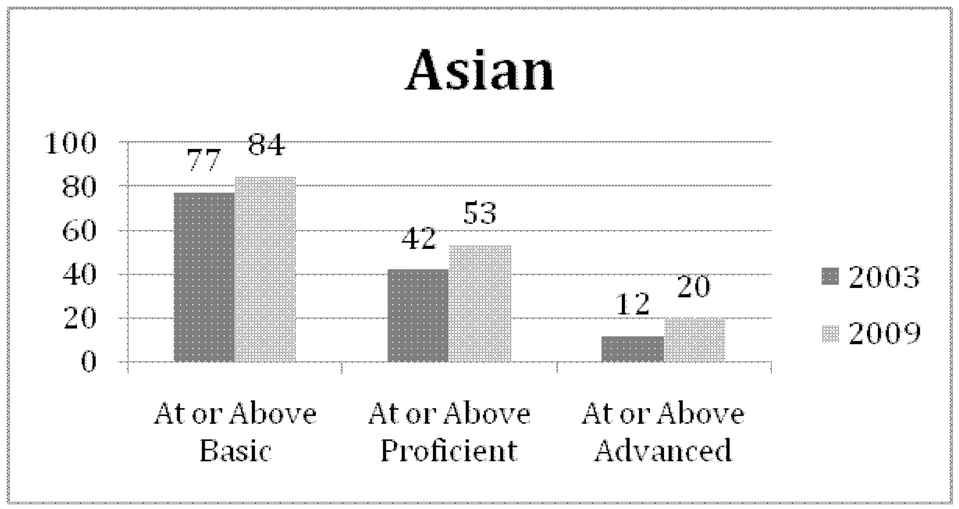


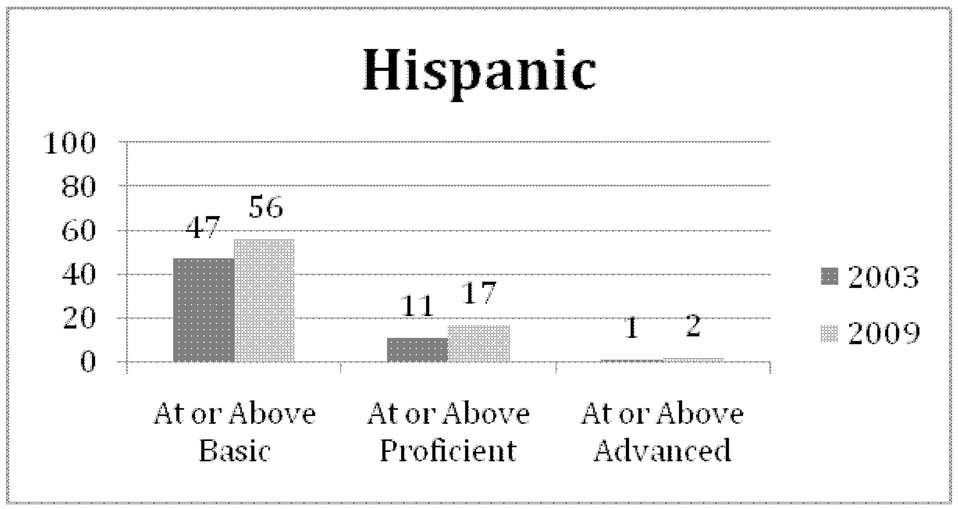


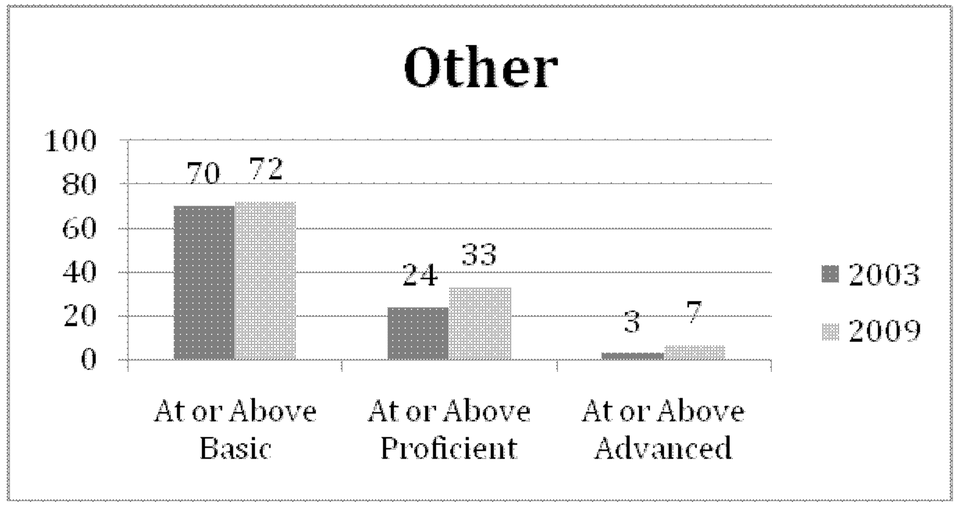
New Hampshire NAEP Results for Mathematics, Grade 8
By Race and Ethnicity from 2003-2009

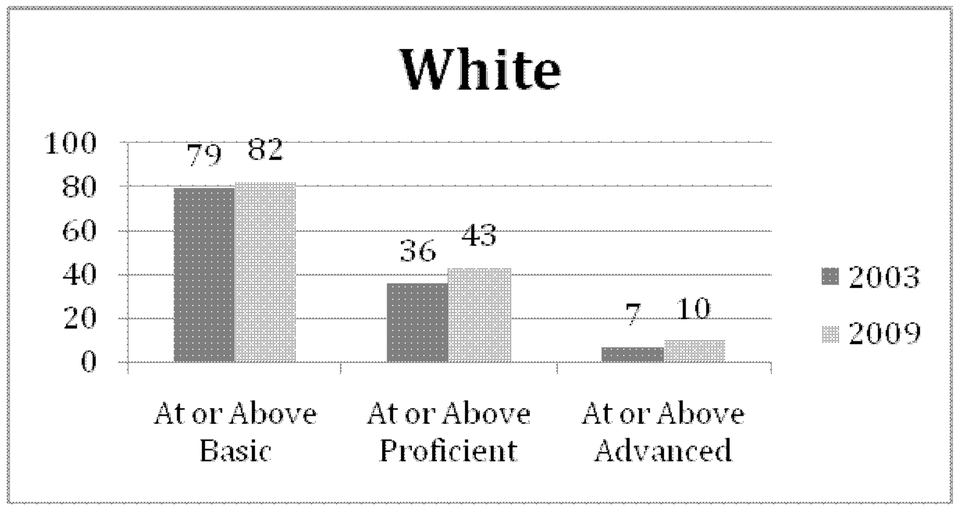




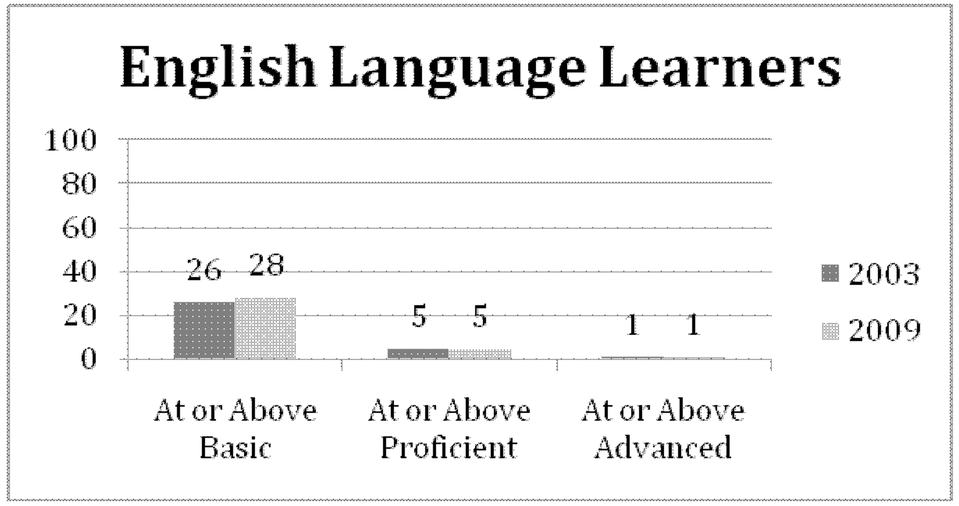


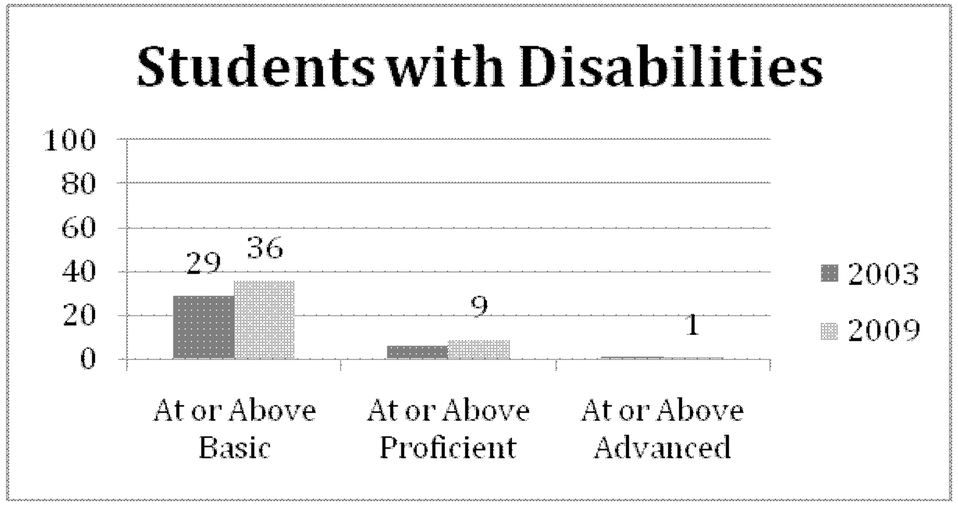


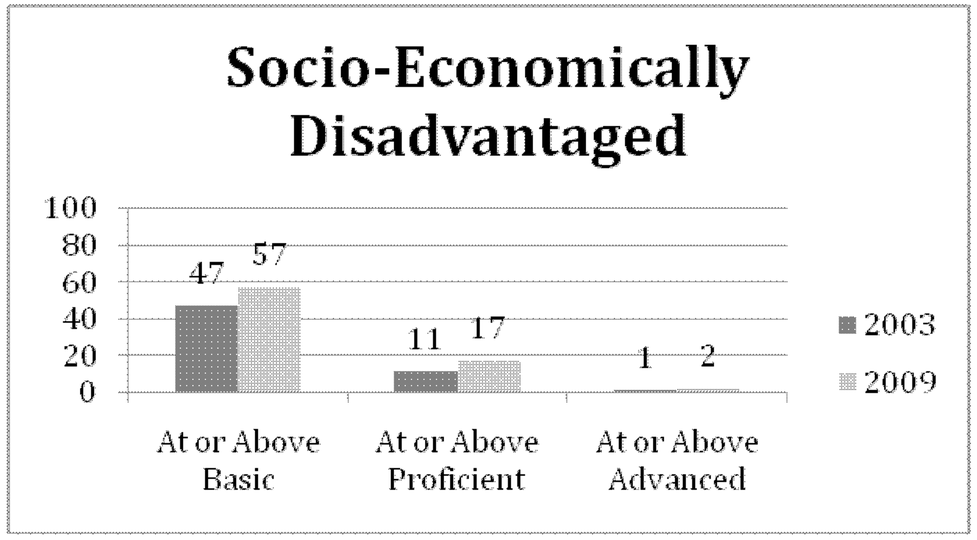

Other
100
80
60
40
20
0
70
72
24
33
3
7
2003
2009
At or Above Basic
At or Above Proficient
At or Above Advanced


White
100
80
60
40
20
0
79
82
36
43
7
10
2003
2009
At or Above Basic
At or Above Proficient
At or Above Advanced

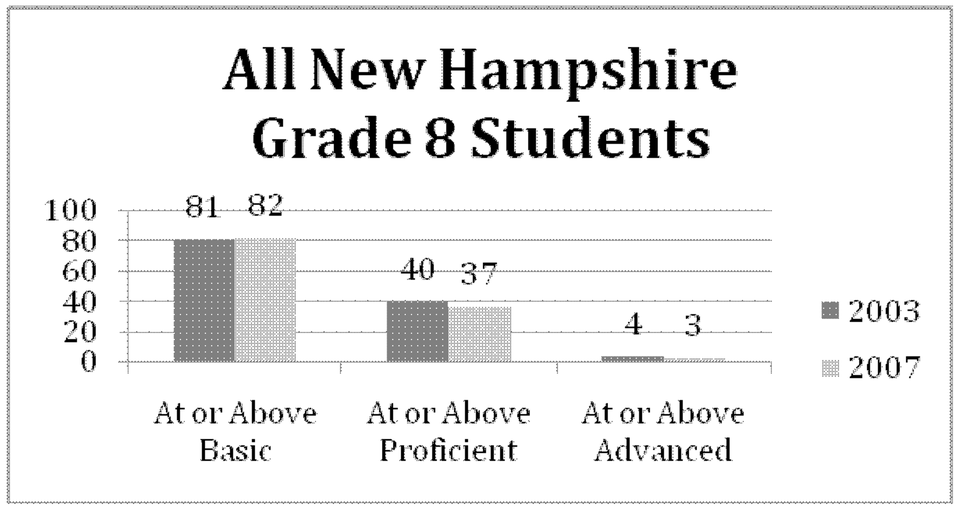
New Hampshire NAEP Results for Mathematics, Grade 8
By Special Populations from 2003-2009

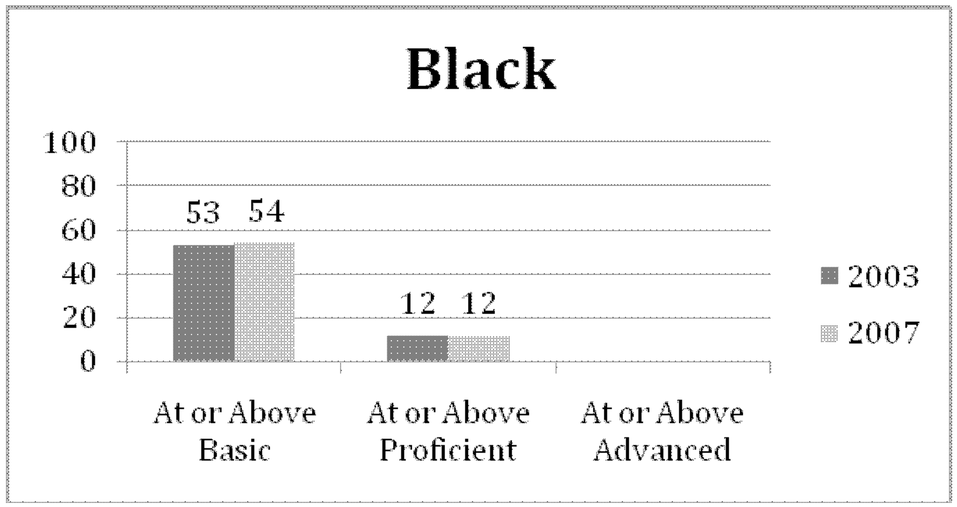


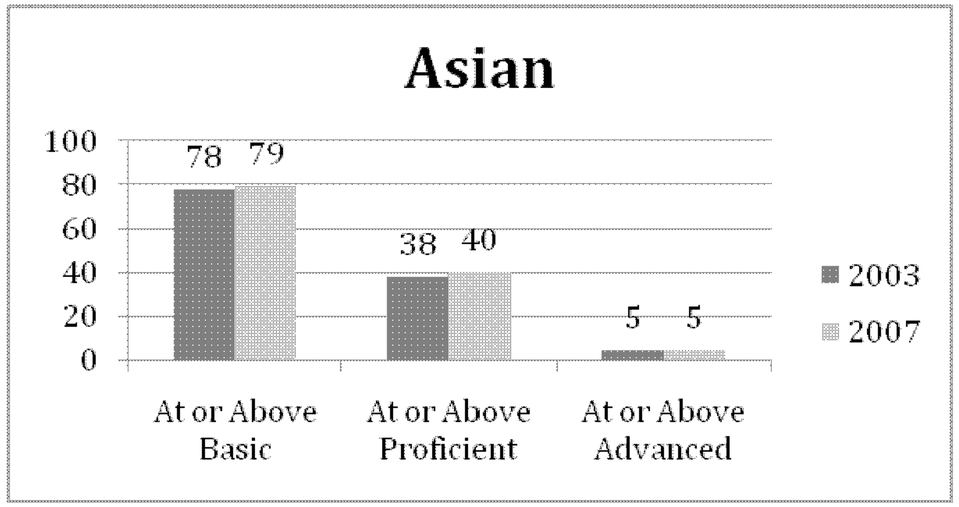


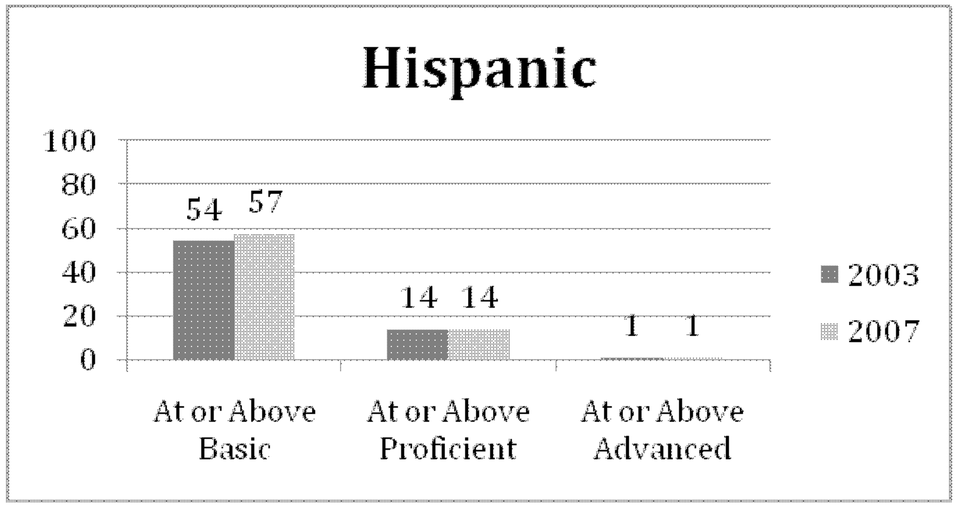


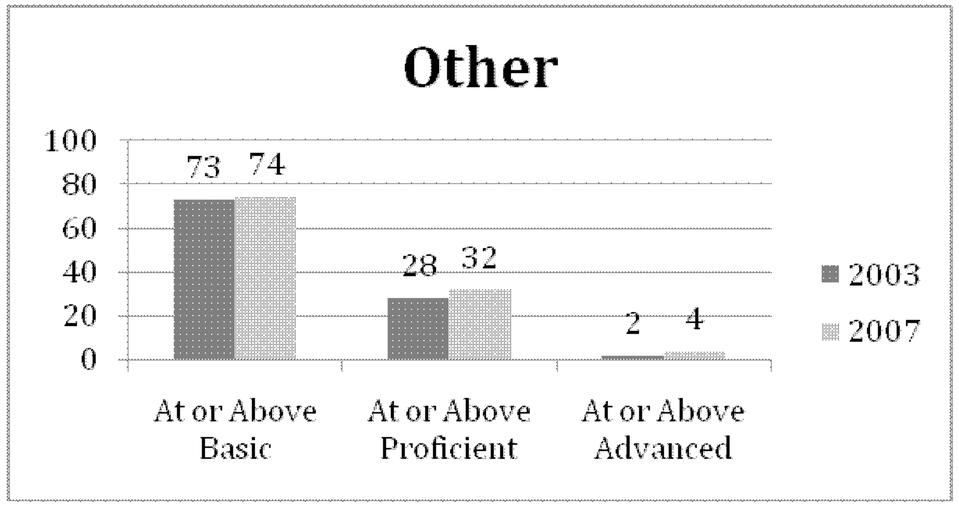
New Hampshire NAEP Results for Reading, Grade 8
By Race and Ethnicity from 2003-2009

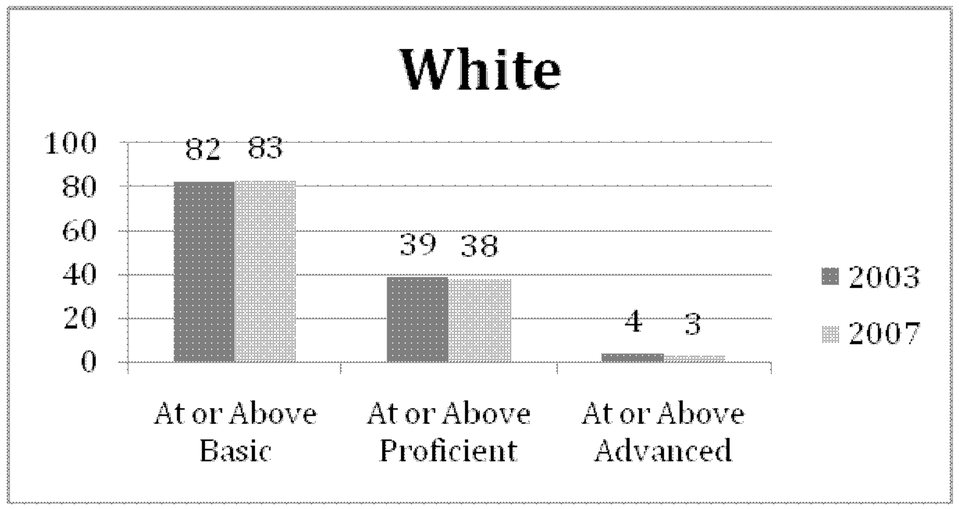




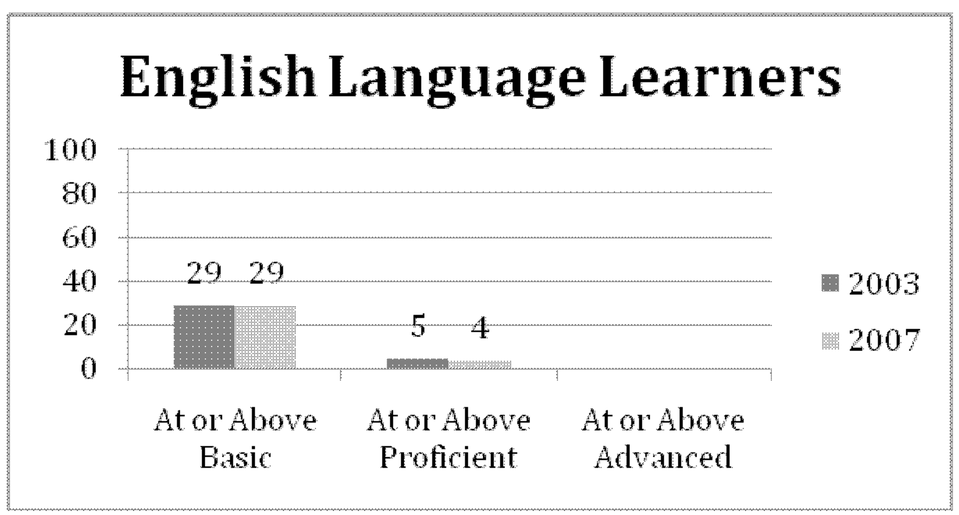


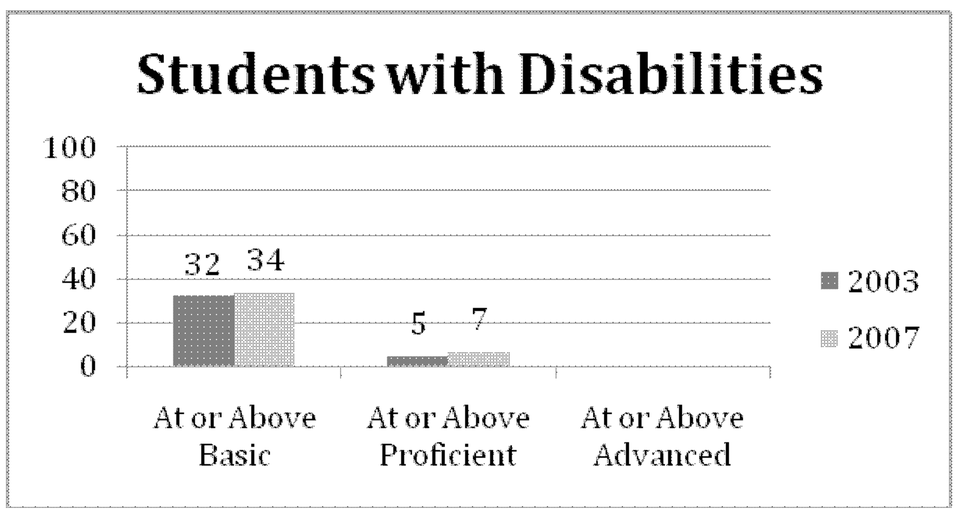


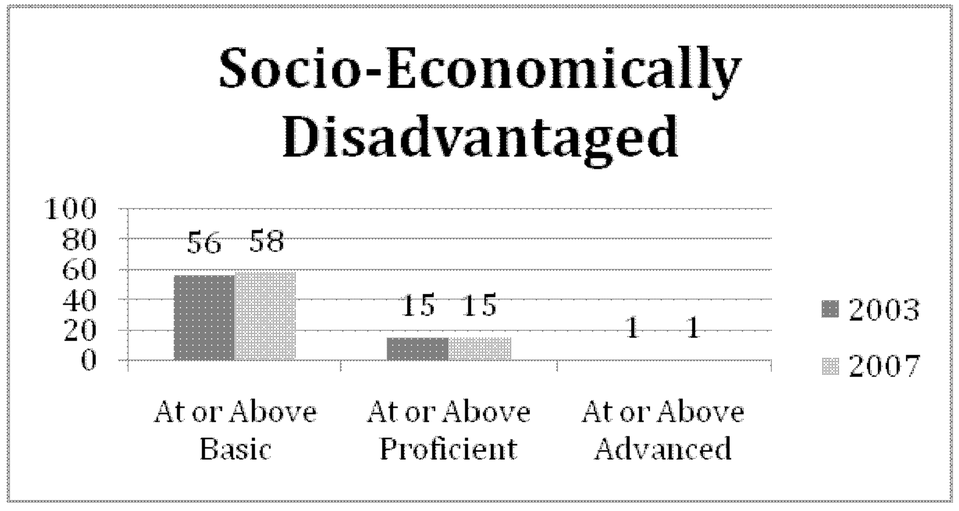

Other
100
80
60
40
20
0
73
74
28
32
2
4
2003
2007
At or Above Basic
At or Above Proficient
At or Above Advanced


White
100
80
60
40
20
0
82
83
39
38
4
3
2003
2007
At or Above Basic
At or Above Proficient
At or Above Advanced

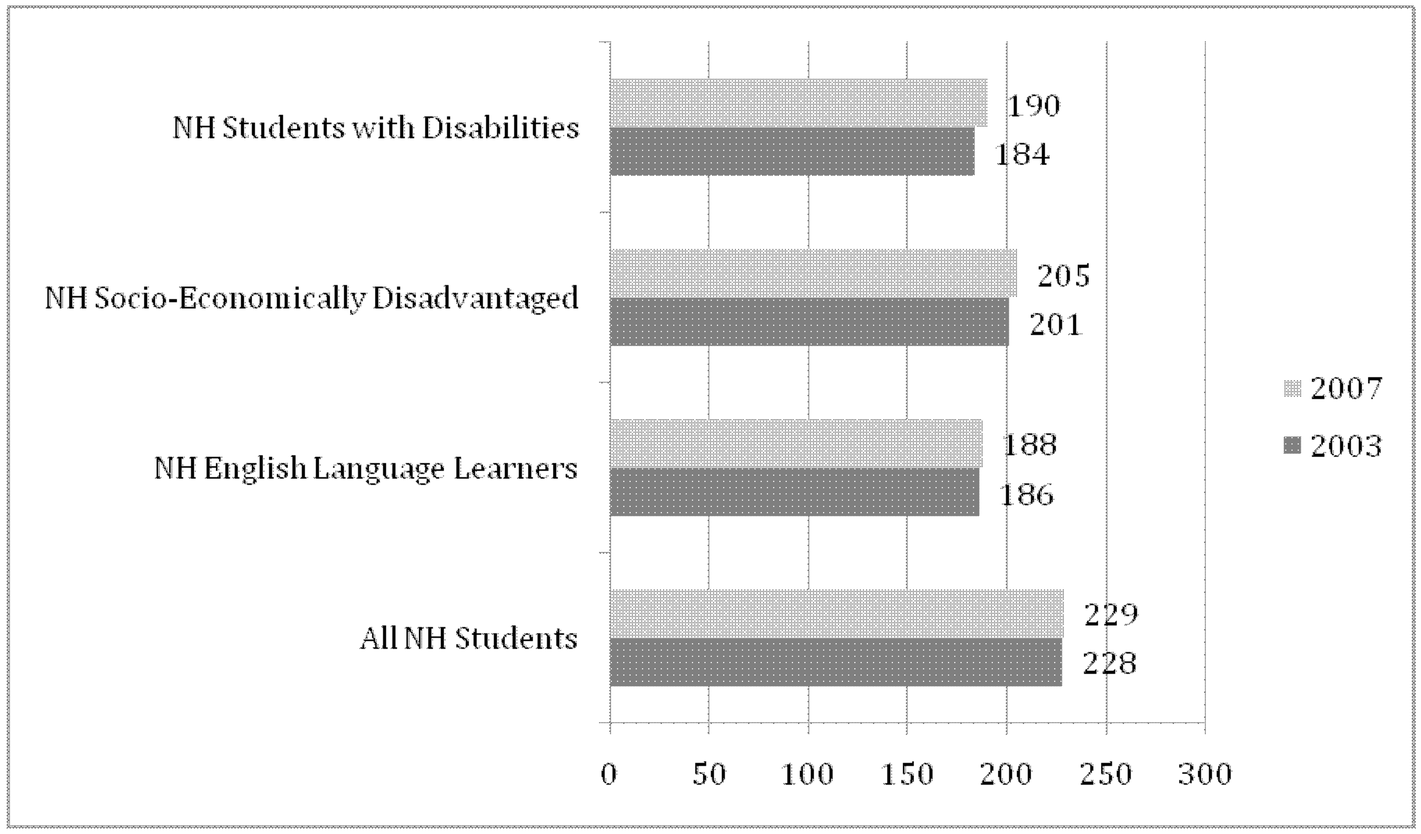
New Hampshire NAEP Results for Reading, Grade 8
By Special Populations from 2003-2009







NAEP Scale Scores for Reading, Grade 4
By Special Populations from 2003-2009



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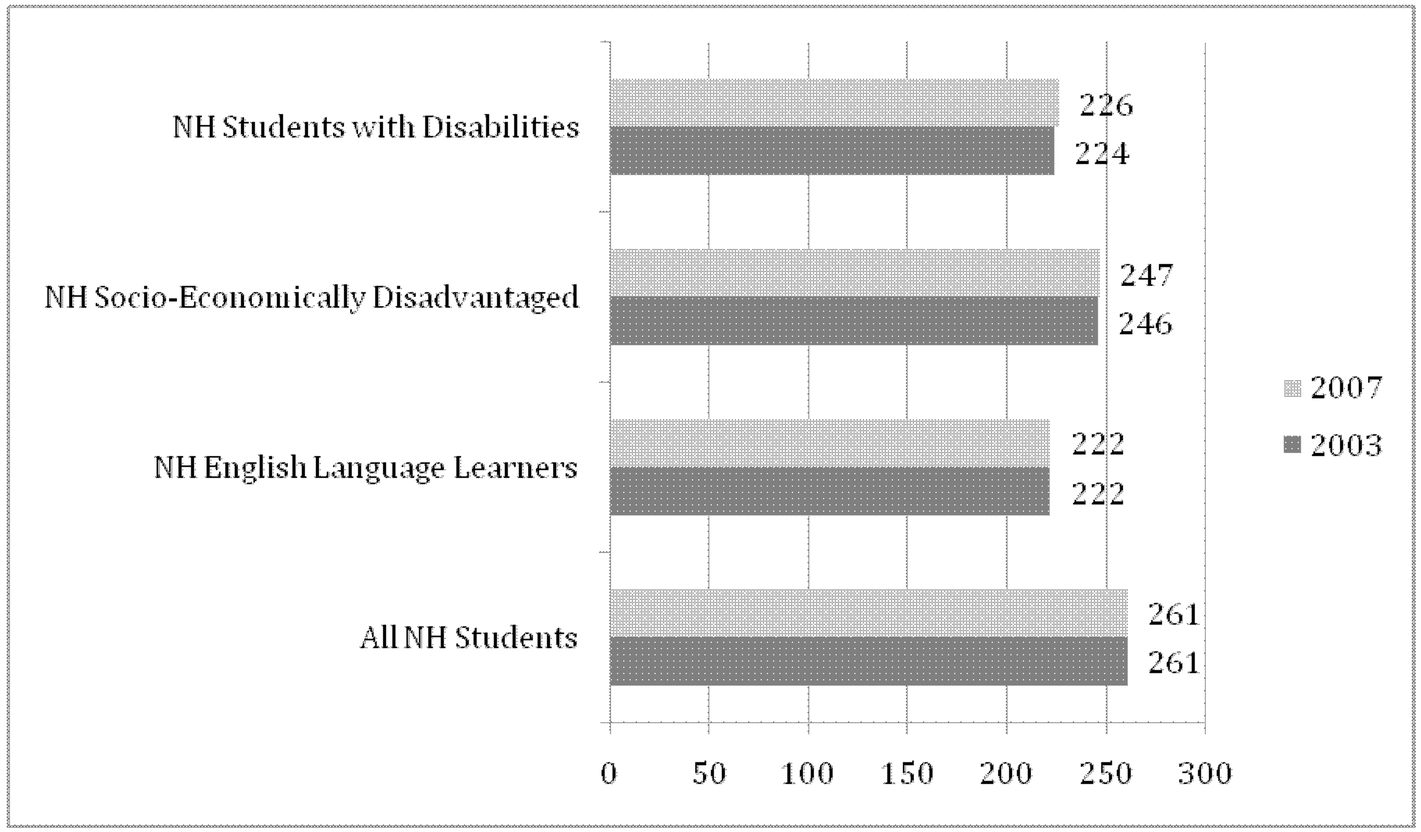

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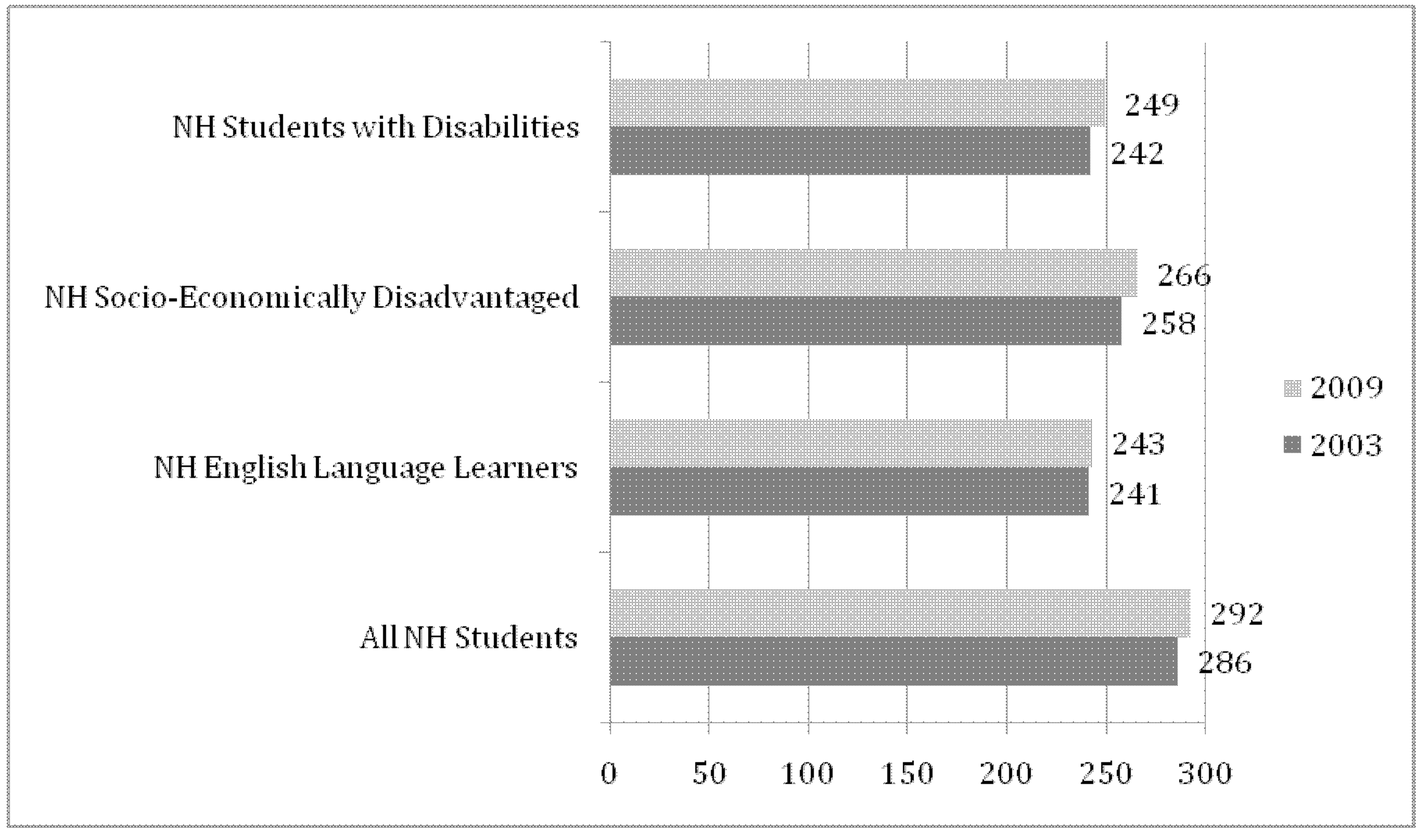
By Special Populations from 2003-2009



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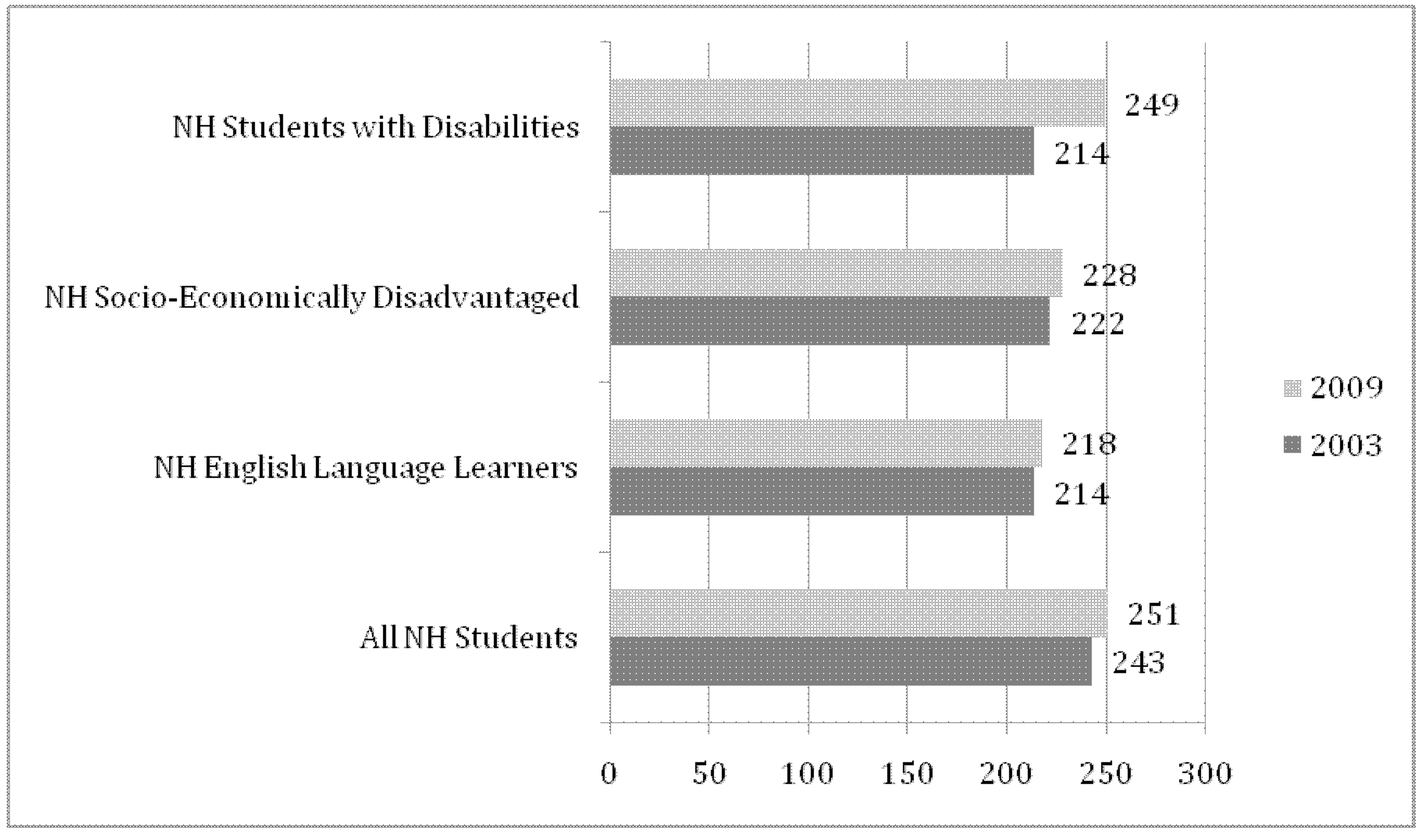
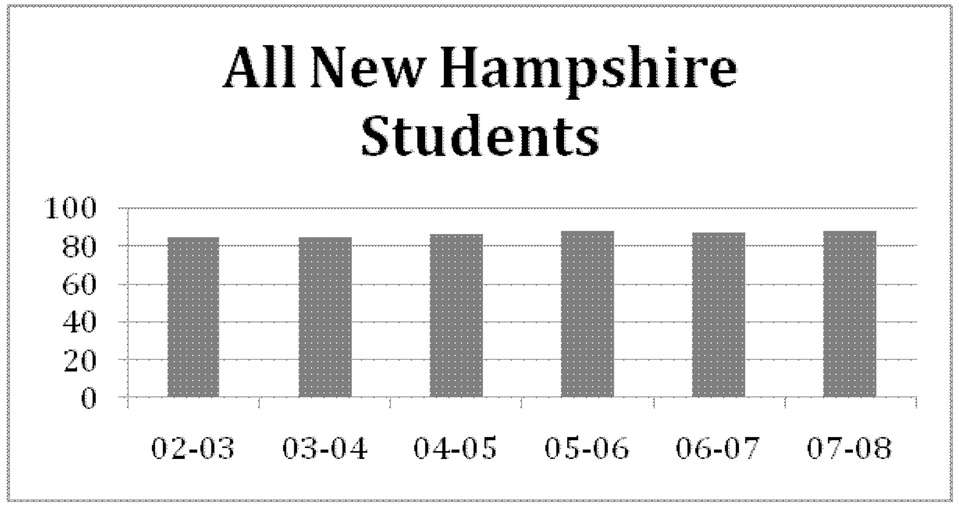
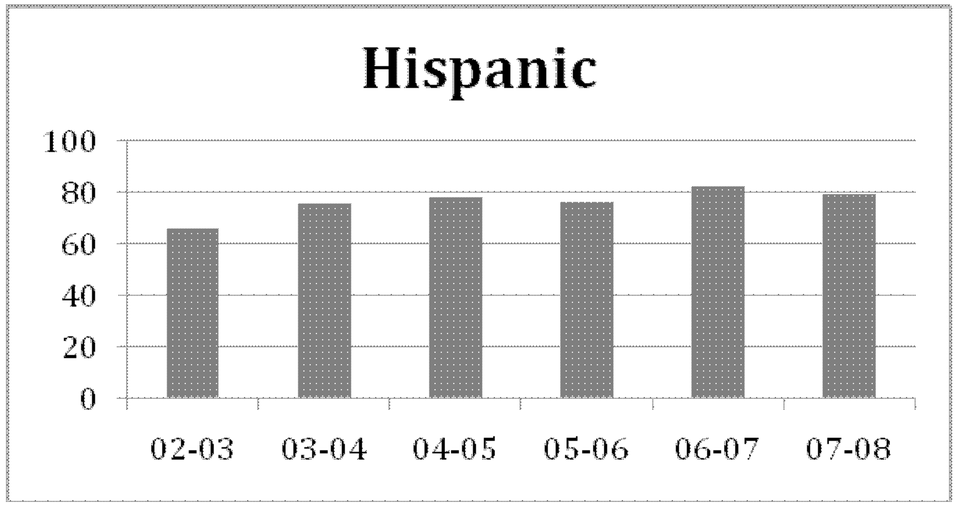
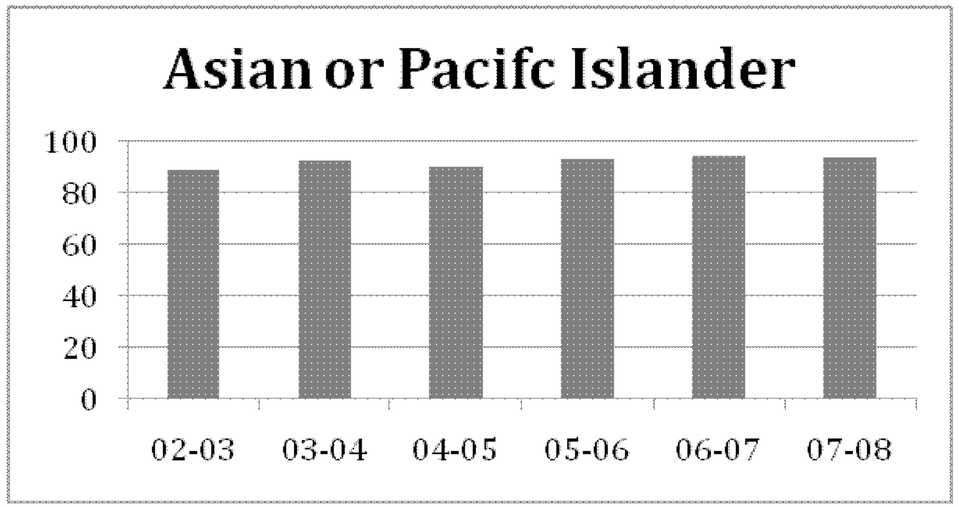
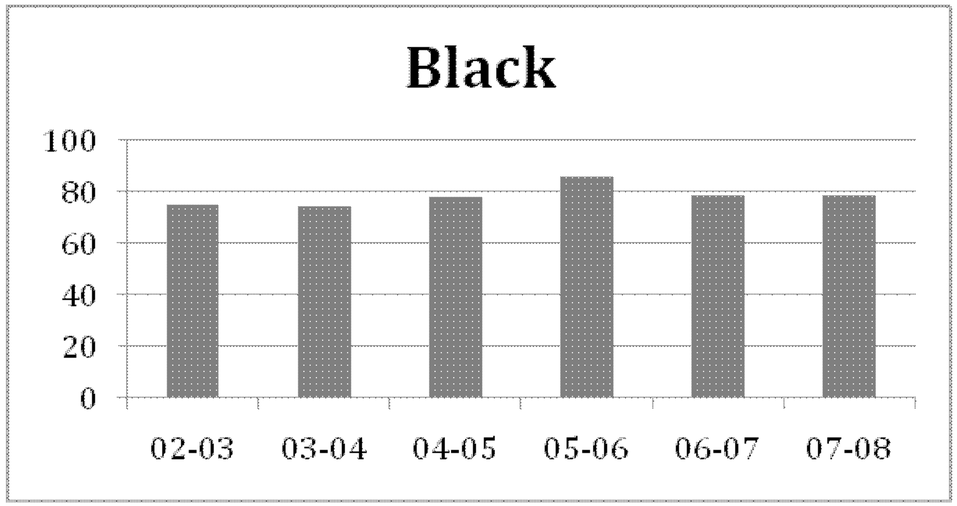


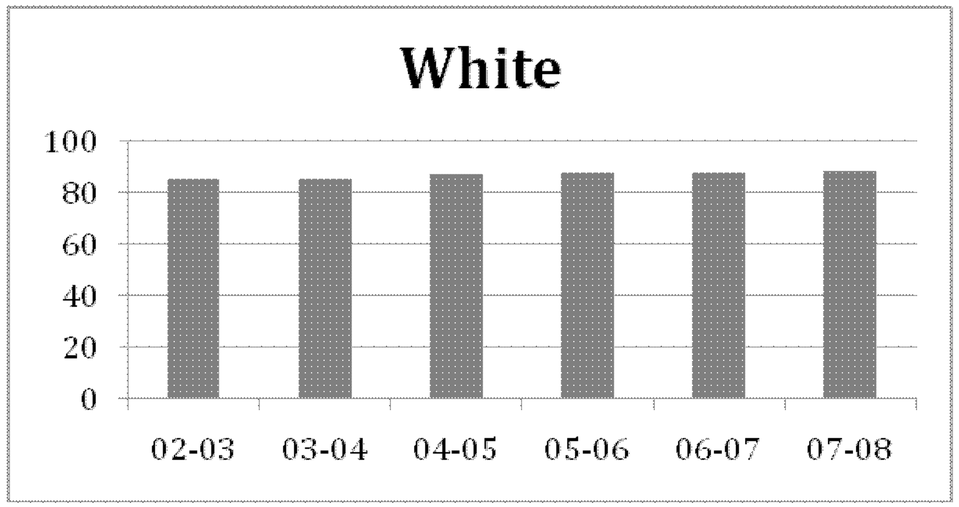
Graduation Rates for New Hampshire Students By Race and Ethnicity from 2002-03 – 2007-08










White
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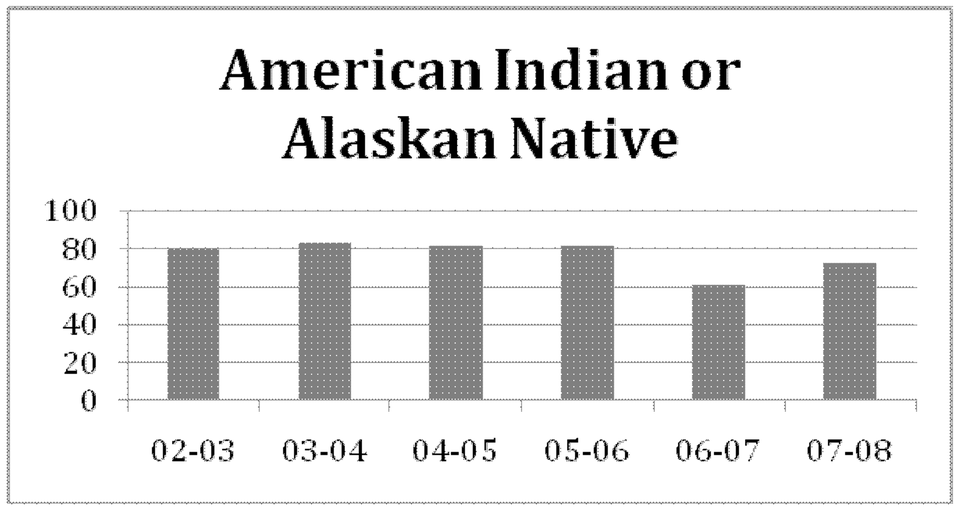
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New England Secondary School Consortium

January 12, 2010

The New England Secondary School Consortium

NOTE: At the request of several states, the following text was specifically created for insertion or integration into state Race to the Top applications for the five Consortium member states. The Consortium leadership believes that our bold vision, shared goals, innovative partnership, and strong alignment with the assurances and objectives of the Race to the Top guidelines will better position the Consortium member states to receive federal funding for school improvement.

Background

New Hampshire is an active state member of the New England Secondary School Consortium (.newenglandssc.org), a pioneering, nationally recognized educational partnership committed to fostering forward-thinking innovations in the design and delivery of secondary education across the New England region. The five partner states of Connecticut, Maine, New Hampshire, Rhode Island, and Vermont believe that our bold vision, shared goals, and innovative strategies will empower us to close persistent achievement gaps, promote greater educational equity and opportunity for all students, dramatically improve teacher quality, enhance data reliability and regional comparability, and lead our educators and schools into a new era of secondary schooling.

For more than two years, the Consortium, in collaboration with its funders and partners, has been designing, planning, and implementing a variety of school-improvement strategies intended to bring greater coherence, alignment, and common purpose to the promotion of best practices, school innovation, and forward-thinking educational policy across the New England region. This combined commitment to the simultaneously improvement of (1) both school-based educational practices and their governing policies; (2) both 21st century learning standards and new skilled-based assessments and data systems that can more accurately measure attainment of those standards; and (3) both statewide systems design and the quality of classroom instruction students receive every day are all highly aligned with the objectives and four assurances outlined in the Race to the Top guidelines.

A leadership team of dedicated policy makers and state education agency staff has established high-functioning, collegial relationships within and among the Consortium's five member states and its partnering organizations, which include the New England Association of Schools and Colleges and the New England

Board of Higher Education. From the beginning, the Council of Chief State School Officers has also been a close partner and strong supporter of the work, and recently the Education Commission of the States and the National High School Center have expressed a desire to work with the Consortium on targeted projects.

The Consortium's multistate strategy is grounded in a set of agreed-upon beliefs and proven transformative strategies. The partnership is guided by the New England Secondary School Consortium Council, which includes the five commissioners of education for the Consortium states, state board of education members, governor appointees, influential legislators from both houses, and prominent business leaders from within each state.

Funded by the Nellie Mae Education Foundation and the Bill & Melinda Gates Foundation, and coordinated by the Great Schools Partnership, the Consortium's goal is to ensure that the educational performance and attainment of our public high school students will not only be competitive with their peers worldwide, but that every student graduates prepared for success in the colleges, careers, and communities of the 21st century. To realize our vision, the Consortium will support the development of a new generation of high-performing, internationally competitive high schools, while assisting the New England states to achieve several ambitious objectives, including increasing four-year, on-time graduation rates across the five states; decreasing annual drop-out rates; increasing the percentage of students enrolling in two- or four-year college-degree programs or pursuing accredited postsecondary credentials; and reducing the number of students required to take remedial courses during their first year of college.

To achieve its strategic goals, the Consortium has been convening critical department of education leaders from each of the NESSC states. In addition to the Consortium leadership teams, our regional partnership has brought together department of education data teams, assessment directors, and communication coordinators to develop operationally collaborative approaches to our regional work. The state data teams are working to develop common regional metrics for measuring progress made toward achieving Consortium goals, metrics that have the potential to serve as true regional performance comparability of educational outcomes. The communications team has focused on common regional messaging and communications strategies, as well as effective use of online tools and social media to enhance information exchange within and across states. Similarly, five commissioners of education for the five Consortium states and department of education staff overseeing standards and assessment have been meeting with national assessment experts to begin developing an ambitious 21st century assessment system that has the potential to make valid and reliable large-scale performance assessment a reality in New England.

Given the unprecedented nature of this regional collaboration and the support it has from key state, educational, and regional leaders, the Consortium's potential to bring about transformative innovations in teacher quality, assessment practices, data systems, and state and local policy across the New England region is enormous. This effort will change schools and the learning that our

students receive.

The New England Secondary School Consortium's mission, objectives, and core operational strategies are highly aligned with the Race to the Top program's four assurances:

1. *Adopting standards and assessments that prepare students to succeed in college and the workplace and to compete in the global economy.* The Consortium has committed to co-adopt a set of forward-thinking, skill-based learning standards that reflect the ways in which our youth will live, work, learn, and lead in the 21st century. These standards will define the academic, cognitive, interpersonal, self-directional, and real-world knowledge, skills, and habits of mind that can be applied throughout a student's life and across all educational, career, and civic contexts. All five of the Consortium states have signed on to the Common Core State Standard Initiative, which we believe will move our states toward the development of more focused and relevant curricula in our schools. The Consortium's standards work will complement the Common Core by prioritizing the skills and attitudes that are critical to success in the modern workplace and in higher education, but that have traditionally gone untaught or unmeasured in our schools.

2. *Building data systems that measure student growth and success, and informing teachers and principals about how they can improve instruction.* For the past year, the Consortium has been convening state data coordinators and key department of education staff from the Consortium's member states. This regional data team has made substantial progress identifying specific metrics and developing common calculation methodologies and reporting mechanisms that will be used by each state to measure the learning progress, academic achievement, and degree completion of every high school student in every public secondary school in each state. Already, this regional data team was able to embed common language, goals, and strategies into federal grant proposals for enhancing longitudinal data systems. Compliance with federal data-reporting requirements is a top priority of this group, and a leading consultant has already been enlisted to vet our common metrics and methodologies and ensure federal compliance going forward. We also plan to use data from the National Student Clearinghouse to augment data collection at the secondary level. Our regional data work is also deeply intertwined with the Consortium's ambitious performance objectives: by 2016, the Consortium states will (1) increase four-year, on-time graduation rates across to ninety percent or higher; (2) decrease annual drop-out rates to less than one percent; (3) increase the percentage of students enrolling in two- or four-year college-degree programs to at least eighty percent; and (4) reduce the number of students required to take remedial courses during their first year of college to five percent or less.

3. *Recruiting, developing, rewarding, and retaining effective teachers and principals, especially where they are needed most.* In the effort to develop innovative, versatile, internationally competitive learning models at the secondary level, a key strategy of the Consortium's work is to support school-embedded professional development and the continuous learning of educators. Over the coming years, the Consortium intends to provide targeted funding, professional development, and on-site technical assistance to hundreds of public schools throughout the five Consortium states. The Consortium promotes policies and practices that will help turn our traditional comprehensive schools into versatile community learning centers that prioritize individual student learning needs, blend secondary and postsecondary experiences, provide engaging educational opportunities both inside and outside the classroom, and offer a variety of student-designed pathways to graduation—all while emphasizing global understanding, multicultural awareness, technological literacy, real-world applications, and other challenging 21st-century skills and proficiencies.

4. *Turning around our lowest-achieving schools.* The Consortium's member states recognize that dramatically improving educational and life outcomes for every student—particularly our most disadvantaged—will not be possible in secondary schools as they are currently designed and operating. Ensuring the academic, collegiate, and career success of every student will requires new and transformed models of schooling and instruction. To this end, New Hampshire is working with the Consortium to transform—from the statehouse to the schoolhouse—educational policies, assessment practices, teaching strategies, professional development, and state and local leadership. Most school redesign efforts, even when successful, reach a "policy ceiling"—the point at which school-level innovations are not supported by, or are in direct conflict with, district and state policies. For this reason, the Consortium believes that schools cannot be transformed in isolation, and that comprehensive systems change, including forward-thinking policies at all levels, is needed ensure that school improvement is not only successful, but sustainable for many years to come. Consequently, we are working directly with state agencies and prominent state policy makers to ensure coherence of action, policy, and messaging not only within states, but across the New England region.

SECTION I. ***Adopting standards and assessments that prepare students to succeed in college and the workplace and to compete in the global economy.***

- All Consortium states support the Common Core State Standards Initiative.
- In addition, the five Consortium member states will be developing—with the goal of co-adopting and assessing—forward-thinking, skill-based 21st century standards that will reflect the ways that students will learn, work, live, and lead in the colleges, careers, and communities of tomorrow.

- To ensure that 21st century standards are not simply adopted, but meaningfully assessed, the Consortium is working on a common regional performance-assessment system that includes features including: (1) a world-class, time-sensitive, on-demand assessment that would make use of cutting-edge online technologies and thoughtfully crafted performance tasks; 2) a common bank of performance-assessment tasks that would be curriculum embedded, but not time-sensitive, and that would include support materials and examples of student work; and 3) a set of common rubrics that would clearly define performance expectations for 21st-century skill acquisition, require demonstration of learning through a body of evidence (portfolios, capstone projects), and lay the foundation for regional comparability of student learning beyond the traditional standardized test.

SECTION 2. ***Building data systems that measure student growth and success, and inform teachers and principals about how they can improve instruction.***

- The Consortium's regional data team has made significant strides toward the identification of key academic-performance and degree-attainment metrics that will be collected, calculated, and reported across the region, including a high school dropout rate, high school graduation rate, postsecondary matriculation rate, college readiness measures, and postsecondary persistence and degree attainment.
- The Consortium's regional data work is laying the foundation for a common, collectively developed data system that will be (1) focused on a few high-leverage performance indicators, (2) in compliance with federal reporting requirements, (2) comparable across multiple states, and (4) a leading national model that other states could adopt.
- In December 2009, the Consortium's regional data team embedded common language, goals, and strategies into federal grant proposals to support the enhancement of longitudinal data systems. This achievement is evidence that the Consortium, by helping states work collaboratively and align critical programs, has the support, operational capacity, and commitment to bring about significant changes in the design, delivery, administration, and evaluation of secondary education across the New England region.

SECTION 3. ***Recruiting, developing, rewarding, and retaining effective teachers and principals, especially where they are needed most.***

- The Consortium's international benchmarking work will be identifying high-leverage strategies from the world's high-performing schools and school systems. It is clear from international research that New England will need to develop innovative programs to attract, support, reward, and retain effective educators and school leaders.
- The Consortium will be developing a robust regional network that will (1) facilitate the sharing best practices across state lines, (2) coordinate

multistate and in-state professional development opportunities, and (3) enhance regional program, strategy, and messaging alignment regarding secondary reform. This network—which comprises state leaders, policymakers, administrators, and educators—is well positioned to create regional articulation agreements, recruiting mechanisms, and leadership training and induction programs focused on elevating the knowledge, skills, and efficacy of teachers, principals, and district administrators.

- The Consortium is forging strong links with teacher associations in each of the five states, knowing the pivotal role that these organizations play in student learning. These links have demonstrated a desire to collaborate to realize common fruitful ends of increases student achievement.

SECTION 4. ***Turning around our lowest-achieving schools.***

- Over the next five years, the Consortium will be providing funding, professional development, and on-site coaching/technical-assistance support to numerous secondary schools and programs in each of the five member states, including new school designs, virtual-learning academies, dual-enrollment programs, career and technical centers, and community-learning models in high-need areas.
- The Consortium is developing a portfolio of practical resources and tools that can support systemic school improvement by addressing policy and practice concurrently. Our *High Leverage Policy Framework* will be used by state policy makers, district administrators, and other school leaders to analyze existing policies, identify systemic strengths and weaknesses, and implement high-leverage educational policies internally coherent and supportive of forward-thinking innovation, teacher flexibility, and high expectations in the classroom. The Consortium's *Global Best Practices in Context* toolkit will provide schools with a practical step-by-step process they can use to assess their relative performance in relation to high-performing schools internationally and strategically shape their improvement plans going forward. (See extended descriptions below for more information.)

Global Best Practices in Context: An Internationally Benchmarked Self-Assessment Tool for Secondary Learning

Global Best Practices in Context bridges the divide between international best-practice research and the practical application of proven strategies in schools. The tool distills some common characteristics of high-performing schools and school systems across the globe, and provides schools with a practical, step-by-step process they can use to (1) assess their relative performance in key areas and (2) strategically shape their improvement plans going forward. This resource is a first step toward describing, in detail, what the public high schools of the 21st century should look like, what strategies they should be considering, and what performance indicators they should be paying attention to. High-quality educational research on high-performing schools and school systems is being produced every day and it's available to anyone with the time to track it

down. But the problem, of course, is that much of this research is so widely dispersed, overly technical, and often difficult to find that its practical utility to the busy educator is significantly diminished. Our hope is that, when completed, *Global Best Practices in Context* will not only make some of this important research more accessible and useful to our schools and educators, but that it will also help translate this important knowledge into on-the-ground actions that will improve educational achievement, attainment, and outcomes for the students of New England.

High Leverage Policy: Transforming Secondary Schooling in Maine, New Hampshire, Rhode Island, and Vermont

Created by a team of researchers from the Center for Education Policy Analysis at the University of Connecticut, *High Leverage Policy* is a detailed exploration of educational policy from rationale to creation to implementation. By taking into account the entire "ecosystem" in which policy is formed, written, and implemented, *High Leverage Policy* provides policy makers, school administrators, and educators with a step-by-step framework they can use to identify and develop effective, high-leverage policies in their states, districts, and schools. Using a common definition of high-leverage policy—i.e., policies that not only increase educational achievement, attainment, and equity for all students, but that also generate positive change throughout the educational system—the Consortium's high-leverage policy framework is a first step toward a more holistic view of educational policy, leading the way for more thoughtful and sustainable guidelines for learning in the 21st century. The report also presents four case studies of high-leverage policies in Maine, New Hampshire, Rhode Island, and Vermont. In the near future, a fifth case study, of Connecticut, will be included.

State of New Hampshire

HOUSE OF REPRESENTATIVES

CONCORD

It gives me great pleasure to write this letter of support for the Race To The Top application that is being submitted by our Department of Education. As we anticipate the educational opportunities and challenges that will be available to our children in the 21st century, I want to be sure that we do all we are able, as a state, to narrow the achievement gap, and to offer the foundation that our youngsters need to compete in a global economy.

We cannot afford to practice business as usual in our educational system, and my active involvement in educational reform in the state assures me that we are perfectly poised to take advantage of the unique opportunity afforded by Race to the Top funds. Actually, equally important, is that the Race to the Top grant application challenges us to think of new and innovative ways to educate our children. As the parent of a Charter School student, the Chair of the Charter School legislative oversight committee, a former school board member, and Board of Trustees member of our innovative Virtual Learning Academy Charter School (VLACS), and the Great Bay eLearning Charter School (GBeCS), the school my youngest son attends, I know N. H. is doing many things right.

The call to concentrate on teacher effectiveness, effective data use and collection, high standards and assessment, and the turning around of the lowest achieving schools is a daunting challenge for public policy makers and educators alike. These are, however, the correct priorities and they are priorities that I think New Hampshire is particularly poised to meet.

We are hopeful that we, as legislative leaders, will be able to collaborate with the NH DOE to:

- Increase the number and percentage of students who annually meet grade-level expectations, state standards, and growth expectations;
- Decrease the achievement gap;
- Increase the graduation rate, while decreasing the dropout rate to zero by 2012;
- Increase the number of students enrolling in and completing postsecondary degrees or credentials;
- Increase the number and equitable distribution of effective teachers and leaders; and,
- Expand use of proven practices throughout the state.

It is a critical time in education and this grant represents our best hope for our children's future. I hope you will support this rural and unique state's attempt to provide for our children the skills they need to be successful in the 21st Century.

I know, as a legislator, I am enthusiastic about our opportunity to continue our work with the NH DOE to improve student outcomes in our cities, our suburbs, our exurbs, and our very rural and isolated communities in the North Country.

There is no more important job, and I am proud to participate and be a small part of New Hampshire's ongoing educational improvement and reform.

Yours truly,

(b)(6)

Rep. Kimberley Casey
Rockingham District 11
East Kingston and Newton

The Senate of the State of New Hampshire

107 North Main Street, Room 302, Concord, N.H. 03301-4951

MOLLY M. KELLY
District 10

Office 271-2111

TTY/TDD
1-800-735-2964

January 11, 2010

Virginia M. Barry, PH.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

As Chair of the New Hampshire Senate Education Committee, I highly support and enthusiastically endorse the New Hampshire Department of Education's Race to the Top application. It is imperative that our students are prepared for the 21st Century and that every child is provided an equal opportunity for a quality education. The goal of the State's innovative education initiatives is to make sure that those students who have not traditionally achieved will succeed and ensure that all students perform at their highest level.

Each and every child is unique and equally important, it is our responsibility as educators and legislators to provide diverse and creative academic resources that reach each one of these children. Because of the Department of Education's current statewide data system, New Hampshire is leading the way in evaluating those innovative programs that have proven to be successful. Developing, refining, supporting and sharing these effective programs are necessary to achieve our educational goals. The use of data will not only improve academic instruction but will also provide important information for necessary legislative policy.

Education is the hope for our future and I am honored to participate with you and the entire Department of Education in their outstanding efforts to increase student academic growth expectations, high school graduation rates, postsecondary degrees, effective teachers and use of innovative programs throughout the State.

I strongly promote the Department's Race to the Top application and look forward to continuing to work with you in reaching New Hampshire's educational goals.

Sincerely,

(b)(6) [redacted]

Molly M. Kelly

GREAT SCHOOLS PARTNERSHIP

January 15, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

On behalf of the New England Secondary School Consortium and the Great Schools Partnership, I want to express our enthusiastic endorsement and support of New Hampshire's Race to the Top application. The New Hampshire Department of Education, as a representative of its state and public schools, is an active member of the New England Secondary School Consortium (www.newenglandssc.org), a pioneering, nationally recognized educational partnership committed to fostering forward-thinking innovations in the design and delivery of secondary education across the New England region. The five partner states of Connecticut, Maine, New Hampshire, Rhode Island, and Vermont believe that our bold vision, shared goals, and innovative strategies will empower us to close persistent achievement gaps, promote greater educational equity and opportunity for all students, dramatically improve teacher quality, enhance the reliability and regional comparability of our data systems, and lead our educators into a new era of secondary schooling. The Consortium's collective commitment is truly unprecedented in its ambition and scope, while its multistate strategy is grounded in a set of agreed-upon beliefs and proven transformative strategies that are all highly aligned with the objectives and four assurances of the American Recovery and Reinvestment Act's Race to the Top Fund.

For more than two years, the Consortium, in collaboration with its funders and partners, has been designing, planning, and implementing a variety of systemic school-improvement strategies intended to bring greater coherence, alignment, and common purpose to the promotion of best practices, school innovation, and forward-thinking educational policies. A leadership team of dedicated policy makers and state education agency staff has established high-functioning, collegial relationships within and among the Consortium's five member states and its partnering organizations, which include the New England Association of Schools and Colleges, the New England Board of Higher Education, and the Council of Chief State School Officers. Our partnership is guided by the New England Secondary School Consortium Council, a regional leadership team encompassing the five commissioners of education for the Consortium states, state board of education members, governor appointees, influential lawmakers from both legislative houses, and prominent business leaders from within each state. In a word, we are marshalling the expertise, leadership, and political will needed to successfully support the effective execution of New Hampshire's Race to the Top proposal, as well as its aligned school-improvement initiatives such as the 21st Century Classrooms Initiative (funded by the NCLB Title II-D Enhancing Education Through Technology Program), Extended Learning Opportunities Project, New Hampshire Equity Plan, State Scholars

Great Schools Partnership, Inc.
482 Congress Street, Suite 500 . Portland, Maine 04101 . 207 773-0505 . 1-877-849-7052 FAX . www.greatschoolspartnership.org

Initiative, New Hampshire Response to Intervention Model, and statewide Educator Information System, among others.

The Consortium's goal is to ensure that the educational performance and attainment of our public high school students will not only be competitive with their peers worldwide, but that every student graduates prepared for success in the colleges, careers, and communities of the 21st century. To realize this vision, the Consortium is working to improve school-based educational practices and their governing policies; develop 21st century learning standards and new skilled-based assessments and data systems that can more accurately measure the attainment of those standards; strengthen statewide educational systems design and the quality of classroom instruction students experience every day; and create a new generation of high-performing, internationally competitive learning models while turning around our chronically underperforming schools—priorities that clearly support New Hampshire's Race to the Top application.

In addition, the five Consortium states have all signed on to and support the Common Core State Standards Initiative, and we expect that these proposed national standards will ultimately be adopted by our states. To complement this groundbreaking initiative and build upon the strong success of the New England Common Assessment Program, the five Consortium member states will be developing—with the goal of co-adopting and assessing—forward-thinking, skill-based, 21st-century standards that reflect the ways in which students will learn, work, live, and lead in the colleges, careers, and communities of tomorrow. To ensure that these standards are not simply adopted, but meaningfully implemented and assessed in our public schools, the Consortium is also working to develop a regional performance-assessment system with three common components: (1) a world-class, time-sensitive, on-demand common assessment that will make use of cutting-edge online technologies and thoughtfully crafted performance tasks focused on real-world relevance and application; (2) a common bank of curriculum-embedded performance-assessment tasks coupled with support materials and examples of student work; and (3) a set of common rubrics that will clearly define performance expectations for 21st-century skill acquisition, require students to demonstrate learning through a body of evidence (such as student portfolios or capstone projects), and lay the foundation for regional comparability of student learning beyond the traditional standardized test.

The Consortium recognizes that the successful adoption of 21st century standards requires equally successful 21st century assessments. Simply adopting more relevant and effective standards will not increase student achievement or improve life outcomes—unless, of course, new skilled-based assessments are developed to ensure accountability, improve the precision and relevance of large-scale performance measurement, and accurately determine school and teacher efficacy. For this reason, the Consortium is addressing standards, large-scale assessment, and data systems systemically in both policy and practice.

In affiliation with the Donahue Institute at the University of Massachusetts, the Consortium has also been convening, over the past year, a multistate data team that is developing common, high-impact metrics for determining the efficacy of public secondary education across New England. One of the Consortium's explicit goals is to "more accurately measure student learning" through innovative performance-based assessments, more robust longitudinal data systems, and regional—even national—comparability of student data. The Consortium has been working closely with our regional data team to establish baseline performance data for the five states using a

common, comprehensive methodology for calculation, reporting, and analysis. In addition to several metrics for measuring student achievement during the critical secondary school years, our regional data team is also developing a plan to gauge postsecondary aspirations and success, including remedial course-taking data and college enrollment and completion rates using the National Student Clearinghouse's StudentTracker for High Schools system.

This regional standards, assessment, and data work is a critical component of a much larger and more systemic rethinking of secondary education in New England. In keeping with national efforts to improve the quality and utility of school and educational data, including the Data Quality Campaign and Race to the Top guidelines, the Consortium is promoting educational policies and practices that will make the measurement of educational efficacy and student outcomes more transparent, reliable, and actionable for policy makers, school leaders, teachers, parents, and citizens.

It is our sincere hope and expectation that the US Department of Education will look favorably on New Hampshire's Race to the Top application and the New England Secondary School Consortium's work—which has come to fruition only after years of investment, collaboration, commitment, and hard work—while also seeing in their design and execution the hallmarks of the kind of innovative leadership that will bring good ideas, effective policies, and proven educational strategies to scale in New England and across the country.

Sincerely,

(b)(6) [redacted]

David Ruff
Executive Director
Great Schools Partnership

This letter has been prepared by the Great Schools Partnership, Inc. on behalf of the New England Secondary School Consortium, its five member states, and its funders and partners. The Great Schools Partnership is the lead coordinator of the Consortium.

NHSBA
NEW HAMPSHIRE SCHOOL BOARDS ASSOCIATION
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or (800) 272-0653
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January 13, 2010

Virginia M. Barry, PhD.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry,

Please accept this as the New Hampshire School Boards Association's support of the New Hampshire Department of Education's application to secure federal Race To The Top funds.

This appears to be a significant new federal program that may bring much needed additional resources to the public schools of New Hampshire.

Please contact me if I can be of further assistance.

Sincerely yours,

(b)(6) [redacted]

Dr. Theodore E. Comstock
Executive Director and General Counsel
New Hampshire School Boards Association
(603)228-2061; email: sklesq@aol.com

Executive Director
Dr. Theodore E. Comstock
sklesq@aol.com
NH School Boards Association
25 Triangle Park Drive, Suite 101
Concord, NH 03301

The Senate of the State of New Hampshire

107 North Main Street, Room 302, Concord, N.H. 03301-4951

SYLVIA B. LARSEN
President of the Senate
District 15

Office 271-2111

TTY/TDD
1-800-735-2964

January 6, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

It is with great enthusiasm that I support the New Hampshire Department of Education's Race to the Top application. Its focus on increasing student learning and student achievement in order to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students, matches the needs of our state.

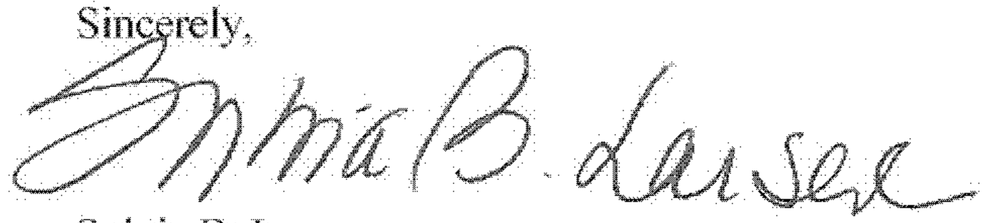
I am supportive of the focus on the four areas of reform that the grant has identified, particularly the intention to concentrate on teacher and leader effectiveness. The plan to continue and enhance New Hampshire's standards for school approval and our assessment system by using first rate data collection is exactly what the state has been incrementally trying to accomplish even pre-No Child Left Behind. A successful grant application will propel us in that direction. It is very exciting to imagine an accelerated pace in helping to close the achievement gap in our state.

We are hopeful that we, as legislative leaders, will be able to collaborate with the NH DOE to:

- Increase the number and percentage of students who annually meet grade-level expectations, state standards, and growth expectations;
- Decrease the achievement gap
- Increase the graduation rate, while decreasing the dropout rate to zero by 2012;
- Increase the number of students enrolling in and completing postsecondary degrees or credentials;
- Increase the number and equitable distribution of effective teachers and leaders; and,
- Expand use of proven practices throughout the state.

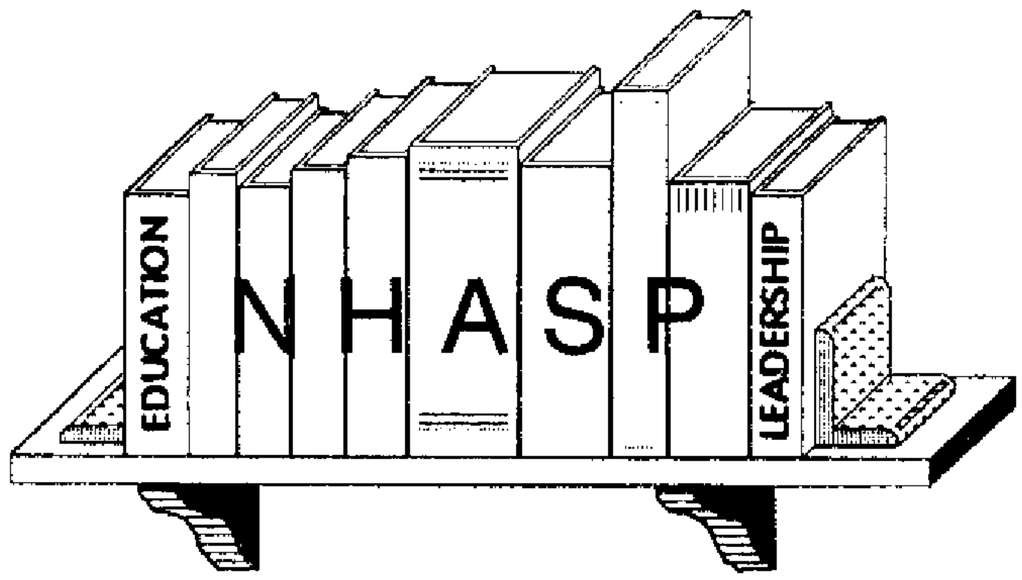
We, as legislators, look forward to collaborating with the Department, schools, districts and organizations to support the education of youngsters. It is a critical time in education and this grant represents our best hopes for our children's future.

Sincerely,



Sylvia B. Larsen
President of the Senate

Peggy McAllister
Executive Director



New Hampshire Association of School Principals

AFFILIATED WITH:
NASSP and NAESP

January 7, 2010

Virginia M. Barry, PhD
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

As Executive Director for the New Hampshire Association of School Principals (NHASP) I speak for the Executive Board and in turn the K-12 school leaders in New Hampshire in supporting the New Hampshire Department of Education's Race to the Top application for principal networking. Networks have the capacity to help principals and assistants learn strategies from their colleagues in a continuous professional development format focused on increasing student learning and achievement to meet the demands of the 21st century including narrowing the achievement gap for subgroups of students. Most importantly, school leaders need to learn from and support one another while creating the conditions for education innovation and reform leading to improved teaching and learning.

Every major study on school reform, numerous professional journals, as well as the mainstream press points to the principal as a key figure in making schools places where all students can achieve at high levels. The mission of the NHASP Leadership Networks is to create professional learning communities for principals and assistant principals committed to leading continuous school improvement. The formation and cultivation of leadership networks will enhance the capacity of individual members to lead school continuous improvement in an effort to close achievement gaps, increase achievement for all, and turn around failing schools. These goals require principals to possess knowledge of best practices, personal courage, deep commitment, and well developed professional ethics to successfully support continuous improvement of teaching and learning. These qualities can be fortified when practicing school leaders come together to jointly examine, discuss, and resolve educational dilemmas. Specifically, the NHASP Leadership Networks will be comprised of 14-20 school leaders who meet monthly for extended periods in regional networks to examine key issues and develop action plans related to enhancing teacher efficacy and increasing student achievement in their schools. Led by a skilled facilitator, the groups will collectively design and implement specific protocols for building professional learning communities to promote continuous improvement within their schools. The facilitators will provide pertinent research and experiences within the networks to encourage, support, sustain, and renew school leaders. As leaders learn from their colleagues via discussions, visitations, emails, phone calls, and network meetings collective inquiry will provide the insights of many as resources for each school leader.

NHASP welcomes the opportunity to build alliances among district leaders within the context of networks. Collaborative work in professional learning communities for school leaders will support principals and assistants as they work first together and then independently to solve the most challenging educational issues around leadership, teacher efficacy and student learning.

Sincerely,

Peggy McAllister

Peggy McAllister
Executive Director

2 Pillsbury Street • Suite 500A, Concord, New Hampshire 03301
Telephone: 603-225-3431 • 1-800-479-6269
FAX 603-224-3766 • e-mail: nhasp@aol.com

NEA New Hampshire

Shaping the Future, One Student at a Time

January 6, 2010

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STATE DEPARTMENT
OF EDUCATION

Commissioner Virginia Barry
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301-3860

Dear Commissioner Barry:

The National Education Association-New Hampshire affiliate is proud to support the New Hampshire Department of Education's Race to the Top grant application. Our organization enjoys a close working relationship with the New Hampshire Department of Education and we have appreciated the Department's inclusion of NEA-NH in the development of our state's Race to the Top grant proposal. Should New Hampshire's proposal be selected for funding, we will continue our collaboration with NH DOE personnel and with educators from our local affiliates who have agreed to be a part of New Hampshire's grant application to implement the activities outlined in the Race to the Top Grant.

We understand the Race to the Top grant competition is designed to encourage and reward states that are creating the conditions for education innovation and reform. As educators who work in New Hampshire schools and classrooms, we believe that New Hampshire is making great progress in restructuring education through recent innovations like the *Running Start Program*, *Extended Learning Opportunities* and the *Moving On when Ready* initiative. While these initiatives have helped us to increase student achievement and lower the high school drop-out rate, we know we will be able to do even more with additional resources the grant will provide. We share the grant's focus on increasing student learning and believe that the goals and activities outlined in the grant proposal will further strengthen education and increase student achievement in New Hampshire.

We also support rewarding teacher and leader effectiveness and look forward to working with the Department and educators from our participating affiliated locals to design and pilot reliable, measurable, and accurate evaluation systems for educators. Like the NH DOE, we are committed to the use of multiple measures to assess student growth as well as teacher and leader effectiveness.

9 South Spring Street, Concord, NH 03301–2425 • Telephone 1–866–556–3264 • Fax 603–224–2648 • www.neanh.org
A National Education Association Affiliate

Because the mission of NEA-NH is to "strengthen and support public education and to serve our members professional, political, economic, and advocacy needs," our organization is committed to supporting our affiliated locals who have agreed to be a part of our state's grant application. We will encourage all involved in the grant to work collaboratively in good faith and will wholeheartedly support our members in their endeavors to move public education forward in New Hampshire.

Sincerely,

Rhonda Wesolowski

Rhonda Wesolowski
President, NEA NH

THE COUNCIL OF CHIEF STATE SCHOOL OFFICERS
ONE MASSACHUSETTS AVENUE, NW, SUITE 700
WASHINGTON, DC 20001-1431
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Deb Wiswell, Administrator
Curriculum, Assessment, Accountability, School Improvement
NH Department of Education
101 Pleasant Street
Londergan Hall
Concord, NH 03301

Dear Deb and New Hampshire Colleagues,

This letter is in support of the New Hampshire Department of Education's proposal for first round funding of the U.S. Department of Education Race to the Top Program. My endorsement is based on my personal experiences working with the programs and personnel of the New Hampshire Department of Education and other educators who teach in New Hampshire's schools.

New Hampshire has a brilliant record of forward-thinking reform efforts with impressive results. The state's emphasis on competency-based education and their recognition of the need for a comprehensive assessment system that features performance assessment techniques prominently has made them one of the leaders in the nation.

In one example, Litchfield's Campbell High School music program features an online, formative assessment program that engages the students in practice and rehearsal techniques that produces significant data on their performance activity while raising their desire to achieve at higher levels. The origins of this program can be directly traced to the state's competency-based approach to learning and to a long standing support of finding new and better ways to measure performance skills in the arts.

Due to the leadership from the State Department of Education, New Hampshire, with the collaboration of Vermont, has established a Summer Institute for Arts Education Assessment that has established itself as a national model training teachers to use a balanced and coherent system of assessment to inform the instructional program and to provide important accountability data for teachers and learners alike.

And last, but most significantly, New Hampshire Department of Education has collaborated with Vermont, Rhode Island, and Maine, to create the **New England Common Assessment Program (NECAP).** This unprecedented effort to work across state boundaries on a set of common standards and assessment is a true milestone in American education.

I can recommend New Hampshire's application without reservation. Support of this program and set of educational leaders is a solid investment.

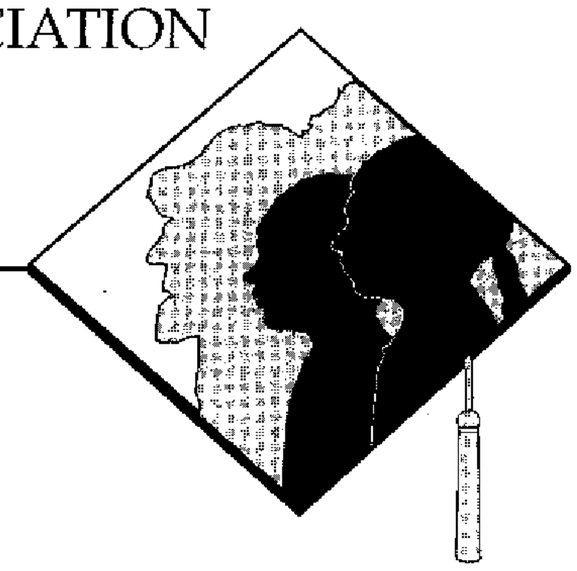
Sincerely,

(b)(6) [redacted]

Frank S. Philip, Program Director
Council of Chief State School Officers

NEW HAMPSHIRE SCHOOL ADMINISTRATORS ASSOCIATION

CHAMPIONS FOR CHILDREN



January 4, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry,

It is with great enthusiasm that we endorse the New Hampshire Department of Education's Race to the Top application. Its focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students matches the needs of our state.

The New Hampshire School Administrators' Association is private non-profit association founded in 1941, to support public education, the interests of children and the development of educational leaders and its members. NHSAA represents school system leaders including: school superintendents, assistants, school finance leaders, curriculum coordinators and special education directors.

We believe that this innovative grant opportunity will allow and empower our local school districts' significant reform efforts designed to transform learning opportunities for ALL our children. While all aspects of the application are innovative and valuable, we are excited to be part of the continuing efforts to: develop our assessment system to include multiple measures of student success, further refine the New England Common Assessment Program, and improve the preparation of teachers and leaders to be successful in their very important and challenging careers.

We look forward to collaborating with the NH Department of Education, schools, districts, and organizations to help reshape New Hampshire's public education system to better prepare all our children for the challenges of the future.

Sincerely,

Mark V. Joyce

Dr. Mark V. Joyce
Executive Director

BOW BROOK PLACE, 46 DONOVAN STREET, SUITE 3 • CONCORD, NH 03301
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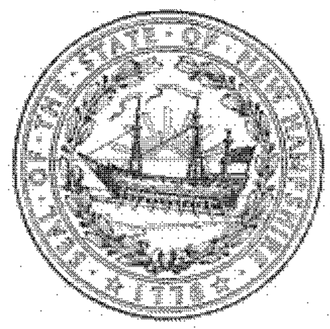

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December 31, 2009

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

It is with great enthusiasm, as Chairman of the New Hampshire State Board of Education, I endorse and support the New Hampshire Department of Education's Race to the Top grant application.

New Hampshire is unique in that our Governor, Senate, House, State Board of Education, Department of Education, Administrators Association, Principals Association, State School Boards Association, Parent/Teacher Organizations, and most importantly, our Teachers Associations have agreed to set aside personal and political preferences for the benefit of all children. As a result, New Hampshire has been in the forefront of education reform which has led to the creation of programs and standards that have fostered a true 21st century education. New Hampshire is well on its way to implementing high school redesign, extended learning opportunities outside of the traditional classroom, eliminating the dropout rate, integrating models of assessment and accountability for students and teachers that align with the common core of K-12 standards as well as improving and supporting the preparation of teachers as true leaders who can meet the needs of our students.

The Department of Education's Race to the Top grant application would ensure that New Hampshire continues to be a vibrant incubator for education reform. I am confident that a

review of New Hampshire's track record will lead the United States Department of Education to conclude that New Hampshire is more than a worthy candidate to be a recipient of Race to the Top funds. With the assistance of Race to the Top funds, New Hampshire will not only improve the success of all students, but particularly those students having the most significant achievement gap. Finally, Race to the Top grant funds will position New Hampshire to be a model other states can look to for guidance.

Sincerely,

[redacted] (b)(6)

John E. Lyons, Jr.,
Chairman

State of New Hampshire

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J. Timothy Dunn
Vice Chairman

COMMITTEE ON EDUCATION

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

January 5, 2010

Dear Commissioner Barry:

It is with great enthusiasm that I endorse the New Hampshire Department of Education's Race to the Top application. The Department's goal to increase student learning and achievement to meet the demands of the 21st century, particularly the achievement of traditionally underserved groups of students, is vital to New Hampshire and the country.

The state's current efforts to improve student achievement are already closely aligned with Race to the Top's four goal/assurance areas. These initiatives include improving high school completion (raising the compulsory attendance age to 18, eliminating drop outs by 2012), turning around low-performing schools (committing to rapid reform, partnering with mentors and change agents), thorough and accessible data systems (expanding the highly successful student identifier number and data system to pre-k and post-secondary), alternative routes for at-risk students (extended learning opportunities, alternative routes to a diploma, charter schools), a more rigorous and inclusive accountability system (developing multiple indicators to measure school and student success, as required in current statute), high curriculum standards which already closely align with the new K-12 Common Core Standards, and ongoing regional cooperation through the New England Common Assessment Program and the New England Secondary School Consortium. The legislature, NHDOE, and the state's teacher unions have opened dialogue on performance standards for teacher evaluation, greater responsibility and leadership for highly effective teachers, support for struggling teachers and administrators, and clear standards for eliminating ineffective teachers and leaders.

I appreciate the Department's efforts to work closely with all stakeholders, including legislators, and I look forward to further collaboration. I am fully supportive of the Department's proposals and believe New Hampshire is well positioned to benefit from Race to the Top funding and to share its successes with the rest of the country.

Sincerely,

(b)(6)

Rep. Emma L. Rous, Chair
NH House Education Committee

PARENT INFORMATION Center
Guiding & Encouraging Families

January 7, 2009

Virginia Barry, Ph.D.
Commissioner of Education
NH Department of Education
101 Pleasant St
Concord, NH 03301

Dear Commissioner Barry,

The Parent Information Center of NH is both pleased and excited to support the NH Department of Education's Race to the Top application and its focus on increasing student achievement to meet the challenges of the 21st century and especially narrowing the achievement gap for all student subgroups.

We have been very encouraged by the Department's clear statements and visible expressions of support for a strong family and community engagement effort being built into the Race to the Top application. As you know, through various programs at the Parent Information Center, we are working to help increase the effectiveness of NH's lowest-achieving schools, in both regular and special education domains, and in particular through our implementation of the Solid Foundation program that we currently have embedded or started in 20 schools.

The Parent Information Center of NH plans to continue to support the Department's effort through expanding the Solid Foundation program into more schools, offering technical assistance and professional development opportunities for school leaders and staff, providing parent workshops, and making resources available to both schools and parents to meet goals around raising student achievement, improving outreach to underserved populations (including ethnic and refugee communities), strengthening school-family communication and building strong family-school-community partnerships.

The Parent Information Center of NH is committed to working in a collaborative statewide fashion with the Department to ensure that all NH students rise to their highest level of achievement.

Sincerely,

Kevin Lew-Hanson

Kevin Lew-Hanson
Executive Director

THEPARENT INFORMATION CENTER OF NH PO Box 2405 Concord, NH 03302-2405
(603) 224-7005 www.PICNH.ORG

SERESC Southeastern Regional Education Service Center, Inc.

Our mission is to engage, support and inspire learning.

29 Commerce Drive
Bedford, NH 03110
Phone: 603-206-6800
Fax: 603-434-3891
www.seresc.net

ANTONIO G. PARADIS, Ph.D.
Executive Director

January 6, 2010

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STATE DEPARTMENT
OF EDUCATION

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

The Southeastern Regional Education Service Center (SERESC) appreciates the work of the NH Department of Education in their continuous efforts on behalf of New Hampshire Students, including their efforts transform education through NH by applying for Race to the Top Funds.

The Focus of Race to the Top, which is increasing student learning and achievement to meet the demands of the 21st Century by narrowing the achievement gap for subgroups of students, matches the needs of our state, can create new initiatives for educational support, and can expand some of the ongoing projects that have been successful in helping all NH educational agencies meet their student achievement goals.

SERESC , incorporated in 1974 to provide regional special education services, has developed into an education service center that focuses on three major areas: technology, education for children of all abilities, and professional development. We have developed major statewide educational support projects in partnership with the NHDOE, with foundations, and with the USDOE. Current major SERESC Projects include a Statewide Early Care and Education Technical Assistance Network, Positive Behavior Interventions and Supports, Focused Monitoring and Program Approval, and an interagency project to support student transition from Department of Health and Human Services to Education Placements. Other projects managed by SERESC over the past decade include a Teaching American History Project, Teacher Enhancement Project and an Adolescent Literacy Project. Our highly regarded consultants bring years of experience as educational administrators and service providers. Our conference center supports technology innovation in its professional development, with capabilities to reach statewide audiences.

SERESC has a strong interest in promoting the incorporation of technologies that enhance teaching and learning and to that end has been the promoter of a new non-profit entity called nhkids1st. The New Hampshire KIDS 1st program will:

- Bring broadband connectivity to each school in New Hampshire
- Ensure adequate networking within each 21st Century Classroom
- Deliver access with the use of computers in each 21st Century Classroom

- Provide rich instruction in each 21st Century Classroom by:
- Delivering adequate and appropriate professional development related to technology use
- Provide software that provides for self-paced instruction
- Software the allows for collaboration to support project-based instruction

The NHKids1st partnership will be a support to NH initiatives including those that are generated through Race to the Top funding.

SERESC stands enthusiastically ready, and willing, to help the NHODE any way we can in their efforts to implement Race To the Top funded projects. We are interested in helping the NHDOE with Race to the Top generated improvement projects in all of the core areas to support local education agency transformation: data systems to inform instruction, standards and assessment, teacher and leader effectiveness, and turning around the lowest-achieving schools.

Sincerely,

Antonio G. Paradis, Ph.D.
Executive Director
Southeastern Regional Education Service Center (SERESC)

CENTER ON
INNOVATION & IMPROVEMENT
Twin paths to better schools

January 15, 2010

Virginia M. Barry
Commissioner
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Dr. Barry,

Pride in professional workmanship and devotion to the children in your midst have always been chief motivators for school improvement, and New Hampshire has these attributes in spades. As a result, New Hampshire's students have traditionally fared well. But there are limits to what strong motivation and hard work can accomplish, especially in schools at the margins and for students who struggle. Motivation must be matched with effective practice and efficient systems. This realization came to the New Hampshire Department of Education over the very recent years, and the Department has met the challenge head-on.

The New Hampshire Department of Education has candidly assessed its system of support for district and school improvement, adopted technological systems to facilitate its assistance to districts and schools, elevated its expectations of locally controlled districts, and sharply focused on the effective practices that produce results for students. Now NHDE has risen to the challenge of Race to the Top, addressing the assurances and laying plans for a system of excellence in a state that expects the best of itself.

In my meetings with NHDE and district personnel in New Hampshire, I have always come away with a respect for their candor and professionalism. Under your leadership I see these characteristics channeled toward creation of a state system that fosters excellence by supplying state supports without crushing local responsibility. I have no doubt that this is a formula for excellence that will propel New Hampshire to *The Top*. I wish you all the best in the competition, and pledge our full support for your good work.

Sincerely,

Sam Redding, Ed.D.
Director

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The Center on Innovation and Improvement is a national content center supported by the U.S. Department of Education's Office of Elementary and Secondary Education

Nellie Mae
Education
Foundation
Opening Doors to Tomorrow

January 11, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

I am writing today on behalf of the Nellie Mae Education Foundation to endorse the New Hampshire Department of Education's Race to the Top application. We enthusiastically support its focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students.

The Foundation is New England's largest public charity dedicated to improving academic achievement for the region's underserved communities. Our mission is to stimulate transformative change of public education systems across New England. We believe that developing a greater variety of higher quality education opportunities will enable all learners--especially and essentially those underserved--to obtain the skills, knowledge and supports necessary to become civically engaged, economically self-sufficient life-long learners.

New Hampshire's focus on meeting the demands is aligned with both our mission and our evolving work. We are currently transitioning to a new strategic focus. Moving forward, we will focus primarily on the promotion and integration of developmentally appropriate, rigorous, student-centered approaches to learning. These approaches takes into account the many ways students learn and are focused on a broad set of essential and relevant skills. It is the Foundation's goal to help grow these approaches into core facets of the education system.

We have previously partnered with the New Hampshire Department of Education to support policy change in the state that is aligned with our mission and strategic focus. We are providing $70,000 in direct grant support to the state to help develop this Race to the Top proposal and have offered input to key administration officials. We have been a key supporter of the state's efforts to assist local districts in offering Extended Learning Opportunities for students to personalize their experience and earn credit towards high school graduation. We are also supporting the high school redesign efforts of the New England Secondary School Consortium, of which New Hampshire is a valued member along with Maine, Vermont, Rhode Island and Connecticut.

We look forward to continued collaboration with the Department and with schools, districts and other organizations to improve education for all New Hampshire's learners.

Regards,

(b)(6)

Nicholas C. Donohue
President and CEO, Nellie Mae Education Foundation

New Hampshire
Partners
in Education

889 Elm Street, Suite 304 Manchester, NH 03101-2000 Tel: 603-540-0620 www.nhpie.org

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Dr. Keith Pfeifer
Grantham School District

Daniel N. Hebert
Executive Director
New Hampshire
Partners in Education

January 14, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

It is with great enthusiasm that NH Partners in Education provide our endorsement to the New Hampshire Department of Education in its Race to the Top application. Its focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students matches the needs of our state.

From our perspective, the most exciting aspect of this initiative is the "out-of-the-box" approach to school reform by developing creative solutions to help our children succeed in a rapidly-changing environment. As a statewide organization who recognizes the thousands of NH school volunteers who donate over one million hours of their time to local schools each year, we know first-hand the power of community and creative collaboration.

We look forward to partnering with the Department, schools, districts, and other organizations to work on creative reforms that will positively transform our schools for decades to come.

Sincerely,

(b)(6)

Daniel N. Hebert
Executive Director

CSSR
The Center for Secondary School Redesign
Breaking Ranks for Student Success

January 4, 2010

Virginia M. Barry, Ph. D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

The Center for Secondary School Redesign, Inc. (CSSR) is pleased to endorse the New Hampshire Department of Education's Race to the Top application. It reflects the needs and opportunities that exist in New Hampshire schools and districts at this time as they focus on meeting the demands of the 21st Century as a guide for increasing student achievement. Also, the grant application addresses the need to narrow the achievement gaps for subgroups of students across the State.

We are particularly excited about how this grant will allow for focusing on turning around the lowest performing schools in the state. CSSR is proud to have had the opportunity to provide technical assistance to schools and districts that have been implementing extended learning opportunities (ELO's) to students as a means to gain the student engagement in learning needed to close achievement gaps.

We plan to build on what we've learned through the ELO project to create a network of high schools that will focus on creating valid and reliable performance assessments as part of a multiple measure assessment system. This aspect of the Race to the Top application will simultaneously provide the development of standards and assessments that prepare students to succeed in college, the workplace and the global economy while assisting in turning around the lowest performing high schools in the State.

Respectfully Submitted,

Joseph A. DiMartino,
President

CSSR; 621 Wakefield Street, West Warwick, RI 02893; Tel: 401-828-0077; Fax: 401-615-3593

EPSCoR

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January 8, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

On behalf of New Hampshire EPSCoR, I am writing to endorse with enthusiasm your Department's Race to the Top application. NH EPSCoR has similar goals of enhancing student achievement, in particular, in Science, Technology, Engineering and Mathematics (STEM) subject areas. Toward this end, we are working to expand broadband Internet access to schools in remote areas, and have proposed to the National Science Foundation a program that would leverage research in the state's universities and colleges by developing teaching modules appropriate for pre-college and college-age classroom instruction.

Our plans for the next five years call for workshops for teachers, a "VisMobile" that will deliver learning modules and related computer technologies to remote sites, and engagement of the public through the NHPTV, museums, and other public venues. NH EPSCoR also is a partner with the Department's STEM Equity Project, an NSF-sponsored program to increase participation by girls and women in STEM education and career pathways.

We look forward to collaborating with the Department, schools, districts and other partners in pursuit of our common goal of preparing students for responsible and effective citizenship in the 21st century.

Sincerely,

[redacted]

Janet W. Campbell, Ph.D.
Interim Director
New Hampshire EPSCoR

University of New Hampshire, Gregg Hall, Durham, NH 03824
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jludes@neasc.org

January 4, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

We enthusiastically endorse and support the New Hampshire Department of Education's Race to the Top application. The focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students matches the needs of the state of New Hampshire. We commend the department's vision.

We are especially excited by New Hampshire's effort to narrow the achievement gap for subgroups. Your success in that area will establish an important model for the rest of the nation.

NEASC and its thousands of trained volunteer professionals stand ready to support this important effort and we will share our enthusiasm for New Hampshire's Race to the Top application with our friends and colleagues in the U.S. Department of Education and in the White House.

We look forward to being helpful in your very worthy effort.

Sincerely,

(b)(6)

Jacob Ludes III

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January 11, 2010

Virginia M. Barry, PhD, Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry,

We wholeheartedly support the New Hampshire Department of Education's Race to the Top application. We applaud its focus on enhancing the education we provide all our students, increasing their learning, and narrowing the achievement gap. The results will include learning environments that meet the needs of our students so they can successfully face the challenges of the world they will enter upon graduating. The Department's goals and proposed programs reflect an innovative philosophy of education reform that strives to address the needs of each student as he/she moves through our education system.

Our enthusiasm for the State's application is based upon the extent to which it builds upon past reforms while embracing thoroughly compatible new innovations it wants to take to scale. The broad area in which we are most interested—the effective use of all forms of assessment to improve teaching and learning—touches all four of USED's key reforms. For example, the application includes an initiative to promote curriculum-embedded performance assessment as a powerful addition to the state's assessment arsenal. The potential benefits of this type of measure span a broad spectrum—from increasing student engagement and opportunities for them to meaningfully demonstrate what they know and can do to providing the type of rigorous exercises that builds college and career readiness, promotes teacher professional development, and encourages collaboration.

The application also includes both pre-service and in-service programs to build the capacity of educators to use a full spectrum of evidence to foster student growth—skills and activities we refer to as assessment literacy. Research shows that effective assessment practices can dramatically improve student achievement, particularly among the lowest-performing students. When such practices pervade schools they contribute substantially to turning them around. What is particularly exciting for us is that the funding will enable the State to make the heavy up-front investment in both these areas to build the capacity needed to sustain and scale the initiatives with fidelity and at a much lower, affordable cost over the long term.

Measured Progress is a not-for-profit organization that has been operating in New Hampshire for over 26 years. The majority of our 400+ regular employees and thousands of temporary staff live in the state and their children attended or are attending

New Hampshire schools. Our organization has also served the Department of Education for close to 20 years as a contractor for its statewide assessment program, most recently the NECAP assessments and the state Alternate Assessment. We have also worked with the Department in securing and implementing federal education grants. In addition, we work with schools and districts in the state in professional development and local assessment resources.

New Hampshire's intimate size and the fact that it is our home state, our interaction with Department of Education officials, policy makers, and other education stakeholders extends far beyond our formal contractual relationship. We understand that to secure any third-party support in implementing the plans set forth in the application, the Department must use its standard procurement processes and that we might not be selected. Our support for the plan would remain strong because we think what the State is proposing will be sound for our schools—and, therefore, our students, our children. Even if we were not selected as a contractor for one or more elements of the plan, we would be available to provide advice and counsel in our areas of expertise, particularly for the initiatives cited above.

In conclusion, we wish you the very best in this extremely competitive program. If your application is successful, we will be honored to work with the Department and other stakeholders to ensure the successful implementation of the State's plans.

Sincerely,

Stuart R. Kahl
CEO and Founder

nimble assessment systems, inc.

3 Bridge Street, Suite B101, Newton, MA 02458 617-431-4441

January 14, 2009

Virginia M. Barry, Ph. D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

I am writing to express my strong support for the New Hampshire Department of Education's Race to the Top application. I have worked closely with the NH Department of Education for the past 10 years. During that time, they have continually demonstrated an unwavering commitment to supporting the highest quality of education, meeting the needs of all students, and doing so by embracing innovative and efficient methods.

NH's commitment in these areas is demonstrated through its leadership in forming the New England Common Assessment Program (NECAP), developing a cutting-edge alternate assessment, and adopting innovative solutions for meeting the access needs of all students during testing. NECAP represents the first and only multi-state consortium that has built common standards, developed common assessments to measure those standards, and administered those tests to monitor and improve educational quality. For this, they have become a model for building effective and efficient state consortium that produce products of the highest quality. While several states have adopted all multiple-choice tests in an effort to save costs, NH's commitment to high-quality has led it to not only resist this strategy, but to insist on developing cost-saving methods to support the ongoing use of items that measure the full range of content standards and skills it holds schools and students accountable for developing.

NH has also been the first state to adopt computer-based methods to increase accessibility of test content for all students and, in turn, improve the validity of its test scores. Its partnership with leading innovators in the field of universal design and computer-based testing has defined NH as pioneer in accessible assessments. NH's efforts to develop a rigorous alternate assessment, that provides valid information about the achievement of students with severe cognitive disabilities, also demonstrates its commitment to educating all students and embracing cutting-edge methods to support teaching, learning, and assessment.

This commitment to embracing and continuing to develop innovative solutions to meet important educational challenges is clearly reflected throughout its current proposal. While I have not discussed a potential role our organization might play in supporting NH's efforts to implement its proposed strategies and solutions, I would welcome the opportunity to work with NH as it continues to be a leader in making educational opportunities accessible, valid, meaningful, and effective for all students.

Sincerely,

Michael Russell
President

email: access@nimbletools.com nimble www.nimbletools.com

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January 4, 2009

Dr. Virginia Barry
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Dr. Barry,

I am writing to convey my full support of the New Hampshire Department of Education's (NHDOE) Race to the Top (RttT) application. As Director of RMC Research Corporation's New England Comprehensive Center (NECC) for the past five years, I have had the opportunity to work with you and your state education agency leaders on several priority education initiatives. This experience, coupled with my knowledge of your RttT plans, gives me confidence that the NHDOE is well positioned to fully utilize this unprecedented opportunity for the educational, civic, and economic benefit of New Hampshire's children and families.

New Hampshire has accomplished important milestones over the past several years that lay a critical foundation for the award and use of RttT funds. New Hampshire is one of four states that has created and adopted common assessments through the New England Common Assessment Program. As you know, recent NAEP data point to the success of this work as shown in student achievement outcomes. The Department has also been underway with high school reform work that is aimed at both drop out prevention and college readiness and success. The state's i4see and Performance Pathways systems are exemplary state initiatives supporting P-20 data access and use to inform instruction and to ensure accountability for outcomes.

New Hampshire is one of six states involved in the NECC's New England Collaborative for Educator Quality and Effectiveness.

Dr. Carol Keirstead, *Director*
Dr. Karen Laba, *Deputy Director*

New England Comprehensive Center Partners

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This collaborative effort is supporting the creation of common educator standards and approaches for educator evaluation and compensation. Finally, we have worked alongside the Department in the development and implementation of a system of support for struggling districts and schools. NHDOE has implemented key statewide policy and professional development initiatives to assist all districts and schools in improving outcomes for all students. In each of the four USED reform priority areas, NH has a proven track record to build from.

In addition to these accomplishments, New Hampshire has the opportunity to lead the nation in solving some important educational challenges. Among these is the urgency to address the educational needs of rural America. Conditions of poverty and the inability to attract and retain a highly trained educator workforce are among the vexing problems faced in rural America. New Hampshire's size and statewide resource capabilities provide opportunities to both innovate and adapt to meet these needs.

The New England Comprehensive Center is poised to assist the Department in these important initiatives as you move forward. As do you, we see the RttT as a once in a lifetime opportunity to bring all of our best collective knowledge, skill, and will to realize the vision of a world class education for every student regardless of race, socio-economic status, or place of residence.

Best of luck with your application. We look forward to our continued partnership in the years to come.

Sincerely,

Carol J. Keirstead, Ed.D.
Senior Research Associate
RMC Research Corporation

Dr. Carol Keirstead, *Director*
Dr. Karen Laba, *Deputy Director*

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January 5, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

It is with great enthusiasm that I support the New Hampshire Department of Education's Race to the Top application. Its focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students matches the needs of our state.

This is an opportunity for us as a state to collaborate and create innovative practices that will allow us to improve student readiness, learning and achievement. The New Hampshire-JAG organization has partnered with schools participating in this application process and we are witness as to how student learning can improve when given the ability and resources to provide innovative and non-traditional ways for students to engage in their school and community.

NH-JAG is affiliated with the National Jobs for America's Graduates organization and is a proven leader in areas of dropout prevention and school to work transition.

I look forward to collaborating with the Department, schools, districts and organizations to provide opportunities that will improve student achievement, support teacher effectiveness and refine data systems to support instruction. The NH-JAG organization is fully prepared to support the Department's efforts.

Sincerely,

(b)(6)

Priscilla Parisien, President
NH-JAG

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January 14, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

It is with great enthusiasm that City Year New Hampshire supports the New Hampshire Department of Education's Race to the Top application. Its focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students matches the needs of our state.

We are most excited to work with Superintendent Tom Brennan, Mayor Ted Gatsas and the Manchester School District to help support the lowest performing schools in the city to best help at-risk students succeed in school and in life. City Year strives to put national service to work addressing the dropout crisis by tutoring and mentoring students in high-poverty schools and by providing meaningful after school, weekend, and vacation time programming to keep kids engaged in their communities, excited about school, and on track to graduate from high school.

Through the funding provided a Race to the Top application, City Year has the potential to grow our AmeriCorps member presence in the Manchester School district and place teams of 10 full time volunteers in classrooms in 3-5 of the lowest performing schools to help students who are off track in the areas of attendance, behavior and course completion in English and Math get the extra focus and help they need to get back on track.

We look forward to collaborating with the Department, schools, districts, and organizations to support our schools to best keep kids in school and on track towards graduation.

Sincerely,

(b)(6)

Alexandra Allen
Co-Executive Director
City Year New Hampshire

Pawn Nitichan
Co-Executive Director
City Year New Hampshire

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January 7, 2009

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

It is with great enthusiasm that we support the New Hampshire Department of Education's "Race to the Top" application. Its focus is on increasing student learning and achievement to meet the demands of the 21st century, narrowing the achievement gap for subgroups of students.

The NH Postsecondary Education Commission (Commission) is a coordinating state agency that regulates the activity of colleges, universities and career schools in all sectors (profit and non profit; independent and public) and administers state funds through financial aid programs.

This grant would provide an opportunity to collaborate with the Commission and all sectors of higher education to focus on student achievement. The NH model for educational transformation focuses on initiatives in four education reform areas. Success in these areas will significantly increase the capacity of higher education to support student learning.

Grant focus also aligns with the Governor's P-16 Working Group, established in 2006, with the purpose to communicate and collaborate across the elementary, secondary, and postsecondary education sectors to encourage students to stay in school, improve their academic performance, and to raise aspirations leading to enrollment in colleges and universities.

Developments would be shared with the Commission, as well as the Governor's P-16 Working Group members to determine necessary support structures. Policy, institutional and industry leaders are among these groups.

We look forward to collaborating with the New Hampshire Department of Education, schools, districts, and organizations to accomplish great things for our students.

Sincerely,

Kathryn G. Dodge
Executive Director

KGD:pme

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University System of New Hampshire

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January 15, 2010

Dr. Virginia Barry
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

New Hampshire has the strongest economy in the region, yet the State's strong position in the high technology economy is at risk. The current level of high technology employment in the state is lower than it was in the early 1990s. The state has dropped in the high tech concentration rank from 4th in 1995 to 9th in 2008. NH was the worst performing state in high-tech employment change during the tech bust in the early 2000s. Between 2000 and 2003, high tech employment fell over 22 percent in NH, compared to a decrease of 12 percent in the nation and since 2003, NH's rate of recovery from the technology downturn has been below the median among states. To reverse this trend, bold action is needed. Therefore, it is with great enthusiasm that I support the New Hampshire Department of Education's (NHDOE) Race to the Top application, particularly as it relates to Science, Technology, Engineering and Math. Its focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students matches the needs of our state.

Specific measures in which the state of NH ranks poorly includes the use of online technology by the state government, the availability of technology in primary and secondary schools, and major deficits in science and technology specific training including the percentage of bachelor's degrees, recent PhDs, and graduate students in science and engineering. New Hampshire's economy rests on the quality of its schools, colleges, and universities to provide a well-educated and well-rounded workforce. The state needs a trained workforce which can address 21st-century employment needs. Postsecondary education institutions, in partnership with business and industry, are the incubators of new products, services, and applications, as well as the catalysts for new companies and new jobs. P-12 education is the foundation of the whole enterprise.

The University System of New Hampshire is the largest provider of post secondary education in the Granite State. With almost 30,000 enrolled students and 75,000 alumni living in state, the sister institutions of the University System - the University of New Hampshire, Plymouth State

University, Keene State College, and Granite State College - have a direct impact on hundreds of thousands of New Hampshire citizens every year. In fact, the University System institutions produce the majority of graduates in New Hampshire in Teacher Education and in the STEM disciplines. Therefore, the goals of the Race to the Top STEM grant are completely in sync with goals the University System of New Hampshire has including the desire to train, develop and retain effective teachers and principals thus guaranteeing an equitable distribution of highly qualified math, science, engineering and technology teachers throughout the state, particularly in areas of high poverty and rural areas; support all priority schools and districts to adopt and implement innovative research and standards-based models for STEM teaching; and actively increase student preparedness for college level math and reduce the need for remedial mathematics for high school graduates enrolling in college.

In addition, the University System of New Hampshire, and its partner Dartmouth College, have recently submitted an EPSCoR grant that would further enhance the outcomes for the NHDOE RACE to the Top STEM grant. The key elements of the NH EPSCoR Plan include: increasing the understanding of the role of science and technology in the economy, a "toolkit" that provides data and metrics for tracking and interpreting the status of STEM infrastructure and its impact on the state's economy resulting in the creation of a Cyber-enabled Learning and Innovation Environment in NH. This means building research strength, enhancing STEM education at all levels and broadening EPSCoR participation by postsecondary institutions, providing public service and communication to K-12 schools and the citizenry, and training future employees for NH high-tech companies. The goals of the NHDOE grant, and the collaborative efforts it represents, are not only in perfect alignment with national priorities but compliment the Science and Technology Plan developed by the EPSCoR Statewide Committee in 2009. I pledge the full support of the University System to implement this grant, and will be engaged with its development and operation along the way.

Sincerely,

(b)(6) [redacted]

Edward R. MacKay
Chancellor

COMMUNITY COLLEGE
system of New Hampshire

January 6, 2010

Dr. Virginia M. Barry, Commissioner
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

It is with great enthusiasm that I support the New Hampshire Department of Education's Race to the Top application. Its focus on increasing student learning and to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students, matches the needs of our state and advances the mission of the Community College System of New Hampshire which seeks to make post-secondary education accessible to as many students as possible.

As you know, we have participated in a number of collaborations with the NH Department of Education over the last decade that have addressed the dual issues of student readiness and accessibility to higher education. Perhaps the most successful of these has been the Running Start program, a concurrent high school/college credit program which delivers college courses in high schools at a greatly reduced tuition rate. Last year we offered 628 courses in 72 high schools and registered nearly 4700 students in the program. Growing out of that initiative is the recently developed eStart program, an online version of Running Start offered in collaboration with the Virtual Learning Academy Charter School. Designed to reach out to high schools who find it difficult to participate in the Running Start program, eStart has had modest success since its inception over a year ago and we anticipate a steady growth as the program gains recognition in high schools across the state.

We have also collaborated with the NHDOE on a Math Partnership Grant over the last three years that addresses the math readiness of students entering our CCSNH colleges. This has been excellent collaboration between math teachers from the high schools and their counterparts in our colleges as they mapped out math competencies students needed when entering our colleges. Most recently this team has partnered to develop a senior year math course specifically designed to eliminate the need for math remediation when students enter one of our colleges. The Math Partnership Grant has also made it possible for this team to present math workshops to joint meetings of math teachers from CCSNH and secondary schools.

CCSNH has also been heavily involved in the development of state legislation to create a data tracking system that would allow the state's institutions of higher education to track students from the time they enter the education system on through to graduation from college. That legislation has been entered for consideration in the state's next legislative session. We have also helped craft a federal grant to be submitted by the NHDOE to fund the creation of such a data sharing system.

As can be seen, a productive spirit of collaboration exists between the CCSNH, the NHDOE, and various high schools around the state. We wholeheartedly support the principles underlying the Race to the Top grant and would hope that projects such as those described above would be enhanced and new ones, building on our past experience of successful partnerships, could be developed. We look forward to continuing to work with the NHDOE, high schools and school districts to increase higher education opportunities to the citizens of our state.

Sincerely,

(b)(6)

Dr. Richard A. Gustafson
Chancellor

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January 7, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, New Hampshire 03301

Dear Commissioner Barry:

On behalf of the Southern New Hampshire University School of Education, we fully endorse and support the New Hampshire Department of Education's *Race to the Top* application. At SNHU, we acknowledge that recruiting, preparing, and retaining good teachers is the central strategy for improving our schools. We also know that true school reform cannot succeed unless it focuses on creating the conditions under which teachers can teach, and teach well so that students can learn. What teachers know and do is one of the most important influences on what students learn. There is simply no way to create good schools without good teachers who can work collaboratively with families and the community. Knowing this, we seek to construct optimal conditions that prompt the integration of theoretical and practical learning which provides a compelling context for developing skilled and thoughtful teachers.

Our teacher candidates learn just as other students do by studying, practicing, and reflecting. That learning is deepened by collaborating with others, by looking closely at students and their work, and by talking with practicing educators about what they observed. This kind of learning cannot occur in university classrooms alone. Our teacher education program cannot teach theory separately from practice, nor can teachers teach in isolation. Changing this process requires educating teachers in partnerships with schools that become exemplars of what is possible, rather than what exists. This is a significant opportunity for SNHU as it redefines its teacher education programs and works to create professional preparation learning environments.

It is our intent to build professional learning communities that focus on learning, that of our teacher candidates, in-service teachers, and most importantly, that of the students in classrooms. By partnering with specifically identified schools to create the conditions and solutions for success, we expect to accomplish the following: (1) deliver a well-articulated curriculum; (2) embrace a commitment to reflective practice and continuous improvement; (3) plan systematically for delivery of instruction; (4) vary assessment methodology to clarify the learner's attainment relative to the designated learning standards and generate the information or facilitation necessary to help the learner achieve the desired results; (5) provide consistently methodical feedback to the learner based on the desired learning outcomes; (6) purposefully engage students in the learning process and guide them to take responsibility for their own learning; (7) document higher levels of student achievement based on multiple assessments; (8) graduate teacher candidates who are prepared to teach effectively in collaboration with their colleagues and who recognize that learning takes place in many venues; (9) recognize teachers who

The School of Education is committed to creating a better tomorrow by preparing students and supporting professional educators today to be knowledgeable, reflective learners, responsive to the needs of a diverse society.

identify their professional learning in connection with the learning of their students; (10) work with school boards and district administrators who are prepared to sustain and support such relationships; (11) conduct induction and mentoring programs that sustain and retain effective teachers; (12) embrace assessment for learning that gauges the progress of each student within the school; and (13) define clear roles and responsibilities for each of the partners that collaborate in rethinking teacher preparation and practice in the classrooms.

To accomplish this bold step in a PreK-16 continuum will take the combined efforts of the Department of Education, partner schools, National Center on Education and the Economy, and the expertise and knowledge investment of Measured Progress. We look forward this collaboration and our participation in this critically important endeavor as partners with the Department, the Manchester School District, schools, districts, National Center and Measured Progress.

Sincerely,

(b)(6)

Mary Sullivan Heath
Dean, School of Education

cc: Dr. Paul LeBlanc, SNHU President
Dr. Patricia Lynott, Vice President Academic Affairs

Office of the President
Keene State College
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January 8, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

On behalf of Keene State College, it is with great enthusiasm that I support the New Hampshire Department of Education's Race to the Top application. Its focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students matches the needs of our state and is consistent with the priorities of Keene State College.

The State of New Hampshire envisions three levels of intervention at which it will provide or broker services for districts and schools. The first level involves the Department of Education coordinating networks of schools, districts, institutions of higher education and professional organizations that will provide vehicles for sharing findings and promising practices, problem solving, and identifying ways to scale up effective practices in the state and across the region.

At this first level, Keene State College anticipates partnering with the New Hampshire Department of Education to mobilize the resources and expertise of its graduate program in education to link directly with the needs of the local school district. Through an innovative immersion apprenticeship model, Keene State teacher candidates will be embedded with collegiate mentors and classroom teachers at a local elementary school where they will support literacy and the creation and delivery of a developmentally-appropriate, and progressive, curriculum. Keene State will partner with colleagues in the school and within the larger school district to lead the development of authentic assessment instruments for students and teacher candidates alike. It is our intention that these instruments will leverage existing statewide data systems and result in complementary tools that support peer comparison and evaluation of effectiveness in outcomes achievement for students, teacher candidates and teaching professionals alike.

As New Hampshire's public liberal arts college with an NCATE accredited teacher education program, Keene State has not only the capacity to advance the goals of the Department of Education, but also a commitment to driving economic growth in our state and a tradition of educating the best New Hampshire teachers for service to their communities. As a member of your advisory council, I also pledge my personal support for education in our state. I look forward to collaborating with the Department of Education on this statewide project that will enhance student learning, improve teacher candidate preparation, and support career success and professional development activities for educators across New Hampshire.

Sincerely,

(b)(6)

Helen F. Giles-Gee
President

3 Barrell Court, Suite 100, Concord, NH 03301
(603) 225-4199 x300 · www.NHscholars.org

COMMITMENT THROUGH COLLABORATION

NEW HAMPSHIRE COLLEGE UNIVERSITY COUNCIL

3 Barrell Court, Suite 100, Concord, NH 03301
(603) 225-4199 · www.nhcuc.org

January 8, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, New Hampshire 03301

Dear Commissioner Barry:

It is with great enthusiasm that the New Hampshire College & University Council supports the New Hampshire Department of Education's Race to the Top application. On behalf of our public and private member institutions, we particularly support the application's focus to increase student learning and achievement to meet the demands of the 21st century. We commend the Department's work on the application in an effort to create an educational system that will build human and social capital to grow and sustain a vibrant New Hampshire economy.

In an effort to better prepare students for college and career, our State Scholars Initiative builds the capacity of school districts to enhance personalized learning, individualized progress and encourages students to take more rigorous course work. We understand New Hampshire's Race to the Top application includes funds to expand New Hampshire Scholars throughout the state, particularly lower performing high schools.

We are very interested in further collaboration with the Department of Education to ensure that all school districts in New Hampshire can systemically support student learning and achievement. In many of our struggling schools there are lacking resources and support structures necessary to promote higher learning. The New Hampshire College & University Council, through its State Scholars Initiative, provides additional resources and support enabling schools to better serve their students.

We are very excited that this application will enable us to target our lowest-achieving schools. In many instances, our struggling schools exhibit these characteristics:

- Low expectations
- Minimal aspirations for higher education
- Students lack access to college readiness material
- Lack of urgency to graduate high school with necessary high level skills

(continued)

We are confident that this application can make a real difference in changing the culture and expectations of these school districts. When students are asked to perform at a high level, enroll in more rigorous courses, explore college and career options they will accept the challenge. In a recent survey, more than 70% of recent high school graduates said they would have worked harder in high school if someone would have asked them to do so. We know our students will accept the challenge. We also know that the innovative work being done in twenty-two of our districts through the State Scholars Initiative will be successful in increasing expectations and building an effective strategy in our lowest-performing schools as well.

The New Hampshire College & University Council has been a long-time partner of New Hampshire's Department of Education. Together we have successfully implemented our college readiness program in one-quarter of the state's school districts. We plan to continue collaboration in an effort to narrow the achievement gap for New Hampshire's students. Our colleges and universities clearly understand the importance of supporting and recognizing well prepared students. With the K-12 pipeline decreasing in New Hampshire it is critically important to foster student learning and student achievement in all of the state's school districts.

We look forward to collaborating with the Department, schools, districts and other partners to successfully meet the goals and objectives of this application.

Sincerely,

(b)(6)

Thomas Horgan
President & CEO
NH College & University Council
(603) 225-4199 x318

Scott Power
Director
New Hampshire Scholars Initiative
(603) 225-4199 x300

COMMITMENT THROUGH
COLLABORATION

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UNIVERSITY
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STATE DEPARTMENT
OF EDUCATION

December 15, 2009

Dr. Virginia Barry
Commissioner
New Hampshire Department of Education
101 Pleasant Street
Concord, New Hampshire 03301

Dear Ginny,

As Chair of the New Hampshire Scholars Leadership Board, I write in support of the statewide State Scholars Initiative and its inclusion in the Race to the Top grant application. Our board understands that Scott Power, State Director, has been in discussion with you regarding New Hampshire's Race to the Top grant application and the inclusion of New Hampshire Scholars in this proposal. Given the increased interest from superintendents and success stories from school districts across the state, our goal is long-term sustainability. Race to the Top funds will greatly assist in meeting these goals and everyone on the Board was excited and grateful to you for stewarding forward our inclusion in the grant.

Scott has shared some language with you regarding program goals and objectives. These goals not only align K-12 with higher education and business expectations, but also raise aspirations in all students. Our board, especially our business leaders, feels strongly that this strategy empowers schools to better prepare New Hampshire students for college and career. For these reasons, we are delighted to know that New Hampshire Scholars is included in the Race to the Top application.

Thank you for your support.

Sincerely,

(b)(6) [redacted]

Paul J. LeBlanc
President, Southern New Hampshire University
Chair, New Hampshire Scholars Leadership Board
(603) 668-2211
p.leblanc@snhu.edu

STATE OF NEW HAMPSHIRE
DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION FOR JUVENILE JUSTICE SERVICES

1056 NORTH RIVER ROAD, MANCHESTER, NH 03104
603-625-5471 FAX: 603-624-0512 TDD Access: 1-800-735-2964

Nicholas A. Toumpas
Commissioner

William W. Fenniman, Jr.
Director

January 11, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

It is with great enthusiasm that I support the New Hampshire Department of Education's Race to the Top application. Its focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students matches the needs of our State.

It is our belief that coordinating the efforts of schools, Districts, institutions of higher education and professional organizations will provide the vehicles for sharing, problem solving and identifying ways to scale up effective practices within the State and across the region.

As an agency that works specifically with students at risk we look forward to collaborating with the Department of Education, schools and their districts and organizations to identify the weaknesses and address positive resolve to issues of grade level and growth expectation standards, and especially in decreasing the achievement gaps of New Hampshire Students.

It is with great pleasure that we support the Department of Education with this grant opportunity and if there is anything else I can do for you, please do not hesitate to ask.

Sincerely,

(b)(6)

William W. Fenniman, Jr.
Director

STATE OF NEW HAMPSHIRE
DEPARTMENT OF CORRECTIONS
OFFICE OF THE COMMISSIONER
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CONCORD, NH 03302-1806
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William L. Wrenn
Commissioner

William G. McGonagle
Assistant Commissioner

January 5, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

It is with great enthusiasm that I endorse and support the New Hampshire Department of Education's Race to the Top application. Its focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students matches the needs of our state.

As you are well aware individuals characterized by under achievement and educational disabilities are over-represented in the prison system in the country. The same is true here in New Hampshire. Through the Corrections Special School District's Granite State High School (GSHS) the Department of Corrections provides academic and technical education services to these male and female inmates in our custody. With the assistance and guidance provided by the Department of Education we are continuously evaluating means to be more effective in this effort.

The Department of Corrections hopes to participate in the Race to the Top initiative by implementing technology aimed at providing remote video and audio connectivity between the Department's educational facilities in Concord and Goffstown. This technology would allow incarcerated students broader access to the curriculum offered by the GSHS as well as to distance learning opportunities beyond the walls of our prisons. Additionally, this technology would allow students preparing for their return to the community to access and communicate with community-based resources that may prove crucial to their success after release.

I and the New Hampshire Department of Corrections look forward to collaborating with the Department of Education, schools, districts and community organizations to assist individuals involved in the criminal justice system close their educational gap with their peers in order to meaningfully participate in their community and the state's economy. Accomplishing this would be one important step toward reducing the societal and fiscal impacts of crime.

Sincerely,

William L. Wrenn
Commissioner

STATE OF NEW HAMPSHIRE
DEPARTMENT of RESOURCES and ECONOMIC DEVELOPMENT
OFFICE of the COMMISSIONER
172 Pembroke Road P.O. Box 1856 Concord, New Hampshire 03302-1856

GEORGE M. BALD
Commissioner

603-271-2411
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george.bald@dred.state.nh.us

January 7, 2010

Ms. Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, New Hampshire 03301

Dear Commissioner Barry:

It is with great enthusiasm that I support the New Hampshire Department of Education's Race to the Top application. Its focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students matches the needs of our state.

The future of the State of New Hampshire's economy is dependent on the students in our system today. Your efforts to increase student learning and achievement will go a long way to insure we have a skilled workforce to sustain current companies and to attract new ones.

My agency is prepared to work closely with you to create this opportunity for educational transformation. When children learn to work in teams, to adapt to changing situations, and have the capacity to be lifelong learners, our economy will be strengthen. It will help us to attract companies that value creativity, and are looking for students that are ready to take on the 21st century.

I look forward to collaborating with the Department, schools, districts, and organizations to support the Race to the Top. Best wishes in this effort, and please feel free to call on me if I can help in any way.

Sincerely,

George M. Bald
Commissioner

GMB:lc

Real World
Design Challenge

11710 Plaza America Drive
Suite 2000
Reston, VA 20190
703-298-6630
rcoppola@ptc.com

January 14, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Commissioner Barry:

New Hampshire is one of the state partners in the Real World Design Challenge. We applaud you for your vision and plan for STEM Education. The Real World Design Challenge has been incorporated in the New Hampshire STEM education plan.

We are pleased to help support your Race to the Top grant application! Since New Hampshire is a partner in the Real World Design Challenge two of the corporate partners PTC and Mentor Graphics will donate engineering software for high school team participating in the Challenge. The following is what is provided:

1. PTC will donate 300 licenses of Pro/ENGINEER 3D Computer Aided Design (CAD) software to each trained teacher. Each license is worth $3,000 that is a donation of $900,000 per teacher. These licenses are perpetual and all upgrades are free.
2. PTC will donate a license of Mathcad for each teacher and student involved in the Real World Design Challenge. Each license is worth $1095. For a team of 8 people that is donation of $8,760 per team. Mathcad plugs into Pro/ENGINEER and enables the user to track and manage and understand and use all of the mathematical formulas associated with their CAD designs.
3. Each student/teacher team will get access to Windchill, global engineering collaboration and data management software. Each seat is worth $2,800. Real World design Challenge teams may have up to 7 students and a teacher or 8 people. Windchill for a team of 8 people is worth $22,400. These seats are server-based and are renewed for each new set of teams each year.

4. Mentor Graphics will donate 1 license of FloEFD.Pro, fluid dynamics testing software package per team. The software package is worth $24,500 per license for each team for the year of the project.

You may have as many teams in the state as you like. Each Real World Design Challenge Team will receive all of the above mentioned software. The US Department of Energy is covering the cost of travel to Washington, DC for the Real World Design Challenge State Winner to compete in the National Challenge Event. Each team also gets access to up to four professional mentors from government, industry and higher education at no cost to them. The teams collaborate with the mentors using Windchill.

All 24 Real World Design Challenge Partners from government, industry and education stand in support of the New Hampshire Race to the Top proposal.

We are very pleased to have New Hampshire involved in the Real World Design Challenge. We anticipate that the number of teams from the state will grow each year. We hope you proposal will be funded! Please let me know if there is anything else that I can do to help!

Sincerely,

(b)(6) [redacted]

Ralph K. Coppola, Ed.D
Director, Real World Design Challenge &
Director of Global Government & Strategic Education Programs at PTC

BAE SYSTEMS

BAE Systems
Electronic Solutions
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Nashua, NH 03061-0868
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January 15, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Dr. Barry:

It is with great enthusiasm that I endorse/support the New Hampshire Department of Education's Race to the Top application, particularly as it relates to Science, Technology, Engineering and Math. Its focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students matches the needs of our state.

Race to the Top has identified the following goals for STEM:

- Increased access to high-quality STEM-related courses and experiences for all students in all schools, P-12, particularly underrepresented groups and of women and girls; identify clear career paths in the STEM industries;
- Recruit, develop and retain effective teachers and principals thus guaranteeing an equitable distribution of highly qualified math, science, engineering and technology teachers throughout the state, particularly in areas of high poverty and rural areas;
- Support all priority schools and districts to adopt and implement innovative research and standards-based models for STEM teaching; and
- Actively increase student preparedness for college level math and reduce the need for remedial mathematics for high school graduates enrolling in college

BAE Systems has been an active supporter of educational initiatives throughout the state of New Hampshire for many years. Our continued outreach is focused on the areas of math, science and technology through support of programs such as FIRST (For Inspiration and Recognition of Science and Technology) of which BAE Systems is a major strategic sponsor. BAE Systems has collaborated with the Department of Education on programs such as Schools to Careers and internship programs which foster an interest in technology and engineering in school age children. BAE Systems opens its doors to a number of students throughout the state to engage in real world experiences in the fields of engineering, science and technology. We plan to continue supporting STEM activities through philanthropy, outreach, and community support.

BAE Systems looks forward to collaborating with the Department, schools, districts, and organizations to encourage students to pursue careers related to science, technology, engineering and mathematics.

Sincerely,

(b)(6)

Lu Goncalves-Getty
Manager, Community and Business Relations
Electronic Solutions

Seacoast School of Technology

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Margaret E. Callahan, Principal
Sam Bruno, Student Services Counselor

Patricia Brinkley, Teacher Resources Counselor
Marilyn Kellogg, Career Advisor

Serving: Epping Exeter Newmarket Raymond Sanborn Winnacunnet

January 12, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Dr. Barry:

It is with great enthusiasm that I endorse and support the New Hampshire Department of Education's Race to the Top application, particularly as it relates to Science, Technology, Engineering and Math. Its focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students matches the needs of our state.

The Health Science and Technologies teachers in New Hampshire are preparing students for postsecondary study and careers that require a strong foundation in science, technology and mathematics. We are excited that this STEM initiative will give students from all backgrounds the necessary skills to succeed in our programs and beyond.

We are currently working with industry and postsecondary faculty to develop statewide rigorous plans of study that outline the science, math and technology required to for postsecondary success in the allied health career paths. It is clear to us that a strong STEM curriculum in New Hampshire is critical to the success of our students.

Through the state and national Health Occupations Student Organization, our students gain experience in science and technology through competition, camaraderie and leadership activities. We continually strive to encourage all students to participate in these activities to increase their knowledge and skills.

We would welcome the opportunity to collaborate with the Department of Education, schools and industry to strengthen STEM education and improve access for as many New Hampshire students as possible.

Sincerely,

(b)(6) [redacted]

Linda Cutler, President
NH Health Science & Technologies Teachers

New Hampshire Technology Education Association

January 15, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Dr. Barry:

It is with great enthusiasm that the New Hampshire Technology Education Association supports the New Hampshire Department of Education's Race to the Top application, particularly as it relates to Science, Technology, Engineering and Math. Its focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students, matches the needs of our state. As Technology Education teaches, our members teach the "T" and "E" in STEM everyday. We are pleased to see engineering and technology teachers included in the second "Race to the Top" goal: Recruit, develop, and retain effective teachers and principals thus guaranteeing an equitable distribution of highly qualified math, science, engineering and technology teachers throughout the state, particularly in areas of high poverty and rural areas.

Race to the Top has identified the following goals for STEM:

- Increased access to high-quality STEM-related courses and experiences for all students in all schools, P-12, particularly underrepresented groups and of women and girls; identify clear career paths in the STEM industries;
- Recruit, develop, and retain effective teachers and principals thus guaranteeing an equitable distribution of highly qualified math, science, engineering and technology teachers throughout the state, particularly in areas of high poverty and rural areas;
- Support all priority schools and districts to adopt and implement innovative research and standards-based models for STEM teaching; and
- Actively increase student preparedness for college level math and reduce the need for remedial mathematics for high school graduates enrolling in college

The state of New Hampshire has placed an emphasis in engineering education for over six years by endorsing PLTW and now Engineering byDesign and including funding for engineering curriculum. New Hampshire is ahead of most states in this regard. The New Hampshire Technology Education Association has been very active in promoting the Standards for Technological Literacy, Engineering byDesign and other engineering curricula and hope that this program will strengthen our efforts to develop a technologically literate society here in New Hampshire.

The New Hampshire Technology Education Association looks forward to collaborating with the Department of Education, schools, districts, and other organizations to increase student awareness and knowledge in STEM subjects.

Sincerely,

Dawn Korade,
President, NHTEA

Dan Caron
EbD Curriculum Specialist

New Hampshire Science & Engineering Exposition Association

SPONSORS OF THE
NH SCIENCE AND ENGINEERING EXPOSITION
WWW.NHSEE.ORG

January 12, 2010

Virginia M. Barry, Ph.D.
Commissioner of Education
New Hampshire Department of Education
101 Pleasant Street
Concord, NH 03301

Dear Dr. Barry:

It is with great enthusiasm that I endorse and support the New Hampshire Department of Education's Race to the Top application, particularly as it relates to Science, Technology, Engineering and Math. Its focus on increasing student learning and achievement to meet the demands of the 21st century, while narrowing the achievement gap for subgroups of students matches the needs of our state.

For the past eight years, a small group of science teachers have been providing students statewide an opportunity to showcase their scientific research projects and participate in science and engineering challenge competitions at the annual New Hampshire Science and Engineering Exposition. Increased access to high quality STEM-related courses and experiences and highly effective teachers will increase the number of students who participate in our event as well as improve the quality of their research.

We are very excited about the STEM initiative in New Hampshire's Race to the Top application because it aligns with our goals of increasing student interest in science and engineering and providing them with the skills necessary to engage in scientific inquiry. We hope to reach students from the northern rural parts of the state to provide students from those communities the opportunities to participate in a statewide science and engineering competition and this effort will assist us in this effort.

We look forward to collaborating with the Department of Education, schools and industry partners to improve and expand science, technology, engineering and mathematics education in New Hampshire.

Sincerely,

(b)(6)

Norma Bursaw
President

K-12 Reading
New Hampshire
Curriculum Framework

(b)(6)

June 2006

www.ed.state.nh.us/frameworks

Governor of New Hampshire
John Lynch

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English Language Arts Curriculum and Assessment Consultant
Linda Stimson

NOTICE OF NONDISCRIMINATION

The New Hampshire Department of Education does not discriminate on the basis of race, color, religion, marital status, national/ethnic origin, age, sex, sexual orientation, or disability in its programs, activities, and employment practices. The following person has been designated to handle inquiries regarding the nondiscrimination policies: Brenda Cochrane, ADA Coordinator, NH Department of Education, 101 Pleasant Street, Concord, NH 03301-3860, (603) 271-3743 TTY/V or bcochrane@ed.state.nh.us.

The information on the following pages is also available on our website at www.ed.state.nh.us.

June, 2006

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Introduction

The purpose of this framework is to serve (1) as the basis for the development of assessment instruments to be administered statewide and (2) as a guide for making local decisions about curriculum development and delivery, in accordance with RSA 193-C relative to the New Hampshire Educational Improvement and Assessment Program.

This framework establishes curriculum and expectations for English language arts. This is the accepted professional term for the subject area of reading and language arts as it is taught throughout the grades. "English" is more commonly used in high school; "language arts," in most elementary and middle/junior high schools. The English language arts consist of the interactive processes of reading, writing, speaking, listening, and viewing.

This framework will be used at the local level, in conjunction with assessment results, as a guide for making decisions about development of curriculum, delivery of instruction and utilization of classroom, school, and district assessments. Educators, school board members, and citizens are encouraged to work cooperatively to develop local educational improvement and assessment plans that build on and complement the state effort.

How this framework is organized

The *K-12 English Language Arts Curriculum Framework* is organized into Grade-Level Expectations (GLEs) and Grade-Span Expectations (GSEs). Both the GLEs and GSEs contain statements about what all New Hampshire students are expected to know and be able to do. The GLEs are delineated by grade level across grades K-8. The GSEs are organized by grade spans of 9-10 and 11-12. Both the GLEs and GSEs are built upon the *K-12 English Language Arts Curriculum Framework* (1995).

Both the GLEs and GSEs are organized into five content strands for Reading: Vocabulary, Initial Understanding of Literary Texts, Analysis and Interpretation of Literary Texts, Initial Understanding of Informational Texts and Analysis and Interpretation of Informational Texts. There are eight strands for Written and Oral Communication: Habit of Writing, Structures of Language, Writing in Response to Literary Text, Writing in Response to Informational Text, Narratives, Informational Writing, Writing Conventions and Oral Communication Strategies.

At the beginning of each strand is a purpose statement which places the strand in the context of the K-12 English Language Arts curriculum. Furthermore, each strand contains a number of big ideas referred to as stems. The stems articulate the main curricular focus across grades K-12.

There are two types of expectations throughout the document, those identified for state assessment purposes and those identified for local curriculum and assessment. The state assessment expectations appear in bold boxes; all other expectations are guidance for local curriculum and assessment.

K-12 Broad Goals for English-Language Arts

These goal statements establish general expectations of what New Hampshire students should know and be able to do in English language arts.

- Students will read fluently with understanding and appreciation.
- Students will write effectively for a variety of purposes and audiences.
- Students will speak purposefully and articulately.
- Students will listen and view attentively and critically.
- Students will understand, appreciate, interpret, and critically analyze classical and contemporary literature as well as works of nonfiction and informational texts.
- Students will use reading, writing, speaking, listening, and viewing to:
  gather and organize information;
  communicate effectively; and
  succeed in educational, occupational, civic, and social settings.

Reading

Purpose: The ability to read is essential for students to succeed as learners, both in school and throughout their lives, and to become contributing members of society. Students must be able to deal critically with a variety of complex texts including literary, informational, and practical. Good readers combine the inclination to read with the ability to use monitoring and discussion to develop understanding. They employ multiple strategies and processes to understand the written word. Throughout their formal instruction, students should read authentic materials including worthy examples of literature as well as texts that reinforce other content areas of the school's curriculum.

Writing

Purpose: Through writing students transmit information, construct and communicate good ideas. Good writers employ language successfully in a wide range of settings for academic, personal, occupational, and public uses. Frequent writing practice across a variety of situations and tasks and in all content areas enables students to refine and expand both their knowledge base and their thinking skills.

English Language Uses

Purpose: Students needs to learn how to use language to communicate in multiple ways and for multiple purposes. To this end, the language processes of reading, writing, speaking, listening, and viewing must become integral parts of their lives. By systematically employing these interactive processes, students are able to gather needed information and to prioritize and organize this material. The skillful use of these language processes provides students with the means of acquiring, constructing, and expressing knowledge in all school content areas and in the human experience. In order to be successful, students must become powerful users of language.

Introduction

The New England Common Assessment Program (NECAP) Reading GLEs have been developed as a means to identify the reading content knowledge and skills expected of all students, for large-scale assessment of reading in grades 3-8. GLEs and GSEs *are meant to capture the "big ideas" of reading that can be assessed, without narrowing the curriculum locally*. They *are not intended* to represent the full reading curriculum for instruction and assessment locally, at each grade. The set of GLEs/GSEs includes concepts and skills intended to be assessed on demand, in a large-scale assessment (indicated by "State") and other GLEs/GSEs (indicated by "Local") for Local assessment purposes only. All of the Reading GLEs/GSEs described in this document are expected to be assessed Locally, even if indicated for large-scale assessment. "Local GLEs" in reading include those concepts and skills not easily assessed in an on-demand setting (e.g., reading fluency, reading accuracy, self-correcting while reading, depth and breadth of reading, etc.). Grade Level/Span Expectations – at any grade – represent reading content knowledge and skills *introduced instructionally at least one to two years before* students are expected to demonstrate confidence in applying them independently in an on-demand assessment.

The NECAP GLEs/GSEs in this document can be interpreted as describing the grade level expectations for the end of the grade identified, or the beginning of the next grade. For example, grade 2 NECAP GLEs identify grade level expectations in reading for both the end of grade 2 and the beginning of grade 3, for assessment purposes.

When using the NECAP Reading Grade Level Expectations, the following are important to understand:

1. All of the concepts and skills identified at a given grade level are "fair game" for large-scale assessment purposes ***if indicated by "(State)."*** However, conjunctions used throughout this document have specific meaning. The use of the conjunction "or" means that a student can be assessed on all or just some of the elements of the GLE in a given year. The use of "and" between elements of a GLE means that the *intent* is to assess each element every year. In some situations, "or" is used when students have choices about how they will provide supporting evidence for their response.
   - (E.g., "R:LT:4:2.2: Describing main characters' physical characteristics or personality traits; or providing examples of thoughts, words, or actions that reveal characters' personality traits" means that students may be asked to describe main characters' physical characteristics OR to describe characters' personality traits, OR to provide any or all of the following – thoughts, words, OR actions -- to support their responses that reveal characters' personality traits.)

2. Each GLE includes three parts.
   - **A statement in bold,** called the "stem," is at the beginning of each GLE/GSE. Each "stem" is the same or similar across the grades for a given GLE/GSE, and is meant to communicate the main curriculum and instructional focus of the GLE/GSE across the grades.

- The unbolded text within a GLE/GSE indicates how the GLE/GSE is specified at a given grade level. There are often are several indicators for each stem. Each indicator is coded.
- Differences between adjacent grades are underlined. (Note: Sometimes nothing is underlined within a GLE/GSE. In these situations, differences in adjacent grades "assumes increasing text complexity" and is noted for those GLEs/GSEs.

3. Each GLE/GSE is coded for the content area, the grade level, the GLE/GSE "stem" number, and the specific indicator for that GLE/GSE stem. [E.g., "R:IT:5:2.3" means R (Reading) – IT (Informational Text) - 5 (grade 5) - 2 (2nd "stem") – 3 (the third specific indicator for the 5th GLE stem).]

Stem

Bold lines around a cell/box indicate a State addresses GLE/GSE.

Vocabulary Strategies (V:1)		
(R:V:1: Assumes a variety of text and increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:V:1: Students identify the meaning of unfamiliar vocabulary by…		
Grade K	**Grade 1**	**Grade 2**
R:V:K:1.1: Using strategies to unlock meaning (e.g., activating prior knowledge, using cues, using context clues, or asking questions) (Local)	R:V:1:1.1: Using strategies to unlock meaning (e.g., activating prior knowledge, using cues, using context clues, or asking questions during read-alouds or text reading) (Local)	R:V:2:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including common base words and suffixes, such as "thickest," "hopeful;" or context clues, including illustrations and diagrams; or prior knowledge) (State)

Specific indicator for assessment at this grade, followed by "(Local)" indicates that it will not be included for the large-scale assessment at this grade level. Specific indicator for assessment at this grade, followed by "(State)" indicates that it will be included on the state assessment at this grade level.

Differences between this grade and prior grade are underlined

The GLE/GSE stem identifies "the what" – meaning, "What is the big idea for instruction and assessment?"
The indicators following each stem identify "the how" – meaning, "How will students demonstrate what they know and can do?"

Overview of New Hampshire Grade Level and Grade Span Expectations (GLEs/GSEs) for Reading

Reading Content Clusters	Focus of GLE/GSE	GLE/GSE Number*	K-2 Page	3-5 Page	6-8 Page	9-12 Page
Early Reading Strategies (Grades K-2 only)	Phonemic Awareness and Phonological Knowledge	**ERS:1**	10	27	44	61
	Concepts of Print	**ERS:2**	11	28	45	62
Reading Fluency and Accuracy	Reading Fluency and Accuracy	**F&A:1**	12	29	46	63
Word Identification Skills and Strategies	Word Identification and Decoding Strategies	**WID:1**	13	30	47	64
Vocabulary	Vocabulary Strategies	**V:1**	14	31	48	65
	Breadth of Vocabulary	**V:2**	15	32	49	66
Literary Texts	Initial Understanding of Literary Texts	**LT:1**	16	33	50	67
	Analysis and Interpretation of Literary Text, Citing Evidence	**LT:2**	17	34	51	68
	Analysis and Interpretation of Literary Text, Citing Evidence	**LT:3**	18	35	52	69
	Generates a Personal Response	**LT:4**	19	36	53	70
Informational Texts	Initial Understanding of Informational Text (Expository and Practical Text across Content Areas)	**IT:1**	20	37	54	71
	Analysis and Interpretation of Informational Text (Expository and Practical Text across Content Areas) /Citing Evidence	**IT:2**	21	38	55	72
Reading Strategies	Strategies for Monitoring and Adjusting Reading	**RS:1**	22	39	56	73
	Reading Comprehension Strategies	**RS:2**	23	40	57	74
Breadth of Reading	Reading Widely and Extensively	**B:1**	24	41	58	75
	Participating in Literate Community	**B:2**	25	42	59	76
	Reading for Research Across Content Areas	**B:3**	26	43	60	77
Reading Appendices	A: *Suggested* Informational and Literary Texts		78			
	B: The Six Syllable Types		82			
	C: Reading Fluency Rates		82			
	D: Metacognition Strategies for Understanding Text		83			
	E: Glossary of Reading Terms		84			
	F: A Discussion of "Increasing Text Complexity"		90			

Early Reading Strategies (ERS:1) Phonemic Awareness and Phonological Knowledge		
R:ERS:K:1: Demonstrates phonemic awareness and applies phonological knowledge and skills by… **R:ERS:1:1: Demonstrates phonemic awareness and applies phonological knowledge and skills by…** **R:ERS:2:1: Demonstrates phonemic awareness by…**		
Grade K	**Grade 1**	**Grade 2**
R:ERS:K:1.1: Blending and segmenting syllables and onset-rimes (e.g., cup-cake, s-at) (Local) R:ERS:K:1.2: No GLE at this grade level R:ERS:K:1.3: Isolating phonemes in single syllable words (e.g., "Tell me the first sound in 'mop';" "tell me the last sound in 'mop) (Local) R:ERS:K:1.4: No GLE at this grade level R:ERS:K:1.5: Recognizing pairs of rhyming words (Local)	R:ERS:1:1.1: Blending and segmenting syllables and onset-rimes (e.g., cup-cake, s-at) (Local) R:ERS:1:1.2: Blending and segmenting phonemes in one syllable words (e.g., f-i-sh, r-u-n) (Local) R:ERS:1:1.3: Isolating phonemes in single syllable words (e.g., "Tell me the first sound in 'mop';" "Tell me the last sound in 'mop,'" "Tell me the middle sound in 'mop.'") (Local) R:ERS:1:1.4: Deleting phonemes in one-syllable words ("What is "crust" without the 'c'?") (Local) R:ERS:1:1.5: Producing pairs of rhyming words (Local) R:ERS:1:1.6: Counting syllables in 1 to 4-syllable words (Local)	R:ERS:2:1.1: Blending and segmenting phonemes in more complex one-syllable words (which may include combinations of blends and digraphs, as in th-i-ck, t-r-a-sh) (Local) R:ERS:2:1.2: Blending and segmenting phonemes in one syllable words (e.g., f-i-sh, r-u-n) (Local) R:ERS:2:1.3: Isolating phonemes in single syllable words (e.g., "Tell me the first sound in 'mop';" "Tell me the last sound in 'mop,'" "Tell me the middle sound in 'mop.'") (Local) R:ERS:2:1.4: Deleting phonemes in one-syllable words ("What is "crust" without the 'c'?") (Local) R:ERS:2:1.5: Producing pairs of rhyming words (Local) R:ERS:2:1.6: Counting syllables in 1 to 4-syllable words (Local)

Early Reading Strategies (ERS:2) Concepts of Print		
R:ERS:2: Demonstrates understanding of concepts of print during shared or individual reading by…		
Grade K	**Grade 1**	**Grade 2**
R:ERS:K:2.1: Distinguishing between printed letters and words (Local) R:ERS:K:2.2: Following text with finger-pointing (e.g., charts, simple books), demonstrating left-to right and top-to bottom directionality (Local) R:ERS:K:2.3: Identifying the first and last parts of a word (beginning/end of the word) (Local) R:ERS:K:2.4: Identifying key parts of a book: front and back, print, illustrations (Local) R:ERS:K:2.5: No GLE at this grade level R:ERS:K:2.6: No GLE at this grade level	R:ERS:1:2.1: No GLE at this grade level R:ERS:1:2.2: No GLE at this grade level R:ERS:1:2.3: No GLE at this grade level R:ERS:1:2.4: Identifying title, author, illustrator (Local) R:ERS:1:2.5: Identifying basic punctuation marks and their usage (e.g., question marks, periods, quotation marks) (Local) R:ERS:1:2.6: Demonstrating 1-1 matching of words spoken to words in print (Local)	R:ERS:2:2.1: No GLE at this grade level R:ERS:2:2.2: No GLE at this grade level R:ERS:2:2.3: No GLE at this grade level R:ERS:2:2.4: Identifying title, author, illustrator (Local) R:ERS:2:2.5: Identifying basic punctuation marks and their usage (e.g., question marks, periods, quotation marks) (Local) R:ERS:2:2.6: Demonstrating 1-1 matching of words spoken to words in print (Local)

Reading Fluency and Accuracy (F&A)		
(R:F&A: Assumes a variety of text and increasing text complexity across grade levels. See Appendix D for descriptions of increasing text complexity.)		
R:F&A: Reads grade-level appropriate material with…		
Grade K	**Grade 1**	**Grade 2**
R:F&A:K:1.1: No GLE at this grade level R:F&A:K:1.2: No GLE at this grade level R:F&A:K:1.3: No GLE at this grade level	R:F&A:1:1.1: **Accuracy**: reading material appropriate for the end of grade 1 with at least 90-94% accuracy (See Appendix F for sample titles) (Local) R:F&A:1:1.2: **Fluency**: reading previously – introduced or previously read grade-appropriate text with oral fluency rates of at least 50-80 words correct per minute (See Appendix C for suggested rates) (Local) R:F&A:1:1.3: **Fluency:** reading grade-appropriate text in a way that makes meaning clear, and demonstrates phrasing, expression, and attention to end punctuation (Local)	R:F&A:2:1.1: **Accuracy**: reading material appropriate for the end of grade 2 with at least 90-94% accuracy (See Appendix F for sample titles) (Local) R:F&A:2:1.2: **Fluency**: reading grade-appropriate text with oral fluency rates of at least 80-100 words correct per minute (See Appendix C for suggested rates) (Local) R:F&A:2:1.3: **Fluency**: reading grade-appropriate text in a way that makes meaning clear, demonstrating phrasing, expression, and with attention to punctuation (including commas and quotation marks) (Local)

Word Identification Skills and Strategies (WID)		
R:WID:K: Applies word identification and decoding strategies (leading to automaticity) by … **R:WID:1: Applies word identification and decoding strategies (leading to automaticity) by …** **R:WID:2: Applies word identification and decoding strategies by …**		
Grade K	**Grade 1**	**Grade 2**
R:WID:K:1.1: Demonstrating a basic understanding of how the letters of phonetically regular words (going from left to right), represent their sounds (Local) R:WID:K:1.2: No GLE at this grade level R:WID:K:1.3: No GLE at this grade level R:WID:K:1.4: Reading high frequency words, including names, environmental print, sight words (as appropriate to the child's personal and classroom experiences) (Local) R:WID:K:1.5: Recognizing and naming all upper and lower case letters (Local) R:WID:K:1.6: Identifying the primary sounds represented by most letters (sound-symbol correspondence) (Local)	R:WID:1:1.1: Sounding out regularly spelled (decodable) one-syllable or two-syllable words using letter-sound correspondence knowledge (Local) EXAMPLES (regularly spelled one and two syllable words): bat, kitten, classroom R:WID:1:1.2: Reading regularly spelled one or two-syllable words using knowledge of sounds and letter patterns (including common endings (s, ed, ly, ing) (Local) R:WID:1:1.3: Reading grade-level appropriate words (in connected text) (Local) R:WID:1:1.4: Reading grade- appropriate, high-frequency words (that include irregularly spelled words – said; contractions – I'm) (Local) R:WID:1:1.5: No GLE at this grade level R:WID:1:1.6: No GLE at this grade level	R:WID:2:1.1: Identifying regularly spelled multi syllabic words, by using knowledge of sounds, syllable types, or word patterns (including most common spellings for consonants and vowels, e.g., knot, catch, float, fight; or common suffixes (State) EXAMPLES: Students might be asked to match words to pictures or to match words to words with similar sounds (e.g., flower and shower) EXAMPLES (multi syllabic words): happiness, shower, sunshine R:WID:2:1.2: Reading regularly spelled one or two-syllable words using knowledge of sounds and letter patterns (Local) R:WID:2:1.3: Reading grade-level appropriate words (in connected text) with automaticity (Local) R:WID:2:1.4: Reading grade- appropriate, high-frequency words (including irregularly spelled words) (Local) R:WID:2:1.5: No GLE at this grade level R:WID:2:1.6: No GLE at this grade level

Vocabulary Strategies (V:1)		
(R:V:1: Assumes a variety of text and increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:V:1: Students identify the meaning of unfamiliar vocabulary by…		
Grade K	**Grade 1**	**Grade 2**
R:V:K:1.1: Using strategies to unlock meaning (e.g., activating prior knowledge, using cues, using context clues, or asking questions) (Local)	R:V:1:1.1: Using strategies to unlock meaning (e.g., activating prior knowledge, using cues, using context clues, or asking questions during read-alouds or text reading) (Local)	R:V:2:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including common base words and suffixes, such as "thickest," "hopeful;" or context clues, including illustrations and diagrams; or prior knowledge) (State)

Breadth of Vocabulary (V:2)		
R:V:2: Shows breadth of vocabulary knowledge, demonstrating understanding of word meanings or relationships by…		
Grade K	**Grade 1**	**Grade 2**
R:V:K:2.1: Identifying synonyms and antonyms (e.g., big/large; hot/ cold) to connect new words to known words (Local) EXAMPLE: What word means the same as ____? R:V:K:2.2: Demonstrating knowledge of basic concepts (i.e., common words that describe position in space and time, such as: over, between, after, behind) (Local) R:V:K:2.3: Organizing words by category (e.g., sorting pictures or objects into groups) (Local)	R:V:1:2.1: Identifying synonyms and antonyms to connect new words to known words (Local) R:V:1:2.2: Selecting appropriate words to use in context (Local) R:V:1:2.3: Describing words in terms of categories, (e.g., A mallard is a kind of duck.), functions (e.g., Scissors are used for cutting.), or features (e.g., A rectangle has four sides.) (Local)	R:V:2:2.1: Identifying synonyms or antonyms; or categorizing words (State) EXAMPLES (of categorizing): Given a T-chart with two "categories" of words listed (e.g., shapes and sizes), students would identify another word to add to the chart that describes shapes or sizes; or in a multiple choice item, select the best category title for the words listed R:V:2:2.2: Selecting appropriate words to use in context, including words specific to the content of the text (State) EXAMPLE: In a short passage about Native American homes, students might encounter the words longhouse and igloo, and then be asked to show that they know the difference between them. R:V:2:2.3: Subsumed under R:V:2:2.1

Initial Understanding of Literary Texts (LT:1)		
(R:LT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:K:1: Demonstrate initial understanding of elements of literary texts read aloud by… **R:LT:1:1: Demonstrate initial understanding of elements of literary texts (including text read aloud, reading independently, or in a guided manner) by…** **R:LT:2:1: Demonstrate initial understanding of elements of literary texts by…**		
Grade K	**Grade 1**	**Grade 2**
R:LT:K:1.1: Identifying characters in a story (Local) R:LT:K:1.2: Responding to simple questions about a book's content (e.g., "What did that hungry caterpillar eat?") (Local) EXAMPLES (of responses): drawing, reenacting parts of a story, etc. R:LT:K:1.3: Generating questions during read alouds (Local) R:LT:K:1.4: No GLE at this grade level R:LT:K:1.5: No GLE at this grade level	R:LT:1:1.1: Identifying characters or setting in a story (Local) R:LT:1:1.2a: Responding to simple questions about a book's content (e.g., "Where did Sylvester go?") R:LT:1:1.2b: Retelling the beginning, middle, and end of a story (Local) R:LT:1:1.3: Generating questions before, during, and after reading (Local) R:LT:1:1.4: Distinguishing between literary and informational texts (Local) R:LT:1:1.5: Identifying literary devices as appropriate to genre: rhyme, repeated language (e.g., "teeny- tiny")(Local) EXAMPLE: In *Brown Bear, Brown Bear*, what words are repeated in the story?	R:LT:2:1.1: Identifying or describing character(s), setting, problem, solution, or major events, as appropriate to text (State) R:LT:2:1.2a: Sequencing key events in order, as appropriate to text (Local) R:LT:2:1.2b: Retelling the key elements of a story (Local) R:LT:2:1.3: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information (Local) R:LT:2:1.4: Distinguishing among a variety of types of text (e.g., literary texts: poetry, plays, realistic fiction, fairy tales, fables, tall tales, or fantasy) (Local) R:LT:2:1.5: Identifying literary devices as appropriate to genre: rhyme, repeated language or dialogue (e.g., "When I was young in the mountains…") (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:2)		
(R:LT:2: Assume increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:K:2: Analyze and interpret elements of literary texts READ ALOUD, citing evidence where appropriate by… **R:LT:1:2: Analyze and interpret elements of literary texts read aloud or read independently, citing evidence where appropriate by…** **R:LT:2:2: Analyze and interpret elements of literary texts, citing evidence where appropriate by…**		
Grade K	**Grade 1**	**Grade 2**
R:LT:K:2.1: Making predictions about what might happen next (Local) R:LT:K:2.2: Identifying characteristics of main characters (Local) R:LT:K:2.3: No GLE at this grade level R:LT:K:2.4: No GLE at this grade level R:LT:K:2.5: No GLE at this grade level R:LT:K:2.6: No GLE at this grade level R:LT:K:2.7: No GLE at this grade level	R:LT:1:2.1: Making predictions about what might happen next, and telling why the prediction was made (Local) R:LT:1:2.2: Identifying physical characteristics, personality traits, or possible motives of main characters (Local) R:LT:1:2.3: Making basic inferences about the text (Local) EXAMPLE: "Why did the wolf want to blow down each pig's house?" R:LT:1:2.4: No GLE at this grade level R:LT:1:2.5: No GLE at this grade level R:LT:1:2.6: No GLE at this grade level R:LT:1:2.7: No GLE at this grade level	R:LT:2:2.1: Making logical predictions (State) EXAMPLE: What might happen next? R:LT:2:2.2: Identifying relevant physical characteristics or personality traits of main characters (State) R:LT:2:2.3: Making basic inferences about problem or solution (State) EXAMPLES: "What helped Luke to solve his problem in the story?" "What was Jane's problem?" R:LT:2:2.4: No GLE at this grade level R:LT:2:2.5: Identifying the author's basic message (Local) R:LT:2:2.6: Identifying possible motives of main characters (Local) EXAMPLE: "Why did the wolf want to blow the house down?" R:LT:2:2.7: Recognizing explicitly stated causes or effects (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:3)		
(R:LT:3: Assume increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:3: Analyze and interpret author's craft, citing evidence where appropriate by …		
Grade K	**Grade 1**	**Grade 2**
R:LT:K:3.1: No GLE at this grade level	R:LT:1:3.1: No GLE at this grade level	R:LT:2:3.1: No GLE at this grade level

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:4)		
R:LT:K:4: Generates a personal response to what is read aloud through a variety of means by… **R:LT:1:4: Generates a personal response to what is read aloud or read independently through a variety of means by…** **R:LT:2:4: Generates a personal response to what is read through a variety of means by…**		
Grade K	**Grade 1**	**Grade 2**
R:LT:K:4.1: Comparing stories or other texts to personal experience, prior knowledge, which might include other texts (Local) R:LT:K:4.2: No GLE at this grade level	R:LT:1:4.1: Comparing stories or other texts to personal experience, prior knowledge or to other texts (Local) R:LT:1:4.2: No GLE at this grade level	R:LT:2:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other texts (Local) R:LT:2:4.2: No GLE at this grade level

Initial Understanding of Informational Texts (IT:1)		
(R:IT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:K:1: Demonstrate initial understanding of informational texts read aloud (expository and practical texts) by… **R:IT:1:1: Demonstrate initial understanding of informational texts (expository and practical texts) by…** **R:IT:2:1: Demonstrate initial understanding of informational texts (expository and practical texts) by…**		
Grade K	**Grade 1**	**Grade 2**
R:IT:K:1.1: Obtaining information, using text features (e.g., title and illustrations) (Local) EXAMPLE: "From the picture on the cover, what do we think this book will tell us?" R:IT:K:1.2: Using explicitly stated information to answer questions (Local) EXAMPLE: "So, what did we learn about what owls eat?" R:IT:K:1.3: No GLE at this grade level R:IT:K:1.4: Generating questions during read alouds (Local) R:IT:K:1.5: No GLE at this grade level	R:IT:1:1.1: Obtaining information, using text features (e.g., title and illustration) (Local) EXAMPLE: "From the title, what do we think this book will tell us?" R:IT:1:1.2: Using explicitly stated information to answer questions (Local) EXAMPLE: "Where do penguins live?" R:IT:1:1.3: No GLE at this grade level R:IT:1:1.4: Generating questions before, during, and after reading (Local) R:IT:1:1.5: Distinguishing between literary and informational texts (Local)	R:IT:2:1.1: Obtaining information, from text features (e.g., simple table of contents, glossary, charts, graphs, diagrams, or illustrations) (State) EXAMPLE: "On what page would you find information about snakes?" R:IT:2:1.2: Using explicitly stated information to answer questions (State) EXAMPLE: "According to this report, what do dolphins eat?" R:IT:2:1.3: Locating and recording information to show understanding, when given an organizational format (e.g., T-chart or Venn diagram) (Local) R:IT:2:1.4: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information (Local) R:IT:2:1.5: Distinguishing among a variety of types of text (e.g., **reference:** beginning dictionaries, glossaries, children's magazines, content trade books, children's newspapers; and **practical/functional/ texts:** procedures/instructions, announcements, book orders, invitations) (Local)

Analysis and Interpretation of Informational Texts/Citing Evidence (IT:2)		
(R:IT:2: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:K:2: Analyze and interpret informational text read-aloud,, citing evidence as appropriate by… **R:IT:1:2: Analyze and interpret informational text read aloud <u>or</u> <u>independently</u>, citing evidence as appropriate by…** **R:IT:2:2: Analyze and interpret informational text, citing evidence as appropriate by…**		
Grade K	**Grade 1**	**Grade 2**
R:IT:K:2.1: Telling what was learned (Local) EXAMPLE: "Draw a picture of something you've learned from this story about dogs." R:IT:K:2.2: No GLE at this grade level R:IT:K:2.3: Making basic inferences (Local) EXAMPLE: "From what we just read, what kinds of foods will help you stay healthy?" R:IT:K:2.4: No GLE at this grade level R:IT:K:2.5: is addressed in R:IT:K:2.3 (Local)	R:IT:1:2.1: Telling what was learned (Local) EXAMPLE: "What do penguins eat? Show me where you found that information?" R:IT:1:2.2: <u>Identifying the topic of the text or explaining the title</u> (Local) EXAMPLE: "What is this about?" R:IT:1:2.3: Making basic inferences or <u>drawing basic conclusions</u> (Local) EXAMPLE: "From what we just read, why do you think firefighters wear special uniforms?" Explain your reasons. R:IT:1:2.4: <u>Identifying facts presented in text</u> (Local) R:IT:1:2.5: is addressed in R:IT:1:2.3 (Local)	R:IT:2:2.1: <u>Connecting information *within* a text</u> (State) EXAMPLE: Combining or comparing facts and details presented – "What food is eaten by both kinds of fish?" R:IT:2:2.2: <u>Recognizing generalizations about text (e.g., identifying appropriate titles or main/central ideas)</u> (State) R:IT:2:2.3: Making basic inferences or drawing basic conclusions (State) EXAMPLE: "Based on this report, do turtles make good pets?" R:IT:2:2.4: Identifying facts presented in text (Local) R:IT:2:2.5: <u>Making inferences about causes or effects, when signal words are present</u> (State) EXAMPLE: "The sun came out. *Then* the puddle dried up. What made the puddle dry up?"

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:1)		
(R:RS:1: Assume increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:K:1: Demonstrates ability to monitor comprehension and strategy use for different types of texts … **R:RS:1:1: Demonstrates ability to monitor comprehension and strategy use for different types of texts …** **R:RS:2:1: Demonstrates ability to monitor comprehension for different types of texts and purposes by…**		
Grade K	**Grade 1**	**Grade 2**
R:RS:K:1.1: Noticing when simple sentences fail to make sense (while listening to a read aloud or reading a simple text) (Local) R:RS:K:1.2: Using pictures, syntax or repetitive language patterns to help predict upcoming words (Local)	R:RS:1:1.1: Monitoring own reading for meaning and self-correcting when attempt to identify or predict words does not fit with cues provided by the print or the context (e.g., syntax/ language structure, semantics/ meaning, picture) (Local) R:RS:1:1.2: Subsumed in R:RS:1:1.1	R:RS:2:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting upcoming text, monitoring, adjusting and confirming, through use of print, syntax/ language structure, semantics/ meaning, or other context cues [e.g., pictures], etc.) (Local) R:RS:1:1.2: Subsumed in R:RS:2:1.1

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:2)		
(R:RS:2: Assume increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:2: Uses comprehension strategies (with flexibility and as needed)…		
Grade K	**Grade 1**	**Grade 2**
R:RS:K:2.1: Using strategies while listening to literary or informational text. (Local) EXAMPLES of reading comprehension strategies might include: using prior knowledge; predicting and making simple text-bases inferences; generating clarifying questions; constructing sensory images (e.g., making pictures in one's mind); or making connections (text to self, text to text, and text to world (See also Appendix D)	R:RS:1:2.1: Using strategies while reading or listening to literary and informational text. (Local) EXAMPLES of reading comprehension strategies might include: using prior knowledge; predicting and making simple text- based inferences; generating clarifying questions; constructing sensory images (e.g., making pictures in one's mind); or making connections (text to self, text to text, and text to world (See also Appendix D)	R:RS:2:2.1: Using strategies while reading or listening to literary and informational text. (Local) EXAMPLES of reading comprehension strategies might include: using prior knowledge; predicting and making text- based inferences; determining importance; generating literal and clarifying questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); or locating and using text features (e.g. headings, parts of the book) (See also Appendix D)

Breadth of Reading: Reading Extensively* and In Depth (B:1)		
R:B:1: Demonstrates the habit of reading widely and extensively* by…		
Grade K	**Grade 1**	**Grade 2**
R:B:K:1.1: No GLE at this grade level R:B:K:1.2: No GLE at this grade level R:B:K:1.3: No GLE at this grade level	R:B:1:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:1:1.2: Reading from a wide range of genres/ kinds of text and a variety of authors (e.g., literary, informational, and practical texts) (Local) (See Appendix A) R:B:1:1.3: No GLE at this grade level	R:B:2:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:2:1.2: Reading from a wide range of genres/ kinds of text and a variety of authors (e.g., literary, informational, and practical texts) (Local (See Appendix A) R:B:2:1.3: No GLE at this grade level

Breadth of Reading: Reading Extensively* and In Depth (B:2)		
***Materials should be at the student's instructional <u>and</u> independent reading levels. The specific number of books should be viewed flexibly and is less important than the extensiveness, duration/ time, and frequency of reading.**		
R:B:2: Demonstrates participation in a literate community by…		
Grade K	**Grade 1**	**Grade 2**
R:B:K:2.1: Self-selecting reading materials aligned with reading ability and personal interests (Local) R:B:K:2.2: Participating in discussions about text, ideas, and student "writing" by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:1:2.1: Self-selecting reading materials aligned with reading ability and personal interests (Local) R:B:1:2.2: Participating in discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:2:2.1: Self-selecting reading materials aligned with reading ability and personal interests (Local) R:B:2:2.2: Participating in discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)

Breadth of Reading: Reading for Research Across Content Areas (B:3)		
***Research materials should be at the student's instructional and independent reading levels, including print and non-print texts.**		
R:B:3: Research* by reading multiple sources (including print and non-print texts) to report information by…		
Grade K	**Grade 1**	**Grade 2**
R:B:K:3.1: No GLE at this grade level	R:B:1:3.1: No GLE at this grade level	R:B:2:3.1: No GLE at this grade level
R:B:K:3.2: No GLE at this grade level	R:B:1:3.2: No GLE at this grade level	R:B:2:3.2: No GLE at this grade level
R:B:K:3.3: No GLE at this grade level	R:B:1:3.3: No GLE at this grade level	R:B:2:3.3: No GLE at this grade level
R:B:K:3.4: No GLE at this grade level	R:B:1:3.4: No GLE at this grade level	R:B:2:3.4: No GLE at this grade level

Early Reading Strategies (ERS:1) Phonemic Awareness and Phonological Knowledge		
R:ERS:1: Demonstrates phonemic awareness and applies phonological knowledge and skills by…		
Grade 3	**Grade 4**	**Grade 5**
No GLE at this grade level	No GLE at this grade level	No GLE at this grade level

Early Reading Strategies (ERS:2) Concepts of Print		
R:ERS:2: Demonstrates understanding of concepts of print during shared or individual reading by…		
Grade 3	**Grade 4**	**Grade 5**
No GLE at this grade level	No GLE at this grade level	No GLE at this grade level

Reading Fluency and Accuracy (F&A)		
(R:F&A: Assumes a variety of text and increasing text complexity across grade levels. See Appendix D for descriptions of increasing text complexity.)		
R:F&A: Reads grade-level appropriate material with…		
Grade 3	**Grade 4**	**Grade 5**
R:F&A:3:1.1: **Accuracy**: reading material appropriate for grade 3 with at least 90-94% accuracy (See Appendix F for sample titles.) (Local) R:F&A:3:1.2: **Fluency**: reading with oral fluency rates of at least 90- 120 words correct per minute (See Appendix C for suggested rates.) (Local) R:F&A:3:1.3: **Fluency**: reading familiar text with phrasing and expression, and with attention to text features, such as punctuation, italics, and dialogue (Local)	R:F&A:4:1.1: **Accuracy**: reading material appropriate for grade 4 with 90-94% accuracy (See Appendix F for sample titles.) (Local) R:F&A:4:1.2: **Fluency**: reading with oral fluency rates of at least 115-140 words correct per minute (Students' rates of reading will and should vary in response to text difficulty, purpose of reading, and other factors.) (See Appendix C for suggested rates.) (Local) R:F&A:4:1.3: **Fluency**: reading familiar text with phrasing and expression, and with attention to text features, such as punctuation, italics, and dialogue (Local)	R:F&A:5:1.1: **Accuracy:** reading material appropriate for grade 5 with 90-94% accuracy (See Appendix F for sample titles.) (Local) R:F&A:5:1.2: **Fluency:** reading with appropriate silent and oral reading fluency rates as determined by text demands and purpose for reading (See Appendix C for suggested rates.) (Local) R:F&A:5:1.3: **Fluency:** reading familiar text with phrasing and expression, and with attention to text features, such as punctuation, italics, and dialogue (Local)

Word Identification Skills and Strategies (WID)		
R:WID: Applies word identification/ decoding strategies by …		
Grade 3	**Grade 4**	**Grade 5**
R:WID:3:1.1: Identifying multi-syllabic words, by using knowledge of sounds, syllable types, or word patterns (including prefixes, suffixes, or variant spellings for consonants or vowels, e.g., bought) (State) EXAMPLES: Students might be asked to match words to words with similar sounds, such as which word rhymes with the word in the box or which word has the same vowel sound as the word in the box? EXAMPLES (multi-syllabic words): pretending, discussion R:WID:3:1.2: Reading regularly spelled multi-syllabic words by using knowledge of sounds, syllable types, or word patterns (Local) R:WID:3:1.3: Reading grade-level appropriate words (in connected text) with automaticity (Local) R:WID:3:1.4: Reading grade-appropriate, high-frequency words (including irregularly spelled words) (Local) R:WID:3:1.5: No GLE at this grade level R:WID:3:1.6: No GLE at this grade level	R:WID:4:1.1: Identifying multi-syllabic words by using knowledge of sounds, six syllable types*/syllable division, or word patterns (including prefixes, and suffixes) (Local) (*See Appendix B for the six syllable types.) R:WID:4:1.2: Reading regularly spelled multi-syllabic words by using knowledge of sounds, syllable types, or word patterns (Local) R:WID:4:1.3: Reading grade-level appropriate words (in connected text) with automaticity (Local) R:WID:4:1.4: Reading grade-appropriate words (including irregularly spelled words) (Local) R:WID:4:1.5: No GLE at this grade level R:WID:4:1.6: No GLE at this grade level	R:WID:5:1.1: Identifying multi-syllabic words by using knowledge of sounds, six syllable types*/ syllable division, and word patterns (including prefixes, and suffixes) (Local) (See Appendix B for the six syllable types.) R:WID:5:1.2: Reading multi-syllabic words, by using knowledge of sounds, syllable types, or word patterns (Local) R:WID:5:1.3: Reading grade-level appropriate words (in connected text) with automaticity (Local) R:WID:5:1.4: Reading grade-appropriate words (Local) R:WID:5:1.5: No GLE at this grade level R:WID:5:1.6: No GLE at this grade level

Vocabulary Strategies (V:1)		
(R:V:1: Assumes a variety of text and increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:V:1: Students identify the meaning of unfamiliar vocabulary by…		
Grade 3	**Grade 4**	**Grade 5**
R:V:3:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes and base words, such as "un-covered;" or context clues; or other resources, such as dictionaries, glossaries; or prior knowledge) (State)	R:V:4:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes and base words; or context clues; or other resources, such as dictionaries, glossaries; or prior knowledge) (State)	R:V:5:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes and base words; or context clues; or other resources, such as dictionaries, glossaries; or prior knowledge) (State)

Breadth of Vocabulary (V:2)		
R:V:2: Shows breadth of vocabulary knowledge through demonstrating understanding of word meanings and relationships by …		
Grade 3	**Grade 4**	**Grade 5**
R:V:3:2.1: Identifying synonyms, antonyms, or homonyms/ homophones; or categorizing words (State) R:V:3:2.2: Selecting appropriate words to use in context, including content specific vocabulary (e.g., predator/prey), or words with multiple meanings) (State) EXAMPLE (multiple meanings): Students identify the intended meaning of words found in text – "The word 'fall' can mean a time of the year or losing your step. What words from the passage help you to know what 'fall' means in this story?" EXAMPLE (multiple meanings): "The word 'fall' has many different meanings. Which sentence below uses the word "fall" to mean a time of the year?" OR "Which sentence below uses 'fall' with the same meaning as it is used in the poem?" R:V:3:2.3: Subsumed under R:V:3:2.1	R:V:4:2.1: Identifying synonyms, antonyms, homonyms/ homophones, or shades of meaning (State) EXAMPLE (of shades of meaning): cold, freezing R:V:4:2.2: Selecting appropriate words to use in context, including content specific vocabulary, words with multiple meanings, or precise vocabulary (State) EXAMPLE (precise vocabulary): "In this passage, the bear could best be described as acting: (A) excited (B) playful (C) harmful (D) curious" R:V:4:2.3: No GLE at this grade level	R:V:5:2.1: Identifying synonyms, antonyms, homonyms/ homophones, or shades of meaning (State) EXAMPLE (of shades of meaning): tired, exhausted R:V:5:2.2: Selecting appropriate words or explaining the use of words in context, including, content specific vocabulary, words with multiple meanings, or precise vocabulary (State) EXAMPLE (multiple meanings): Students explain the intended meanings of words found in text – "Based on the way 'spring' is used in this passage, would having a 'spring' be necessary for survival? Explain how you know." R:V:5:2.3: No GLE at this grade level

Initial Understanding of Literary Texts (LT:1)		
(R:LT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:1: Demonstrate initial understanding of elements of literary texts by…		
Grade 3	**Grade 4**	**Grade 5**
R:LT:3:1.1: Identifying or describing character(s), setting, problem/solution, major events, or plot, as appropriate to text (State) R:LT:3:1.2: Paraphrasing or summarizing key ideas/plot, with events sequenced, as appropriate to text (State) R:LT:3:1.3: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information (Local) R:LT:3:1.4: Identifying the characteristics of a variety of types of text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, tall tales, or realistic fiction) (Local) R:LT:3:1.5: Identifying literary devices as appropriate to genre: rhyme, alliteration, dialogue, or description (Local)	R:LT:4:1.1: Identifying or describing character(s), setting, problem/ solution, major events, or plot, as appropriate to text; or identifying any significant changes in character(s) over time (State) R:LT:4:1.2 Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (State) R:LT:4:1.3: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information (Local) R:LT:4:1.4: Identifying the characteristics of a variety of types of text (e.g., **literary text:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction) (Local) R:LT:4:1.5: Identifying literary devices as appropriate to genre: rhyme, alliteration, simile, description, or dialogue (Local)	R:LT:5:1.1: Identifying or describing character(s), setting, problem/ solution, major events, or plot, as appropriate to text; or identifying any significant changes in character(s) over time (State) R:LT:5:1.2: Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (State) R:LT:5:1.3: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information (Local) R:LT:5:1.4: Identifying the characteristics of a variety of types of text (e.g., **literary texts**: poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries) (Local) R:LT:5:1.5: Identifying literary devices as appropriate to genre: rhyme, alliteration, simile, dialogue, imagery, or simple metaphors (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:2)		
(R:LT:2: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:2: Analyze and interpret elements of literary texts, citing evidence where appropriate by…		
Grade 3	**Grade 4**	**Grade 5**
R:LT:3:2.1 Making logical predictions (State)	R:LT:4:2.1: Making logical predictions (State)	R:LT:5:2.1: Making logical predictions (State) EXAMPLE: "Which event is most likely to happen next?"
R:LT:3:2.2: Describing main characters' physical characteristics or personality traits; or providing examples of thoughts, words or actions that reveal characters' personality traits (State)	R:LT:4:2.2: Describing main characters' physical characteristics or personality traits; or providing examples of thoughts, words, or actions that reveal characters' personality traits (State)	R:LT:5:2.2: Describing characters' physical characteristics, personality traits, or interactions; or providing examples of thoughts, words, or actions that reveal characters' personality traits or their changes over time (State)
R:LT:3:2.3: Making basic inferences about problem, conflict, or solution (e.g., cause-effect relationships) (State) EXAMPLE: "How might the story have been different if…?"	R:LT:4:2.3: Making inferences about problem, conflict, or solution (State) EXAMPLE: "What influenced the father's decision to let his son try the climb?"	R:LT:5:2.3: Making inferences about problem, conflict, solution, or the relationship among elements (plot, character, setting) within text (e.g., how the setting affects a character or plot development) (State)
R:LT:3:2.4: Identifying who is telling the story (Local)	R:LT:4:2.4: Identifying who is telling the story (State)	R:LT:5:2.4: Identifying the narrator (State)
R:LT:3:2.5: Identifying the author's basic message (State) EXAMPLE: "In this story, Jon learned an important lesson about what to do when lost in the woods. What lesson did Jon learn?"	R:LT:4:2.5: Identifying author's message or theme (State) EXAMPLE: "What was the author trying to say about friendship in this story?" (e.g., friendship begins with accepting differences)	R:LT:5:2.5: Identifying author's message or theme (implied or stated, as in a fable) (State)
R:LT:3:2.6: Identifying possible motives of characters (Local)	R:LT:4:2.6: Identifying causes or effects, including possible motives of characters (Local)	R:LT:5:2.6: Identifying causes or effects, including possible motives of characters (Local)
R:LT:3:2.7: Recognizing explicitly stated causes or effects (Local)	R:LT:4:2.7: is subsumed under R:LT:4:2.6	R:LT:5:2.7: No GLE at this grade level

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:3)		
(R:LT:3: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:3: Analyze and interpret author's craft, citing evidence where appropriate by …		
Grade 3	**Grade 4**	**Grade 5**
R:LT:3:3.1: Recognizing the use of literary elements and devices ((i.e., imagery, exaggeration) to interpret intended meanings (Local)	R:LT:4:3.1: Demonstrating knowledge of use of literary elements and devices (i.e., imagery, exaggeration) to interpret intended meanings (Local)	R:LT:5:3.1: Demonstrating knowledge of use of literary elements and devices (i.e., imagery, exaggeration) to analyze literary works (State)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:4)		
R:LT:4: Generates a personal response to what is read through a variety of means by…		
Grade 3	**Grade 4**	**Grade 5**
R:LT:3:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:3:4.2: No GLE at this grade level	R:LT:4:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:4:4.2: No GLE at this grade level	R:LT:5:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:5:4.2: Providing relevant details to support the conclusions made (Local)

Initial Understanding of Informational Texts (IT:1)		
(R:IT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:1: Demonstrate initial understanding of informational texts (expository and practical texts) by…		
Grade 3	**Grade 4**	**Grade 5**
R:IT:3:1.1: Obtaining information, from text features (e.g., table of contents, glossary, basic transition words, bold or italicized text, headings, graphic organizers, charts, graphs, or illustrations) (State) EXAMPLES: "What words does the author want you to notice on this page?" "What is the last step of the directions?"	R:IT:4:1.1a: Obtaining information from text features (e.g., table of contents, glossary, index, transition words/phrases, bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations) (State)	R:IT:5:1.1a: Obtaining information from text features (e.g., table of contents, glossary, index, transition words /phrases, bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations) (State)
R:IT:3:1.2: Using information from the text to answer questions related to explicitly stated main/central ideas or details (State)	R:IT:4:1.1b: Obtaining information from text features (e.g., maps, diagrams, tables, captions, timelines) (Local)	R:IT:5:1.1b: Obtaining information from text features (e.g., maps, diagrams, tables, captions, timelines, citations) (Local)
R:IT:3:1.3: Organizing information to show understanding (e.g., representing main/central ideas or details within text through charting or mapping) (State) EXAMPLE: Given a chart (with headings filled in), students are asked to provide examples from the text to show physical characteristics of two different places or things	R:IT:4:1.2: Using information from the text to answer questions related to explicitly stated main/central ideas or key details (State)	R:IT:5:1.2: Using information from the text to answer questions related to main/central ideas or key details (State)
R:IT:3:1.4: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information. (Local)	R:IT:4:1.3: Organizing information to show understanding (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, or summarizing) (State)	R:IT:5:1.3: Organizing information to show understanding (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, summarizing, or comparing/contrasting) (State)
R:IT:3:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference:** dictionaries, glossaries, children's magazines, content trade books, textbooks, children's newspapers; and **practical/functional texts:** book orders, procedures, instructions, announcements, invitations) (Local)	R:IT:4:1.4: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information. (Local)	R:IT:5:1.4: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information. (Local)
	R:IT:4:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference:** dictionaries, glossaries, encyclopedias, children's magazines, content trade books, textbooks, student newspapers; and **practical/functional texts:** procedures, instructions, book orders, announcements, invitations) (Local)	R:IT:5:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference:** dictionaries, glossaries, reports, encyclopedias, children's magazines, content trade books, textbooks, student newspapers, Internet websites, biographies; and **practical/functional texts:** procedures, instructions, book orders, announcements, invitations, recipes, menus (Local)

Analysis and Interpretation of Informational Texts/Citing Evidence (IT:2)		
(R:IT:2: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:2: Analyze and interpret informational text, citing evidence as appropriate by…		
Grade 3	**Grade 4**	**Grade 5**
R:IT:3:2.1: Connecting information *within* a text (State) EXAMPLE: Combining, comparing, or using information found in both the written text and in a caption in a text	R:IT:4:2.1: Connecting information *within* a text or *across* texts (State)	R:IT:5:2.1: Connecting information *within* a text or *across* texts (State)
R:IT:3:2.2: Recognizing generalizations about text (e.g., identifying appropriate titles, assertions, or controlling ideas) (State)	R:IT:4:2.2: Synthesizing information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas) (State)	R:IT:5:2.2: Synthesizing information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas) (State)
R:IT:3:2.3: Making basic inferences, drawing basic conclusions, or forming judgments/opinions about central ideas that are relevant (State)	R:IT:4:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain) or message; or drawing basic conclusions; or forming judgments/opinions about central ideas that are relevant (State)	R:IT:5:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or forming and supporting opinions/judgments and assertions about central ideas that are relevant (State)
R:IT:3:2.4: Distinguishing fact from opinion (State)	R:IT:4:2.4 Distinguishing fact from opinion (State)	R:IT:5:2.4: Distinguishing fact from opinion (State)
R:IT:3:2.5 Making inferences about causes or effects (State) EXAMPLE: "What probably caused the fire to start in the garage?"	R:IT:4:2.5: Making inferences about causes or effects (State)	R:IT:5:2.5: Making inferences about causes or effects (State)

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:1)		
(R:RS:1: Assumes increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:1: Demonstrates ability to monitor comprehension for different types of texts and purposes by…		
Grade 3	**Grade 4**	**Grade 5**
R:RS:3:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting upcoming text, monitoring, adjusting and confirming, through use of print, syntax/ language structure, semantics/meaning, or other context cues) (Local) R:RS:3:1.2: Subsumed in R:RS:3:1.1	R:RS:4:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting upcoming text, monitoring, adjusting and confirming, through use of print, syntax/ language structure, semantics/ meaning, or other context cues) (Local) R:RS:4:1.2: Subsumed in R:RS:4:1.1	R:RS:5:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting upcoming text, monitoring, adjusting, and confirming through use of print, syntax/ language structure, semantics/ meaning, or other context cues) (Local) R:RS:5:1.2: Subsumed in R:RS:5:1.1

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:2)		
(R:RS:2: Assumes increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:2: Uses comprehension strategies (with flexibility and as needed)…		
Grade 3	**Grade 4**	**Grade 5**
R:RS:3:2.1: Using strategies before, during, and after reading literary and informational text. (Local) EXAMPLES of reading comprehension strategies might include :using prior knowledge; predicting and making text-based inferences; determining importance; generating literal and clarifying questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); or locating and using text features (e.g., transition words, subheadings, bold/italicized print, parts of the book) (See also Appendix D)	R:RS:4:2.1:Using strategies before, during, and after reading literary and informational text. (Local) EXAMPLES of reading comprehension strategies might include: using prior knowledge; sampling a page for readability; summarizing; predicting and making text-based inferences; determining importance; generating literal and clarifying questions; constructing sensory images(e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); locating and using text features (e.g., transition words, subheadings, bold/italicized print, parts of the book); or using text structure clues (e.g., chronological, cause/effect, compare/contrast, proposition and support, description, classification) (See also Appendix D)	R:RS:5:2.1: Using strategies before, during, and after reading literary and informational text. (Local) EXAMPLES of reading comprehension strategies might include: using prior knowledge; sampling a page for readability; summarizing; predicting and making text-based inferences; determining importance; generating literal, clarifying, and inferential questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); taking notes; locating, using, and analyzing text features (e.g., transition words, subheadings, bold/italicized print, parts of the book); or using text structure clues (e.g., chronological, cause/effect, compare/contrast, proposition, description classification, support, and logical/ sequential) (See also Appendix D)

Breadth of Reading: Reading Extensively* and In Depth (B:1)		
R:B:1: Demonstrates the habit of reading widely and extensively* by…		
Grade 3	**Grade 4**	**Grade 5**
R:B:3:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:3:1.2: Reading from a wide range of genres/ kinds of text and a variety of authors (e.g., literary, informational, and practical texts) (Local) (See Appendix A) R:B:3:1.3: Reading multiple texts for depth of understanding an author or genre (Local)	R:B:4:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:4:1.2: Reading from a wide range of genres/ kinds of text and a variety of authors (e.g., literary, informational, and practical texts) (Local) (See Appendix A) R:B:4:1.3: Reading multiple texts for depth of understanding an author or genre (Local)	R:B:5:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:5:1.2: Reading from a wide range of genres/ kinds of text and a variety of authors (e.g., literary, informational, and practical texts) (Local) (See Appendix A) R:B:5:1.3: Reading multiple texts for depth of understanding an author, a subject, a theme, or genre (Local)

Breadth of Reading: Reading Extensively* and In Depth (B:2)		
***Materials should be at the student's instructional <u>and</u> independent reading levels. The specific number of books should be viewed flexibly and is less important than the extensiveness, duration/ time, and frequency of reading.**		
R:B:2: Demonstrates participation in a literate community by…		
Grade 3	**Grade 4**	**Grade 5**
R:B:3:2.1: Self-selecting reading materials aligned with reading ability and personal interests (Local) R:B:3:2.2: Participating in discussions about text, ideas, and student "writing" by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:4:2.1: Self-selecting reading materials aligned with reading ability and personal interests (Local) R:B:4:2.2: Participating in discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:5:2.1: Self-selecting reading materials aligned with reading ability and personal interests (Local) R:B:5:2.2: Participating in discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)

Breadth of Reading: Reading for Research Across Content Areas (B:3)		
***Research materials should be at the student's instructional and independent reading levels, including print and non-print texts.**		
R:B:3:3: Research* by reading multiple sources (including print and non-print texts) to report information by… **R:B:4:3: Research* by reading multiple sources (including print and non-print texts) to report information, or to <u>formulate a judgment</u> by…** **R:B:5:3: Research* by reading multiple sources (including print and non-print texts) to report information, <u>solve a problem</u>, or to formulate a judgment by…**		
Grade 3	**Grade 4**	**Grade 5**
R:B:3:3.1: Using sources provided (Local) R:B:3:3.2: Evaluating information presented in terms of relevance (Local) R:B:3:3.3: Gathering information and using a given structure (e.g., chart, diagram, outline, etc.) to organize it (Local) R:B:3:3.4: Using evidence to support conclusions (Local)	R:B:4:3.1: Using sources provided (Local) R:B:4:3.2: Evaluating information presented in terms of relevance (Local) R:B:4:3.3: Gathering information and using a given structure (e.g., chart, diagram, outline, etc.) to organize it (Local) R:B:4:3.4: Using evidence to support conclusions (Local)	R:B:5:3.1: <u>Identifying potential sources of information from those provided</u> (Local) R:B:5:3.2: Evaluating information presented in terms of relevance (Local) R:B:5:3.3: Gathering, <u>organizing, and interpreting</u> the information (Local) R:B:5:3.4: Using evidence to support conclusions (Local)

Early Reading Strategies (ERS:1) Phonemic Awareness and Phonological Knowledge		
R:ERS:1: Demonstrates phonemic awareness and applies phonological knowledge and skills by…		
Grade 6	**Grade 7**	**Grade 8**
No GLE at this grade level	No GLE at this grade level	No GLE at this grade level

Early Reading Strategies (ERS:2) Concepts of Print		
R:ERS:2: Demonstrates understanding of concepts of print during shared or individual reading by…		
Grade 6	**Grade 7**	**Grade 8**
No GLE at this grade level	No GLE at this grade level	No GLE at this grade level

Reading Fluency and Accuracy (F&A)		
(R:F&A: Assumes a variety of text and increasing text complexity across grade levels. See Appendix D for descriptions of increasing text complexity.)		
R:F&A: Reads grade-level appropriate material with…		
Grade 6	**Grade 7**	**Grade 8**
R:F&A:6:1.1: Accuracy: reading material appropriate for grade 6 with 90-94% accuracy (Local) (See Appendix F for sample titles.) R:F&A:6:1.2: Fluency: reading with appropriate silent and oral reading fluency rates as determined by text demands and purpose for reading (Local) (See Appendix C for suggested rates.) R:F&A:6:1.3: Fluency: reading familiar text with phrasing and expression, and with attention to text features, such as punctuation, italics, and dialogue (Local)	R:F&A:7:1.1: Accuracy: reading material appropriate for grade 7 with at least 90-94% accuracy (Local) (See Appendix F for sample titles.) R:F&A:7:1.2: Fluency: reading with appropriate silent and oral reading fluency rates as determined by text demands, and purpose for reading (Local) (See Appendix C for suggested rates.) R:F&A:7:1.3: Fluency: reading familiar text with phrasing and expression, and with attention to text features such as punctuation, italics, and dialogue (Local)	R:F&A:8:1.1: Accuracy: reading material appropriate for grade 8 with at least 90-94% accuracy (Local) (See Appendix F for sample titles.) R:F&A:8:1.2: Fluency: reading with appropriate silent and oral reading fluency rates as determined by text demands, and purpose for reading (Local) (See Appendix C for suggested rates.) R:F&A:8:1.3: Fluency: reading familiar text with phrasing and expression, and with attention to text features such as punctuation, italics, and dialogue (Local)

Word Identification Skills and Strategies (WID)		
R:WID: Applies word identification/ decoding strategies by …		
Grade 6	**Grade 7**	**Grade 8**
R:WID:6:1.1: Identifying multi-syllabic words by using knowledge of sounds, syllable division, and word patterns (Local)	R:WID:7:1.1: Identifying multi-syllabic words by using knowledge of sounds, syllable division, and word patterns (Local)	R:WID:8:1.1: Identifying multi-syllabic words by using knowledge of sounds, syllable division, and word patterns (Local)

Vocabulary Strategies (V:1)		
(R:V:1: Assumes a variety of text and increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:V:1: Students identify the meaning of unfamiliar vocabulary by…		
Grade 6	**Grade 7**	**Grade 8**
R:V:6:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes and base words; or context clues; or other resources, such as dictionaries, glossaries, thesauruses; or prior knowledge) (State)	R:V:7:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes, base words, common roots, or word origins; or context clues; or other resources, such as, dictionaries, glossaries, thesauruses; or prior knowledge) (State) EXAMPLE (of common root): inspection (in -**spec**-tion)	R:V:8:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes, base words, common roots, or word origins; or context clues; or other resources, such as dictionaries, glossaries, thesauruses; or prior knowledge) (Local)

Breadth of Vocabulary (V:2)		
R:V:2: Shows breadth of vocabulary knowledge through demonstrating understanding of word meanings or relationships by …		
Grade 6	**Grade 7**	**Grade 8**
R:V:6:2.1: Identifying synonyms, antonyms, homonyms/ homophones, or shades of meaning (State) R:V:6:2.2: Selecting appropriate words or explaining the use of words in context, including content specific vocabulary, words with multiple meanings, or precise vocabulary (State)	R:V:7:2.1: Identifying synonyms, antonyms, homonyms/ homophones, or shades of meaning (State) R:V:7:2.2: Selecting appropriate words or explaining the use of words in context, including content specific vocabulary, words with multiple meanings, or precise vocabulary (State)	R:V:8:2.1: Identifying synonyms, antonyms, homonyms/ homophones, shades of meaning, or word origins, including words from other languages that have been adopted into our language (Local) EXAMPLE (word origin from other language): de'ja' vu R:V:8:2.2: Selecting appropriate words or explaining the use of words in context, including content specific vocabulary, words with multiple meanings, or precise vocabulary (Local)

Initial Understanding of Literary Texts (LT:1)		
(R:LT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:1: Demonstrate initial understanding of elements of literary texts by…		
Grade 6	**Grade 7**	**Grade 8**
R:LT:6:1.1: Identifying or describing character(s), setting, problem/ solution, or plot, as appropriate to text; or identifying any significant changes in character or setting over time (State) EXAMPLE (of setting changing): In this poem, how does the farm's appearance change over the years? R:LT:6:1.2: Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (State) R:LT:6:1.3: Generating questions before, during, and after reading to enhance understanding and recall, expand understanding and/or gain new information (Local) R:LT:6:1.4: Identifying the characteristics of a variety of types/genres of literary text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends (Local) R:LT:6:1.5: Identifying literary devices as appropriate to genre: rhyme, alliteration, simile, dialogue, imagery, simple metaphors, flashback, onomatopoeia, repetition, or idioms (Local)	R:LT:7:1.1: Identifying or describing character(s), setting, problem/ solution, or plot, as appropriate to text; or identifying any significant changes in character or setting over time; or identifying rising action, climax, or falling action (State) R:LT:7:1.2 Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (State) R:LT:7:1.3: Generating questions before, during, and after reading to enhance//expand understanding and /or gaining new information (Local) R:LT:7:1.4: Identifying the characteristics of a variety of types/genres of literary text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, short stories (Local) R:LT:7:1.5: Identifying literary devices as appropriate to genre: rhyme schemes, alliteration, simile, dialogue, imagery, metaphors, flashback, onomatopoeia, repetition, or personification (Local)	R:LT:8:1.1: Identifying or describing character(s), setting, problem/ solution, or plots/subplots, as appropriate to text; or identifying any significant changes in character or setting over time; or identifying rising action, climax, or falling action (Local) R:LT:8:1.2: Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (State) R:LT:8:1.3: Generating questions before, during, and after reading to enhance//expand understanding and /or gaining new information (Local) R:LT:8:1.4: Identifying the characteristics of a variety of types/genres of literary text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, short stories, epics (poems, novels, dramas) (Local) R:LT:8:1.5: Identifying literary devices as appropriate to genre: rhyme schemes, alliteration, simile, dialogue, imagery, metaphors, flashback, onomatopoeia, repetition, personification, or hyperbole (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:2)		
(R:LT:2: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:2: Analyze and interpret elements of literary texts, citing evidence where appropriate by…		
Grade 6	**Grade 7**	**Grade 8**
R:LT:6:2.1 Explaining or supporting logical predictions (e.g., providing evidence from text to explain why something is likely to happen next) (State) R:LT:6:2.2: Describing characters' traits, motivation, or interactions, citing thoughts, words, or actions that reveal characters' traits, motivations, or their changes over time (State) R:LT:6:2.3: Making inferences about cause/effect, external conflicts (e.g., person versus person, person versus nature/society/fate), or the relationship among elements within text (e.g., how the historical era influences the characters' actions or thinking) (State) R:LT:6:2.4: Explaining how the narrator's point of view affects the reader's interpretation (State) EXAMPLE: "This story is told from Ted's point of view. What do you know about how Ted feels because he tells the story?" R:LT:6:2.5: Identifying author's message or theme (State) R:LT:6:2.6: is subsumed under R:LT:6:2.2 and R:LT:6:2.3	R:LT:7:2.1: Explaining or supporting logical predictions (State) R:LT:7:2.2: Describing characters' traits, motivation, or interactions, citing thoughts, words, or actions that reveal characters' traits, motivations, or their changes over time (State) R:LT:7:2.3: Making inferences about cause/effect (e.g., explaining how an event gives rise to the next), internal or external conflicts (e.g., person versus self, person versus person, person versus nature/society/fate), or the relationship among elements within text (State) R:LT:7:2.4: Explaining how the narrator's point of view affects the reader's interpretation (State) R:LT:7:2.5: Explaining how the author's message or theme is supported within the text (State)	R:LT:8:2.1: Explaining or supporting logical predictions (Local) R:LT:8:2.2: Describing characterization (e.g., stereotype, antagonist, protagonist), motivation, or interactions, citing thoughts, words, or actions that reveal characters' traits, motivations, or their changes over time (Local) R:LT:8:2.3: Making inferences about cause/effect, internal or external conflicts (e.g., person versus self, person versus person, person versus nature/society/fate), or the relationship among elements within text (e.g., describing the interaction among plot/subplots) (Local) R:LT:8:2.4: Explaining how the narrator's point of view affects the reader's interpretation (Local) R:LT:8:2.5: Explaining how the author's message or theme (which may include universal themes) is supported within the text (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:3)		
(R:LT:3: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:3: Analyze and interpret author's craft, citing evidence where appropriate by …		
Grade 6	**Grade 7**	**Grade 8**
R:LT:6:3.1: Demonstrating knowledge of use of literary elements and devices (i.e., imagery, exaggeration, simile, metaphor, foreshadowing, or suspense) to analyze literary work (State) R:LT:6:3.2: Demonstrating knowledge of use of literary elements and devices (e.g., rhyme, alliteration, dialogue, flashback, onomatopoeia, repetition, or idioms) to analyze literary works (Local)	R:LT:7:3.1: Demonstrating knowledge of use of literary elements and devices (i.e., imagery, exaggeration, repetition, flashback, foreshadowing, or personification) to analyze literary works (State) EXAMPLE: "Why did the author choose to use flashback in this story?" R:LT:7:3.2: Demonstrating knowledge of use of literary elements and devices (e.g., rhyme schemes, alliteration, simile, dialogue, metaphors, onomatopoeia, repetition, or idioms to analyze literary works (Local)	R:LT:8:3.1: Demonstrating knowledge of author's style or use of literary elements and devices (e.g., imagery, repetition, flashback, foreshadowing, personification, hyperbole, symbolism, or use of punctuation) to analyze literary works (Local) R:LT:8:3.2: is subsumed under R:LT:8:3.1, since all aspects are assessed Locally in grade 8

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:4)		
(R:LT:4: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:4: Generates a personal response to what is read through a variety of means by…		
Grade 6	**Grade 7**	**Grade 8**
R:LT:6:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:6:4.2: Providing relevant details to support the connections made or judgments (interpretive, analytical, evaluative, or reflective) (Local)	R:LT:7:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:7:4.2: Providing relevant details to support the connections made or judgments (interpretive, analytical, evaluative, or reflective) (Local)	R:LT:8:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:8:4.2: Providing relevant details to support the connections made or judgments (interpretive, analytical, evaluative, or reflective) (Local)

Initial Understanding of Informational Texts (IT:1)		
(R:IT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:1: Demonstrate initial understanding of informational texts (expository and practical texts) by…		
Grade 6	**Grade 7**	**Grade 8**
R:IT:6:1.1a: Obtaining information from text features (e.g., table of contents, glossary, index, transition words /phrases, bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations) (State) R:IT:6:1.1b: Obtaining information from text features (e.g., maps, diagrams, tables, captions, timelines, citations, or transitional devices) (Local) R:IT:6:1.2: Using information from the text to answer questions related to main/central ideas or key details (State) R:IT:6:1.3: Organizing information to show understanding (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, summarizing, or comparing/contrasting) (State) R:IT:6:1.4: Generating questions before, during, and after reading to enhance understanding and recall; expand understanding and/or gain new information (Local) R:IT:6:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference:** dictionaries, glossaries, thesauruses, encyclopedias, reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles; and **practical/functional:** procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets) (Local)	R:IT:7:1.1: Obtaining information from text features (e.g., table of contents, glossary, index, transition words /phrases, transitional devices, bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations) (State) R:IT:7:1.2: Using information from the text to answer questions, to state the main/central ideas, or to provide supporting details (State) R:IT:7:1.3: Organizing information to show understanding (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, summarizing, or comparing/contrasting) (State) R:IT:7:1.4: Generating questions before, during, and after reading to enhance understanding and recall; expand understanding and/or gain new information (Local) R:IT:7:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference:** thesauruses, reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles, technical manuals; and **practical/functional:** procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets) (Local)	R:IT:8:1.1: Obtaining information from text features (e.g., table of contents, glossary, index, transition words /phrases, transitional devices, bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations) (Local) R:IT:8:1.2: Using information from the text to answer questions, to state the main/central ideas, or to provide supporting details (Local) R:IT:8:1.3: Organizing information to show understanding or relationships among facts, ideas, and events (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, summarizing, comparing/contrasting, or outlining) (Local) R:IT:8:1.4: Generating questions before, during, and after reading to enhance understanding and recall; expand understanding and/or gain new information (Local) R:IT:8:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference:** reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles, technical manuals ; and **practical/functional:** procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, schedules) (Local)

Analysis and Interpretation of Informational Texts/Citing Evidence (IT:2)		
(R:IT:2: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:2: Analyze and interpret informational text, citing evidence as appropriate by…		
Grade 6	**Grade 7**	**Grade 8**
R:IT:6:2.1: Connecting information *within* a text or *across* texts (State)	R:IT:7:2.1: Explaining connections about information *within* a text, *across* texts, or to related ideas (State)	R:IT:8:2.1: Explaining connections about information *within* a text, *across* texts, or to related ideas (Local)
R:IT:6:2.2: Synthesizing information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas (State)	R:IT:7:2.2: Synthesizing and evaluating information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas (State)	R:IT:8:2.2: Synthesizing and evaluating information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas) (Local)
R:IT:6:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or forming and supporting opinions/judgments and assertions about central ideas that are relevant (State)	R:IT:7:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or using supporting evidence to form or evaluate opinions/judgments and assertions about the central ideas that are relevant (State) EXAMPLE (of evaluating): Given a statement (opinion, judgment, or assertion), students provide evidence from the text that this statement does/does not support the author's purpose in writing the piece.	R:IT:8:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or explaining how purpose may affect the interpretation of the text; or using supporting evidence to form or evaluate opinions/judgments and assertions about central ideas that are relevant (Local)
R:IT:6:2.4: Distinguishing fact from opinion, and identifying possible bias/propaganda (State)	R:IT:7:2.4: Distinguishing fact from opinion, and identifying possible bias/propaganda or conflicting information within or across texts (State)	R:IT:8:2.4: Distinguishing fact from opinion, and identifying possible bias/propaganda or conflicting information within or across texts (Local)
R:IT:6:2.5 Making inferences about causes or effects (State)	R:IT:7:2.5: Making inferences about causes or effects (State)	R:IT:8:2.5: Making inferences about causes or effects (Local)
R:IT:6:2.6: No GLE at this grade level	R:IT:7:2.6: Evaluating the clarity and accuracy of information (Local)	R:IT:8:2.6: Evaluating the clarity and accuracy of information (Local)

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:1)		
(R:RS:1: Assumes increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:1: Demonstrates ability to monitor comprehension for different types of texts and purposes by…		
Grade 6	**Grade 7**	**Grade 8**
R:RS:6:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting and confirming, rereading, adjusting rate, sub-vocalizing, consulting resources, questioning, skimming, scanning, using syntax/language structure, semantics/ meaning, or other context cues, etc.) (Local)	R:RS:7:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting and confirming, rereading, adjusting rate, sub-vocalizing, consulting resources, questioning, skimming, scanning, using syntax/language structure, semantics/ meaning, or other context cues, etc.) (Local)	R:RS:8:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting and confirming, rereading, adjusting rate, sub-vocalizing, consulting resources, questioning, skimming, scanning, using syntax/language structure, semantics/ meaning, or other context cues, etc.) (Local)

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:2)		
(R:RS:2: Assumes increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:2: Uses comprehension strategies (flexibly and as needed) before, during, and after reading literary and informational text. (Local)		
Grade 6	**Grade 7**	**Grade 8**
R:RS:6:2.1: Using strategies before, during, and after reading literary and informational text. EXAMPLES of reading comprehension strategies might include: using prior knowledge; sampling a page for readability; summarizing; predicting and making text based inferences; determining importance; generating literal, clarifying, and inferential questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); taking notes; locating, using, and analyzing text features (e.g., transition words, subheadings, bold/italicized print, parts of the book); or using text structure clues (e.g., chronological, cause/effect, compare/contrast, proposition, description, classification and support, logical/ sequential) (Local) (See also Appendix D)	R:RS:7:2.1: Using strategies before, during, and after reading literary and informational text. EXAMPLES of reading comprehension strategies might include: using prior knowledge; sampling a page for readability; summarizing; predicting and making text based inferences; determining importance; generating literal, clarifying, and inferential questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); taking notes; locating, using, and analyzing text features (e.g., transition words, subheadings, bold/italicized print, parts of the book); or using text structure clues (e.g., chronological, cause/effect, compare/contrast, proposition and support, description, classification, logical/ sequential) (Local) (See also Appendix D)	R:RS:8:2.1: Using strategies before, during, and after reading literary and informational text. EXAMPLES of reading comprehension strategies might include: using prior knowledge; sampling a page for readability; summarizing; predicting and making text based inferences; determining importance; generating literal, clarifying, and inferential questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); taking notes; locating, using, and analyzing text features (e.g., transition words, subheadings, bold/italicized print, parts of the book); or using text structure clues (e.g., chronological, cause/effect, compare/contrast, proposition and support, description, classification, logical/ sequential) (Local) (See also Appendix D)

Breadth of Reading: Reading Extensively* and In Depth (B:1)		
R:B:1: Demonstrates the habit of reading widely and extensively* by…		
Grade 6	**Grade 7**	**Grade 8**
R:B:6:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:6:1.2: Reading from a wide range of genres/ kinds of text, <u>including primary and secondary sources,</u> and a variety of authors (e.g., literary, informational, and practical/functional texts) (Local) (See Appendix A) R:B:6:1.3: Reading multiple texts for depth of understanding an author, a subject, a theme, or genre (Local)	R:B:7:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:7:1.2: Reading from a wide range of genres/ kinds of text, including primary and secondary sources, and a variety of authors (e.g., literary, informational, and practical/functional texts) (Local) (See Appendix A) R:B:7:1.3: Reading multiple texts for depth of understanding an author, a subject, a theme, or genre (Local)	R:B:8:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:8:1.2: Reading from a wide range of genres/ kinds of text, including primary and secondary sources, and a variety of authors (e.g., literary, informational, and practical/functional texts) (Local) (See Appendix A) R:B:8:1.3: Reading multiple texts for depth of understanding an author, a subject, a theme, or genre (Local)

Breadth of Reading: Reading Extensively* and In Depth (B:2)		
***Materials should be at the student's instructional <u>and</u> independent reading levels. The specific number of books should be viewed flexibly and is less important than the extensiveness, duration/ time, and frequency of reading.**		
R:B:2: Demonstrates participation in a literate community by…		
Grade 6	**Grade 7**	**Grade 8**
R:B:6:2.1: Self-selecting reading materials aligned with reading ability and personal interests (Local) R:B:6:2.2: Participating in in-depth discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:7:2.1: Self-selecting reading materials in line with reading ability and personal interests (Local) R:B:7:2.2: Participating in in-depth discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:8:2.1: Self-selecting reading materials in line with reading ability and personal interests (Local) R:B:8:2.2: Participating in in-depth discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)

Breadth of Reading: Reading for Research Across Content Areas (B:3)		
***Research materials should be at the student's instructional and independent reading levels, including print and non-print texts.**		
R:B:6:3: Research* by reading multiple sources (including print and non-print texts) to report information, to solve a problem, or to make a decision, or to formulate a judgment by… **R:B:7:3: Research* by reading multiple sources (including print and non-print texts) to solve a problem, or to make a decision, or to formulate a judgment, or to support a thesis by…** **R:B:8:3: Research* by reading multiple sources (including print and non-print texts) to solve a problem, or to make a decision, or to formulate a judgment, or to support a thesis by…**		
Grade 6	**Grade 7**	**Grade 8**
R:B:6:3.1: Identifying potential sources of information (Local) R:B:6:3.2: Evaluating information presented, in terms of relevance (Local) R:B:6:3.3: Gathering, organizing, and interpreting the information (Local) R:B:6:3.4: Using evidence to support conclusions (Local)	R:B:7:3.1: Identifying potential sources of information (Local) R:B:7:3.2: Evaluating information presented, in terms of relevance (Local) R:B:7:3.3: Gathering, organizing, analyzing, and interpreting the information (Local) R:B:7:3.4: Using evidence to support conclusions (Local)	R:B:8:3.1: Identifying and evaluating potential sources of information (Local) R:B:8:3.2: Evaluating information presented, in terms of completeness and relevance (Local) R:B:8:3.3: Gathering, organizing, analyzing, and interpreting the information (Local) R:B:8:3.4: Using evidence to support conclusions (Local)

Early Reading Strategies (ERS:1) Phonemic Awareness and Phonological Knowledge		
R:ERS:1: Demonstrates phonemic awareness and applies phonological knowledge and skills by…		
Grade 8	**Grade 10**	**Grade 12**
No GLE at this grade level	No GLE at this grade level	No GLE at this grade level

Early Reading Strategies (ERS:2) Concepts of Print		
R:ERS:2: Demonstrates understanding of concepts of print during shared or individual reading by…		
Grade 8	**Grade 10**	**Grade 12**
No GLE at this grade level	No GLE at this grade level	No GLE at this grade level

Reading Fluency and Accuracy (F&A)		
(R:F&A: Assumes a variety of text and increasing text complexity across grade levels. See Appendix D for descriptions of increasing text complexity.)		
R:F&A: Reads grade-level appropriate material with…		
Grade 8	**Grade 10**	**Grade 12**
R:F&A:8:1.1: Accuracy: reading material appropriate for grade 8 with at least 90-94% accuracy (Local) (See Appendix F for sample titles.) R:F&A:8:1.2: Fluency: reading with appropriate silent and oral reading fluency rates as determined by text demands, and purpose for reading (Local) (See Appendix C for suggested rates.) R:F&A:8:1.3: Fluency: reading familiar text with phrasing and expression, and with attention to text features such as punctuation, italics, and dialogue (Local)	R:F&A:10:1.1: Accuracy: reading material appropriate for high school with at least 90-94% accuracy (Local) (See Appendix F for sample titles.) R:F&A:10:1.2: Fluency: reading with appropriate silent and oral reading fluency rates as determined by text demands, and purpose for reading (Local) (See Appendix C for suggested rates.) R:F&A:10:1.3: Fluency: reading familiar text with phrasing and expression, and with attention to text features such as punctuation, italics, and dialogue (Local)	R:F&A:12:1.1: Accuracy: reading material appropriate for high school with at least 90-94% accuracy (Local) (See Appendix F for sample titles.) R:F&A:12:1.2: Fluency: reading with appropriate silent and oral reading fluency rates as determined by text demands, and purpose for reading (Local) (See Appendix C for suggested rates.) R:F&A:12:1.3: Fluency: reading familiar text with phrasing and expression, and with attention to text features such as punctuation, italics, and dialogue (Local)

Word Identification Skills and Strategies (WID)		
R:WID: Applies word identification/ decoding strategies by …		
Grade 8	**Grade 10**	**Grade 12**
R:WID:8:1.1: Identifying multi-syllabic words by using knowledge of sounds, syllable division, and word patterns (Local)	R:WID:10:1.1: Identifying multi-syllabic words by using knowledge of sounds, syllable division, and word patterns (Local)	R:WID:12:1.1: Identifying multi-syllabic words by using knowledge of sounds, syllable division, and word patterns (Local)

Vocabulary Strategies (V:1)		
(R:V:1: Assumes a variety of text and increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:V:1: Students identify the meaning of unfamiliar vocabulary by…		
Grade 8	**Grade 10**	**Grade 12**
R:V:8:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes, base words, common roots, or word origins; or context clues; or other resources, such as dictionaries, glossaries, thesauruses; or prior knowledge) (Local)	R:V:10:1.1a: Using strategies to unlock meaning (e.g., prior knowledge of word structure) including prefixes/suffixes, common roots, or word origins; or context clues; or resources including dictionaries, glossaries, or thesauruses <u>to determine definition, pronunciation, etymology, or usage of words</u>; (State) R:V:10:1.1b: Using strategies to unlock meaning including prior knowledge, base words, <u>general and specialized print or electronic resources to determine definition, pronunciation, etymology, or usage of words</u> (Local)	R:V:12:1.1a: Using strategies to unlock meaning (e.g., prior knowledge of word structure, including prefixes/suffixes, common roots, or word origins; or context clues; or resources including dictionaries, glossaries, or thesauruses to determine definition, pronunciation, etymology, or usage of words) (Local) R:V:12:1.1b: Using strategies to unlock meaning including prior knowledge, base words, <u>general and specialized print or electronic resources to determine definition, pronunciation, etymology, or usage of words</u> (Local)

Breadth of Vocabulary (V:2)		
R:V:2: Shows breadth of vocabulary knowledge through demonstrating understanding of word meanings and relationships by …		
Grade 8	**Grade 10**	**Grade 12**
R:V:8:2.1: Identifying synonyms, antonyms, homonyms/ homophones, shades of meaning, or word origins, including words from other languages that have been adopted into our language (Local) EXAMPLE (word origin from other language): de'ja' vu R:V:8:2.2: Selecting appropriate words or explaining the use of words in context, including content specific vocabulary, words with multiple meanings, or precise vocabulary (Local)	R:V:10:2.1: Identifying synonyms, antonyms, homonyms/ homophones, shades of meaning, idioms, or word origins, including words from dialects, or other languages that have been adopted into our language/standard English (State) R:V:10:2.2: Selecting appropriate words or explaining the use of words in context, including connotation or denotation, shades of meanings of words/nuances, or idioms; or use of content-specific vocabulary, words with multiple meanings, precise language, or technical vocabulary (State) EXAMPLE: Students might be asked to explain the meaning of terminology appropriate to the content of the subject area as used in a text passage	R:V:12:2.1: Identifying synonyms, antonyms, homonyms/ homophones, shades of meaning, analogies, idioms, or word origins, including words from dialects, or other languages that have been adopted into standard English (Local) R:V:12:2.2: Selecting appropriate words or explaining the use of words in context, including connotation or denotation, shades of meanings of words/nuances, or idioms; or use of content-specific vocabulary, words with multiple meanings, precise language, or technical vocabulary (Local)

Initial Understanding of Literary Texts (LT:1)		
(R:LT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:1: Demonstrate initial understanding of elements of literary texts by…		
Grade 8	**Grade 10**	**Grade 12**
R:LT:8:1.1: Identifying or describing character(s), setting, problem/ solution, or plots/subplots, as appropriate to text; or identifying any significant changes in character or setting over time; or identifying rising action, climax, or falling action (Local) R:LT:8:1.2: Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (State) R:LT:8:1.3: Generating questions before, during, and after reading to enhance//expand understanding and /or gaining new information (Local) R:LT:8:1.4: Identifying the characteristics of a variety of types/genres of literary text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, short stories, epics (poems, novels, dramas) (Local) R:LT:8:1.5: Identifying literary devices as appropriate to genre: rhyme schemes, alliteration, simile, dialogue, imagery, metaphors, flashback, onomatopoeia, repetition, personification, or hyperbole (Local)	R:LT:10:1.1: Identifying, describing, or making logical predictions about character (such as protagonist or antagonist), setting, problem/solution, or plots/subplots, as appropriate to text; or identifying any significant changes in character, relationships, or setting over time; or identifying rising action, climax, or falling action (State) R:LT:10:1.2 Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (State) R:LT:10:1.3: Generating questions before, during, and after reading to enhance//expand understanding and /or gaining new information(Local) R:LT:10:1.4: Identifying the characteristics of a variety of types/genres of literary text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, legends, myths, short stories, epics, novels, dramatic presentations, comedies, tragedies, satires, parodies, memoirs, epistles) (Local) R:LT:10:1.5: Identify literary devices as appropriate to genre (e.g., similes, metaphors, alliteration, rhyme scheme, onomatopoeia, imagery, repetition, flashback, foreshadowing, personification, hyperbole, symbolism, allusion, diction, syntax, bias, or point of view) (Local)	R:LT:12:1.1: Identifying, describing, or making logical predictions about character (such as protagonist or antagonist), setting, problem/solution, or plots/subplots, as appropriate to text; or identifying any significant changes in character, relationships, or setting over time; or identifying rising action, climax, or falling action (Local) R:LT:12:1.2: Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (Local) R:LT:12:1.3: Generating questions before, during, and after reading to enhance understanding and recall enhance//expand understanding and /or gaining new information (Local) R:LT:12:1.4: Identifying the characteristics of a variety of types/genres of literary text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, legends, myths, short stories, epics, novels, dramatic presentations, comedies, tragedies, satires, parodies, memoirs, epistles) (Local) R:LT:12:1.5: Identify literary devices as appropriate to genre (e.g., similes, metaphors, alliteration, rhyme scheme, onomatopoeia, imagery, repetition, flashback, foreshadowing, personification, hyperbole, symbolism, allusion, diction, syntax, bias, or point of view) (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:2)		
(R:LT:2: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:8:2: Analyze and interpret elements of literary texts, citing evidence where appropriate by… **R:LT:10:2: Analyze and interpret elements of literary texts, citing evidence where appropriate by…** **R:LT:12:2: Analyze and interpret literary elements within or across texts, citing evidence where appropriate by…**		
Grade 8	**Grade 10**	**Grade 12**
R:LT:8:2.1: Explaining or supporting logical predictions (Local) R:LT:8:2.2: Describing characterization (e.g., stereotype, antagonist, protagonist), motivation, or interactions, citing thoughts, words, or actions that reveal characters' traits, motivations, or their changes over time (Local) R:LT:8:2.3: Making inferences about cause/effect, internal or external conflicts (e.g., person versus self, person versus person, person versus nature/society/fate), or the relationship among elements within text (e.g., describing the interaction among plot/subplots) (Local) R:LT:8:2.4: Explaining how the narrator's point of view affects the reader's interpretation (Local) R:LT:8:2.5: Explaining how the author's message or theme (which may include universal themes) is supported within the text (Local)	R:LT:10:2.1: Explaining and supporting logical predictions or logical outcomes (e.g., drawing conclusions based on interactions between characters or evolving plot) (State) R:LT:10:2.2: Examining characterization (e.g., stereotype, antagonist, protagonist), motivation, or interactions (including relationships), citing thoughts, words, or actions that reveal character traits, motivations, or changes over time (State) R:LT:10:2.3: Making inferences about cause/effect, internal or external conflicts (e.g., person versus self, person versus person, person versus nature/society/fate), or the relationship among elements within text (e.g., describing the interaction among plot/subplots) (State) R:LT:10:2.4: Explaining how the narrator's point of view or author's style is evident and affects the reader's interpretation (State) EXAMPLE: "If this story were told from another character's point of view, how would the reader's interpretation be different?" R:LT:10:2.5: Explaining how the author's purpose (e.g., to entertain, inform or persuade) message or theme (which may include universal themes) is supported within the text (State)	R:LT:12:2.1: Explaining and supporting logical predictions or logical outcomes (e.g., drawing conclusions based on interactions between characters or evolving plot) (Local) R:LT:12:2.2: Examining characterization (e.g., stereotype, antagonist, protagonist), motivation, or interactions (including relationships), citing thoughts, words, or actions that reveal character traits, motivations, or changes over time (Local) R:LT:12:2.3: Making inferences about cause/effect, internal or external conflicts (e.g., person versus self, person versus person, person versus nature/society/fate), or the relationship among elements within text(s) (e.g., describing the interaction among plot/subplots, theme/setting, symbolism/characterization) (Local) R:LT:12:2.4: Explaining how the narrator's point of view, or author's style, or tone is evident and affects the reader's interpretation or is supported throughout the text(s) (Local) R:LT:12:2.5: Explaining how the author's purpose (e.g., to entertain, inform or persuade) message or theme (which may include universal themes) is supported within the text(s) (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:3)		
(R:LT:3: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:8:3: Analyze and interpret author's craft, citing evidence where appropriate by … **R:LT:8:3: Analyze and interpret author's craft, citing evidence where appropriate by …** **R:LT:12:3: Analyze and interpret author's craft <u>within or across texts</u>, citing evidence where appropriate by…**		
Grade 8	**Grade 10**	**Grade 12**
R:LT:8:3.1: Demonstrating knowledge of <u>author's style</u> or use of literary elements and devices (e.g., imagery, repetition, flashback, foreshadowing, personification, <u>hyperbole, symbolism, or use of punctuation</u>) to analyze literary works (Local) R:LT:8:3.2: is subsumed under R:LT:8:3.1, since all aspects are assessed Locally in grade 8	R:LT:10:3.1: Demonstrating knowledge of author's style or use of literary elements and devices (i.e., imagery, repetition, flashback, foreshadowing, personification, hyperbole, symbolism, <u>analogy, allusion, diction, syntax</u>, or use of punctuation) to analyze literary works (State)	R:LT:12:3.1a: Demonstrating knowledge of author's style or use of literary elements and devices (e.g., <u>simile, metaphor, point of view</u>, imagery, repetition, flashback, foreshadowing, personification, hyperbole, symbolism, analogize allusion, diction, syntax, genre, or bias, or use of punctuation, etc.) to analyze literary works (Local) R:LT:12:3.1b: <u>Examining author's style or use of literary devices to convey theme</u> (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:4)		
(R:LT:4: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:4: Generates a personal response to what is read through a variety of means by…		
Grade 8	**Grade 10**	**Grade 12**
R:LT:8:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:8:4.2: Providing relevant details to support the connections made or judgments (interpretive, analytical, evaluative, or reflective) (Local)	R:LT:10:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:10:4.2: Providing relevant details to support the connections made or judgments (interpretive, analytical, evaluative, or reflective) (Local)	R:LT:12:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:12:4.2: Providing relevant details to support the connections made or judgments (interpretive, analytical, evaluative, or reflective) (Local)

Initial Understanding of Informational Texts (IT:1)		
(R:IT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:1: Demonstrate initial understanding of informational texts (expository and practical texts) by…		
Grade 8	**Grade 10**	**Grade 12**
R:IT:8:1.1: Obtaining information from text features (e.g., table of contents, glossary, index, transition words /phrases, transitional devices, bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations) (Local) R:IT:8:1.2: Using information from the text to answer questions, to state the main/central ideas, or to provide supporting details (Local) R:IT:8:1.3: Organizing information to show understanding or relationships among facts, ideas, and events (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, summarizing, comparing/contrasting, or outlining) (Local) R:IT:8:1.4: Generating questions before, during, and after reading to enhance understanding and recall; expand understanding and/or gain new information (Local) R:IT:8:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference:** reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles, technical manuals ; and **practical/functional:** procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, schedules) (Local)	R:IT:10:1.1: Obtaining information from text features [e.g., table of contents, glossary, index, transition words/phrases, transitional devices (including use of white space), bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations] (State) R:IT:10:1.2: Using information from the text to answer questions; to state the main/central ideas; to provide supporting details; to explain visual components supporting the text; or, to interpret maps, charts, timelines, tables, or diagrams. (State) R:IT:10:1.3: Organizing information to show understanding or relationships among facts, ideas, and events (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, summarizing, comparing/contrasting, outlining (State) R:IT:10:1.4: Generating questions before, during, and after reading to enhance understanding and recall; expand understanding and/or gain new information (Local) R:IT:10:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference** - See Appendix A for suggestions), public documents (drivers' manuals) and discourse, essays (including literary criticisms), articles, technical manuals, editorials/commentaries, primary source documents, periodicals, job-related materials, speeches, on-line reading, documentaries; and **practical/functional** procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, schedules) (Local)	R:IT:12:1.1: Obtaining information from text features [e.g., table of contents, glossary, index, transition words/phrases, transitional devices (including use of white space), bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations] (Local) R:IT:12:1.2: Using information from the text to answer questions, perform specific tasks, or solve problems; to state the main/central ideas; to provide supporting details; to explain visual components supporting the text; or to interpret maps, charts, timelines, tables, or diagrams (Local) R:IT:12:1.3: Organizing information to show understanding or relationships among facts, ideas, and events (e.g., representing main/central ideas or details within text through charting (including flowcharts), mapping, paraphrasing, summarizing, comparing/contrasting, outlining, or connecting information with related ideas, etc.) (Local) R:IT:12:1.4: Generating questions before, during, and after reading to enhance understanding and recall; expand understanding and/or gain new information (Local) R:IT:12:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference** - See Appendix A for suggestions), public documents (drivers' manuals) and discourse, essays (including literary criticisms), articles, technical manuals, editorials/commentaries, primary source documents, periodicals, job-related materials, speeches, on-line reading, documentaries; and **practical/functional** procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, schedules) (Local)

Analysis and Interpretation of Informational Texts/Citing Evidence (IT:2)		
(R:IT:2: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:8:2/R:IT:10:2: Analyze and interpret informational text, citing evidence as appropriate by… **R:IT:12:2: Analyze and interpret informational text (which may include technical writing), citing evidence as appropriate by…**		
Grade 8	**Grade 10**	**Grade 12**
R:IT:8:2.1: Explaining connections about information *within* a text, *across* texts, or to related ideas (Local) R:IT:8:2.2: Synthesizing and evaluating information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas) (Local) R:IT:8:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or explaining how purpose may affect the interpretation of the text; or using supporting evidence to form or evaluate opinions/judgments and assertions about central ideas that are relevant (Local) R:IT:8:2.4: Distinguishing fact from opinion, and identifying possible bias/propaganda or conflicting information within or across texts (Local) R:IT:8:2.5: Making inferences about causes or effects (Local) R:IT:8:2.6: Evaluating the clarity and accuracy of information (Local)	R:IT:10:2.1: Explaining connections about information *within* a text, *across* texts, or to related ideas (State) EXAMPLE: Students are asked to compare information presented in two textual excerpts. R:IT:10:2.2: Synthesizing and evaluating information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas) (State) EXAMPLE: "How does the title of the article reflect the author's perspective?" R:IT:10:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or explaining how purpose may affect the interpretation of the text; or using supporting evidence to form or evaluate opinions/judgments and assertions about central ideas that are relevant (State) R:IT:10:2.4 Distinguishing fact from opinion, and evaluating possible bias/propaganda or conflicting information within or across texts R:IT:10:2.5: Making inferences about causes and/or effects (State) R:IT:10:2.6: Evaluating the clarity and accuracy of information (e.g., consistency, effectiveness of organizational pattern, or logic of arguments) (State)	R:IT:12:2.1: Explaining connections among ideas *across multiple* texts (Local) R:IT:12:2.2: Synthesizing and evaluating information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas) (Local) R:IT:12:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or explaining how purpose may affect the interpretation of the text; or using supporting evidence to form or evaluate opinions/judgments and assertions about central ideas that are relevant (Local) R:IT:12:2.4: Critiquing author's use of strategies to achieve intended purpose or message (e.g., to inform, explain, entertain, persuade) (Local) EXAMPLE (critique public documents): May include analysis of using anecdotes, addressing counterclaims, appealing to audience, using emotionally-laden language EXAMPLE (critique functional documents): May include visual appeal, logical sequences, awareness of possible reader misunderstanding R:IT:12:2.5: Making inferences about causes and effects (Local) R:IT:12:2.6: Evaluating the clarity and accuracy of information (e.g., consistency, effectiveness of organizational pattern, or logic of arguments) (Local)

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:1)		
(R:RS:1: Assumes increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:8:1: Demonstrates ability to monitor comprehension for different types of texts and purposes by… **R:RS:10:1: Demonstrates ability to monitor comprehension and strategy use for different types of texts and purposes by…** **R:RS:12:1: Demonstrates ability to monitor comprehension and strategy use for different types of texts and purposes by…**		
Grade 8	**Grade 10**	**Grade 12**
R:RS:8:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting and confirming, rereading, adjusting rate, sub-vocalizing, consulting resources, questioning, skimming, scanning, using syntax/language structure, semantics/ meaning, or other context cues, etc.) (Local)	R:RS:10:1.1: Using a range of self-monitoring and self-correction approaches (e.g., rereading, adjusting rate, sub-vocalizing, consulting resources, questioning, using flexible note taking/mapping systems, skimming, scanning, etc.) (Local)	R:RS:12:1.1: Using a range of self-monitoring and self-correction approaches (e.g., rereading, adjusting rate, sub-vocalizing, consulting resources, questioning, using flexible note taking/mapping systems, skimming, scanning, etc.) (Local)

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:2)		
(R:RS:2: Assumes increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:2: Uses comprehension strategies (flexibly and as needed) before, during, and after reading literary and informational text. (Local)		
Grade 8	**Grade 10**	**Grade 12**
R:RS:8:2.1: Using strategies before, during, and after reading literary and informational text. EXAMPLES of reading comprehension strategies might include: using prior knowledge; sampling a page for readability; summarizing; predicting and making text based inferences; determining importance; generating literal, clarifying, and inferential questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); taking notes; locating, using, and analyzing text features (e.g., transition words, subheadings, bold/italicized print, parts of the book); or using text structure clues (e.g., chronological, cause/effect, compare/contrast, proposition and support, description, classification, logical/ sequential) (Local) (See also Appendix D)	R:RS:10:2.1: Using strategies before, during, and after reading literary and informational text. EXAMPLES of reading comprehension strategies might include: using prior knowledge; summarizing; predicting and making text based inferences; determining importance; generating literal, clarifying, inferential, analysis, synthesis, and evaluative questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); taking notes; <u>locating and using text discourse features and elements to support inferences and generalizations about information (e.g., vocabulary, text structure, evidence, format, use of language, arguments used)</u>; or using cues for text structures (e.g., chronological, cause/effect, compare/contrast, proposition and support, description, classification, logical, sequential) (Local) (See also Appendix D)	R:RS:12:2.1: Using strategies before, during, and after reading literary and informational text. EXAMPLES of reading comprehension strategies might include: using prior knowledge; summarizing; predicting and making text based inferences; determining importance; generating literal, clarifying, inferential, analysis, synthesis, and evaluative questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); taking notes; locating and using text discourse features and elements to support inferences and generalizations about information (e.g., vocabulary, text structure, evidence, format, use of language, arguments used); or using cues for text structures (e.g., chronological, cause/effect, compare/contrast, proposition and support, description, classification, logical, sequential like Grade 10) (Local) (See also Appendix D)

Breadth of Reading: Reading Extensively* and In Depth (B:1)		
R:B:1: Demonstrates the habit of reading widely and extensively* by…		
Grade 8	**Grade 10**	**Grade 12**
R:B:8:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:8:1.2: Reading from a wide range of genres/ kinds of text, including primary and secondary sources, and a variety of authors (e.g., literary, informational, and practical/functional texts) (Local) (See Appendix A) R:B:8:1.3: Reading multiple texts for depth of understanding an author, a subject, a theme, or genre (Local)	R:B:10:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:10:1.2: Reading from a wide range of genres/ kinds of text, including primary and secondary sources, and a variety of authors (e.g., literary, informational, and practical/functional texts) (Local) (See Appendix A) R:B:10:1.3: Reading multiple texts for depth of understanding an author, a subject, a theme, or genre (Local)	R:B:12:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:12:1.2: Reading from a wide range of genres/ kinds of text, including primary and secondary sources, and a variety of authors (e.g., literary, informational, and practical/functional texts) (Local) (See Appendix A) R:B:12:1.3: Reading multiple texts for depth of understanding an author, a subject, a theme, or genre (Local)

Breadth of Reading: Reading Extensively* and In Depth (B:2)		
***Materials should be at the student's instructional <u>and</u> independent reading levels. The specific number of books should be viewed flexibly and is less important than the extensiveness, duration/ time, and frequency of reading.**		
R:B:2: Demonstrates participation in a literate community by…		
Grade 8	**Grade 10**	**Grade 12**
R:B:8:2.1: Self-selecting reading materials in line with reading ability and personal interests (Local) R:B:8:2.2: Participating in in-depth discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:10:2.1: Self-selecting reading materials in line with reading ability and personal interests (Local) R:B:10:2.2: Participating in in-depth discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:12:2.1: Self-selecting reading materials in line with reading ability and personal interests (Local) R:B:12:2.2: Participating in in-depth discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)

Breadth of Reading: Reading for Research Across Content Areas (B:3)		
***Research materials should be at the student's instructional and independent reading levels, including print and non-print texts.**		
R:B:3: Research* by reading multiple sources (including print and non-print texts) to solve a problem, or to make a decision, or to formulate a judgment, or to support a thesis by…		
Grade 8	**Grade 10**	**Grade 12**
R:B:8:3.1: Identifying and evaluating potential sources of information (Local) R:B:8:3.2: Evaluating information presented, in terms of completeness and relevance (Local) R:B:8:3.3: Gathering, organizing, analyzing, and interpreting the information (Local) R:B:8:3.4: Using evidence to support conclusions (Local)	R:B:10:3.1: Identifying and evaluating potential sources of information (Local) R:B:10:3.2: Evaluating and selecting the information presented, in terms of completeness, relevance, and validity (Local) R:B:10:3.3: Organizing, analyzing, and interpreting the information (Local) R:B:10:3.4: Drawing conclusions/judgments and supporting them with evidence (Local)	R:B:12:3.1: Identifying and evaluating potential sources of information (Local) R:B:12:3.2: Evaluating and selecting the information presented, in terms of completeness, relevance, and validity (Local) R:B:12:3.3: Organizing, analyzing, and interpreting the information (Local) R:B:12:3.4: Drawing conclusions/judgments and supporting them with evidence (Local)

Appendix A: *Suggested* Informational and Literary Texts (Grades K-2)

Suggested Print and Non-Print Informational and Literary Texts – for Instruction and Assessment **All students need ongoing opportunities to apply and practice reading strategies with many different types of LITERARY and INFORMATIONAL texts. Recognizing a variety of texts and their characteristics will help students in meeting grade level expectations described in the NECAP GLEs. Suggested Texts listed below are not meant to be exhaustive for any given grade level.**		
Grade K	**Grade 1**	**Grade 2**
Suggested **Informational Texts include, but are not limited to** **Reference materials:** Read-alouds and guided/shared reading of children's magazines, content trade books, informational charts, etc. **Practical texts:** lists, signs, labels, environmental print, pictorial charts and graphs, etc.	***Suggested*** **Informational Texts include, but are not limited to** **Reference materials:** Read-alouds and guided/shared reading of children's magazines, content trade books, informational charts, etc. **Practical texts:** lists, labels, environmental print, pictorial charts and graphs, simple directions, invitations, calendar, simple maps/classroom maps, etc.	***Suggested*** **Informational Texts include, but are not limited to** **Reference materials:** Beginning dictionaries, glossaries, children's magazines, content trade books, children's newspapers, etc. **Practical texts:** Procedures/instructions, announcements, invitations, book orders, etc.
Suggested **Literary Texts** **include, but are not limited to** Nursery rhymes, poetry, fairytales, fantasy, realistic fiction, songs, chants, etc.	***Suggested*** **Literary Texts** **include, but are not limited to** Poetry, fairytales, fantasy, realistic fiction, songs, chants, etc.	***Suggested*** **Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, tall tales, realistic fiction, etc.
(Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		

Appendix A: *Suggested* Informational and Literary Texts (Grades 3-5)

Suggested Print and Non-Print Informational and Literary Texts – for Instruction and Assessment **All students need ongoing opportunities to apply and practice reading strategies with many different types of LITERARY and INFORMATIONAL texts. Recognizing a variety of texts and their characteristics will help students in meeting grade level expectations described in the NECAP GLEs. Suggested Texts listed below are not meant to be exhaustive for any given grade level.**		
Grade 3	**Grade 4**	**Grade 5**
Suggested **Informational Texts include, but are not limited to** **Reference materials:** Dictionaries, glossaries, children's magazines, content trade books, children's newspapers, textbooks, etc. **Practical texts:** Procedures/instructions, announcements, invitations, book orders, etc.	***Suggested*** **Informational Texts include, but are not limited to** **Reference materials:** Dictionaries, glossaries, encyclopedias, children's magazines, content trade books, student newspapers, textbooks, etc. **Practical texts:** Procedures/instructions, announcements, invitations, book orders, etc.	***Suggested*** **Informational Texts include, but are not limited to** **Reference materials:** Dictionaries, glossaries, reports, encyclopedias, children's magazines, content trade books, student newspapers, textbooks, biographies, Internet websites, etc. **Practical texts:** Procedures/instructions, announcements, invitations, book orders, recipes, menus, etc.
Suggested **Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, tall tales, realistic fiction, etc.	***Suggested*** **Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, etc.	***Suggested*** **Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, etc.
(Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		

Appendix A: *Suggested* Informational and Literary Texts (Grades 6-8)

***Suggested* Informational and Literary Texts (Print and Non-Print) for Instruction and Assessment** **All students need ongoing opportunities to apply and practice reading strategies with many different types of LITERARY and INFORMATIONAL texts. Recognizing a variety of texts and their characteristics will help students in meeting grade level expectations described in the NECAP GLEs and GSEs. Suggested Texts listed below are not meant to be exhaustive for any given grade level.** (Underlining indicates additional text types introduced for the first time at this grade level.)		
Grade 6	**Grade 7**	**Grade 8**
Suggested **Informational Texts include, but are not limited to** **Reference materials:** Dictionaries, thesauruses, reports, encyclopedias, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles, etc. **Practical/functional texts:** Procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, etc.	***Suggested*** **Informational Texts include, but are not limited to** **Reference materials:** Thesauruses, reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles, technical manuals, etc. **Practical/functional texts:** Procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, etc.	***Suggested*** **Informational Texts include, but are not limited to** **Reference materials:** Reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles, technical manuals, etc. **Practical/functional texts:** Procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, schedules, etc.
***Suggested* Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, etc.	***Suggested* Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, short stories, etc.	***Suggested* Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, short stories, epics (poems, novels, dramas), etc.
(Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		

Appendix A: *Suggested* Informational and Literary Texts (Grades 9-12)

***Suggested* Informational and Literary Texts (Print and Non-Print) for Instruction and Assessment** **All students need ongoing opportunities to apply and practice reading strategies with many different types of LITERARY and INFORMATIONAL texts. Recognizing a variety of texts and their characteristics will help students in meeting grade level expectations described in the NECAP GLEs and GSEs. Suggested Texts listed below are not meant to be exhaustive for any given grade level.** (Underlining indicates additional text types introduced for the first time at this grade level.)	
Grade 8	**High School**
Suggested **Informational Texts include, but are not limited to** **Reference materials:** Reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles, technical manuals, etc. **Practical/functional texts:** Procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, schedules, etc.	***Suggested*** **Informational Texts include, but are not limited to** **Reference materials:** Reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, legal documents (i.e, Supreme Court case decisions, lease agreements), public documents (drivers' manuals) and discourse, essays (including literary criticisms), articles, technical manuals, editorials/commentaries, primary source documents, periodicals, job-related materials, speeches, on-line reading, documentaries, etc. **Practical/functional texts:** Procedures/instructions, announcements, invitations, advertisements, pamphlets, schedules, memos, applications, catalogues, etc.
***Suggested* Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, short stories, epics (poems, novels, dramas), etc.	***Suggested* Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, short stories, epics, novels, dramatic presentations, comedies, tragedies, satires, parodies, memoirs, epistles, etc.
(Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)	

Appendix B: The Six Syllable Types

1. closed – [not] - closed in by a consonant - vowel makes its **short** sound
2. open – [no] - ends in a vowel - vowel makes its **long** sound
3. silent e – [note] - ends in vowel consonant e - vowel makes its **long** sound
4. vowel combination – **[**nail] the two vowels together make a sound
5. r-controlled – [bird] - contains a vowel plus "r" - vowel sound is changed
6. consonant - l - e –[table] - at the end of a word

Appendix C: Reading Fluency Rates

Recommended Fluency Rates * (in words read correctly per minute)	**Grade K**	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade 5**	**Grade 6**	**Grade 7**	**Grade 8**
Oral:	**N/A**	**50-80 words correct per minute**	**80-100 words correct per minute**	**90-120 words correct per minute**	**115-140 words correct per minute**	**125-150 words correct per minute**	**135-160 words correct per minute**	**140-175 words correct per minute**	**150-180 words correct per minute**
Silent:	**N/A**	**N/A**	**N/A**	**115-140**	**130-175**	**160-200**	**190-220**	**215-245**	**235-270**

The following sources were referenced to determine fluency rates:

- Caldwell, *Reading Assessment*, Guilford Press, 2002
- Fountas and Pinnell, *Guiding Readers and Writers Grades 3-6*, Heinemann, 2001
- *Put Reading First*, National Institute for Literacy, 2001
- Lipson and Wixson, *Assessment and Instruction of Reading and Writing Difficulty*, Pearson Education, 2003
- NAEP's Scale for Assessing Oral Reading Fluency, 2001

Appendix D: Metacognition Strategies for Understanding Text

Teachers continually model and reinforce use of strategies, so that students learn to flexibly apply strategies that help them comprehend and interpret literary and informational texts.
Reading and learning to read are problem solving processes that require strategies for the reader to make sense of written language and remain engaged with texts.
Complexity of text and purpose of reading will determine the extent to which each strategy is applied.

Before reading, students…	During reading, students…	After reading, students…
• Set a purpose • Activate prior knowledge (schema) • Preview text • Identify text structure clues (e.g., chronological, cause/effect, compare/contrast, etc.) • Locate text features (e.g., transitional words, subheadings, bold print, etc.) • Use Cues: graphics and pictures • Skim/Scan • Predict and make text-based references • Sample a page of text for readability and interest	• Self-monitor using: ➢ Meaning ➢ Language structure ➢ Print cues • Reread • Self-correct • Clarify • Determine Importance • Generate literal, clarifying, and inferential questions • Visualize • Construct sensory images • Summarize and paraphrase • Check predictions • Interpret ➢ Literal meaning ➢ Inferential meaning • Make Connections, using ➢ Graphics ➢ Pictures • Monitor fluency (oral/silent; or text complexity) ➢ Adjust rate ➢ Use punctuation and dialogue cues ➢ Use phrasing, intonation, expression • Read for accuracy • Use note-taking strategies	• Reread for confirmation • Summarize and paraphrase key ideas • Evaluate ➢ Accuracy of information ➢ Literary merit and use of author's craft • Clarify • Analyze information within and across texts • Support conclusions with references from text • Synthesize • Connect ideas/themes in text to… ➢ Text: Compare one text to another text ➢ Self: Relate and explain ideas or events in text to personal experience ➢ World: Recognize commonalities of text to world

Appendix E: Glossary of Reading Terms

Affix – A meaningful part of a word that is attached before (prefix) or after (suffix) a root or base word to modify its meaning.

Alliteration - The repetition of initial consonant sounds in neighboring words. (For example: The slithering, slimy snake)

Allusion - A reference to a familiar person, place, or thing.

Analogy - A comparison of two or more similar objects, suggesting that if they are alike in certain respects, they will probably be like in other ways, too.

Analysis - A separating of a whole into its parts with an examination of these parts to find out their nature and function.

Antagonist - A person or thing working against the main character.

Antonym - A word that is opposite in meaning to another word. (For example: love – hate, hot-cold)

Author's Craft – The techniques the author chooses to enhance writing. (Examples of author's craft: style, bias, point of view, flashback, foreshadowing, symbolism, figurative language, sensory details, soliloquy, stream of consciousness, etc.)

Autobiography – An account of the life of an individual written by the subject, classified as non-fiction.

Base Word – A free morpheme (can stand alone), to which affixes can be added. (For example: worry)

Bias - A highly personal judgment.

Biography – An account of the life of an individual, classified as non-fiction or informational text.

Cause/Effect – A text or response to reading text which provides explanations or reasons for phenomena.

Character - A person, animal, or object that takes part in the action of a literary work. The main or major character is the most important and central to the action. A minor or supporting character is one who takes part in the action, but is not the focus of the attention.

Characterization - The method an author uses to reveal the characters and their various personalities. Authors use two major methods of characterization: direct and indirect. When using direct characterization, a writer states the characters' traits, actions, motives, or feelings. When describing a character indirectly, a writer depends on the reader to draw conclusions about the character's traits or uses other participants in the story to reveal a character's traits and motives.

Cite - To quote as an example.

Citation - A direct quote from the text, as opposed to a generalized summary or statement; an acknowledgment and documentation of sources of information.

Climax – The high point or turning point in the plot of a story.

Comparison/Contrast - A text or response to reading text that identifies how information presented has similar or different characteristics or qualities.

Conflict - The problem or struggle in a story that triggers the action. Conflicts may be internal (struggles from within a character) or external.

Context - The set of facts or circumstances surrounding an event or a situation, explanation of characters, or definition of important terms in text; the background information the reader needs to know in order to fully understand the message of the text.

Context clues - Information in the reading passage that helps the reader determine the meaning of unfamiliar words or phrases, such as illustrations or the meaning of other words in the text.

Controlling Idea – This is the main idea/focus that runs throughout the paper or text.

Conventions - Features of standard written English that usually include sentence formation, grammar, spelling, usage, punctuation, and capitalization.

Decode – The ability to translate a word from print to speech, usually by employing knowledge of sound-symbol correspondence

Dialogue - A conversation between two characters. In poems, novels, and short stories, dialogue is usually set off by quotations marks to indicate a speaker's exact words; in a play, dialogue follows the names of the characters, and no quotation marks are used.

Diction - An author's choice of words based on their accuracy, clarity, and effectiveness.

Drama - A story written to be performed by actors. Dramas are often divided into parts called acts, which are often divided into smaller parts called scenes.

Evaluate - Examine and judge carefully, based on evidence found in the text.

Figurative Language - Language used in writing or speech that is not meant to be interpreted literally, as the intent of the language is to create a special effect, idea, image, or feeling.

Fluency - The clear, easy, written or spoken expression of ideas, or freedom from word-identification problems that may hinder comprehension during silent reading or the expression of ideas during oral reading; The ability to read text accurately, quickly, and with proper expression, phrasing, and intonation between word recognition and comprehension; Rapidly and automatically recognizing and decoding words, with evidence that the reader is accessing the deeper meaning of the text; Assessment of fluency is associated with rate, accuracy, and scores on comprehension tests.

Focus - The concentration of a specific idea(s) within the topic the writer is addressing; the main/central idea that runs through a text. (For example: If the topic is "horses," the focus might be: Horses are very expensive to own.)

Genre - A category used to classify literary works, usually by form, technique, or content. For example, literature is commonly divided into three manor genres: poetry, prose, and drama. Each genre is, in turn, divided into sub-genres

Graphic Organizer- A diagram or pictorial device used to record and show relationships among ideas or information.

Historical fiction – Fiction drawn from the writer's imagination, but true to life in some period of the past.

Homonym - One of two words that have the same sound and often the same spelling but differ in meaning. (For example, *bear* "to carry," *bear* (the animal), and *bare* "naked.")

Homophone - One of two or more words that are pronounced the same but differ in meaning, origin, and sometimes spelling. [For example, hair/hare, knight/night, and (fish) scale /(musical) scale.]

Hyperbole - A figure of speech in which exaggeration is used for emphasis or effect.

Inference - A deduction or conclusion made from facts that are suggested or implied rather than overly stated. (For example: Mom said that I should study more and watch television less. I inferred that I should get better grades or the television would be taken out of my room.)

Informational text – A text that provides facts, ideas, and principles that are related to the physical, biological, or social world; classified as non-fiction text.

Literary conflict - The tension that grows out of the interplay of the two opposing forces in a plot.

Literary devices - Tools used by the author to enliven and provide voice to the writing, such as dialogue, alliteration, foreshadowing, personification, metaphors, etc.

Literary elements - The essential techniques used in literature, such as characterization, setting, plot, and theme.

Metaphor - A figure of speech in which one thing is described in terms of another to make an implicit comparison – that is, a comparison that does not use words such as "like" or "as." (For example: The sky's lamp was bright.)

Morpheme – The smallest meaningful unit of language; may be a word or part of a word (For example – "less" or "child")

Narrative - A story, actual or fictional, expressed orally or in writing; a text that tells about a sequence of events.

Narrative passage - Text in any form that recounts or tells a story.

Narrator - The person (or animal or object) telling a story, who may be a character within the story or someone outside of the story.

Onomatopoeia - A figure of speech in which the sound of the word imitates the sounds associated with the objects or actions to which they refer. (For example, *crackle, moo, pop, zoom.)*

Opinion - A belief or conclusion held with confidence, but not sustained with proof.

Paraphrase - Restate text or passage mostly in other (or in own) words.

Personification - The attribution of human qualities to inanimate objects. (For example: *The clouds played and danced in the sky.*)

Phoneme - The smallest unit of sound in a spoken word; a speech sound that combines with other sounds in a language to make words.

Phonemic awareness ability to hear, identify and manipulate individual sounds in spoken words; Involves blending, segmenting, deleting sounds, etc.

Phonics - Relationships between the letters of written language and the individual sounds of spoken language.

Plot - The plan, design, storyline, or pattern of events in a play, poem, or works of fiction.

Poem - A composition characterized by use of condensed language, chosen for its sound and suggestive power and the use of literary techniques such as rhyme, blank verse, rhythm, meter, and metaphor.

Point of View - The way in which an author reveals characters, events, and ideas when telling a story; the perspective or vantage point from which a story is told.

Problem - The conflict or struggle (internal or external) that causes the action in a story or play. An internal conflict takes place within the mind of a character, such as a struggle to make a decision, take an action, or overcome a feeling. An external conflict is one in which a character struggles against some outside force, such as another person or something in nature.

Prose - Writing that is not restricted in rhythm, measure, or rhyme; most writing that is not drama, poetry, or song is considered prose.

Protagonist - The main character or hero of a text.

Reading critically - Reading in which a questioning attitude, logical analysis, and inference are used to judge the worth of the text; evaluating relevancy and adequacy of what is read; the judgment of validity of worth of what is read, based on sound criteria and evidence.

Reading rate - The speed at which a person reads; generally measured as words per minute or words correct per minute.

Realistic Fiction – Fiction drawn from the writer's imagination, but is true to life; often focuses on universal human problems.

Resolution - The portion of the play or story in which the problem is resolved. It comes after the climax and falling action and is intended to bring the story to a satisfying end.

Rhyme - A metrical device in which sounds at the ends of words or lines or verse correspond. Another common device is the use of internal rhymes, or rhyming words within lines.

Rhyme scheme - A regular pattern of rhyming words in a poem, usually indicated by assigning a different letter to each rhyme in a stanza such as, *a-b-a-b*.

Rhythm - In verse or prose, the movement or sense of movement communicated by the arrangement of long and short or stressed and unstressed syllables.

Root – A bound morpheme, usually of Latin origin, that cannot stand alone, but is used to form a family of words with related meanings. (For example: "spec")

Self-monitor - Metacognitive awareness and processes whereby the reader realizes that what is being read is or is not making sense, and adjusts reading strategies to improve comprehension.

Semantics - The study of meaning in language, particularly the meaning of words and changes in the meanings.

Setting - The time and place of the action in a literary work. The setting includes all the details of a place and time. In most stories, the setting serves as a backdrop or context in which the characters interact and the plot progresses.

Simile - A figure of speech in which one thing is likened to another using an explicit comparison (that is, using the words "like" or "as") to clarify or enhance an image. (For example: It was as cold as an ice cube.)

Soliloquy - A speech delivered by a character when he/she is alone on the stage; monologue.

Stereotype - A pattern or form that does not change. A character is "stereotyped" if she or he has no individuality and fits the mold of that particular type of person or character, such as a villain.

Style - The characteristic manner used by an author to express ideas and create intended effects, including the writer's use of language, choice of words, and use of literary devices.

Summary - Writing that presents the main/central points of a larger work in condensed form.

Synonym - Two or more words that have highly similar meanings. (For example: *happy, glad,* and *cheerful.)*

Syntax - The pattern or structure of word order in sentences, clauses, and phrases.

Temporal Sequence – Ideas or events presented in the order in which they happen.

Text Structure – The way information is organized and presented. (For example: Fiction texts and biographies generally use a narrative structure and are meant to be read from beginning to end; nonfiction or informational texts are organized by topics or into sections, using text features such as headings, bold print, transitional words/phrases, etc.)

Theme - The central idea, message, concern, or purpose in a literary work, which may be stated directly or indirectly. (For example: In the book *The Pancake*, by Anita Lobel, "People should work together" or "Don't be too cocky" are themes.)

Thesis - The basic proposition put forward by a speaker or writer, which then is proved through fact, argument, or support from a text; the subject or argument of a composition. It is the controlling idea about a topic that the writer is attempting to prove; a sentence that announced the writer's main, unifying controlling idea about a topic. A thesis statement usually contains two main elements: a limited subject (Internet), a strong verb, and the reason for it - the "why"- (The Internet provides information of varying depth and quality).

Tone - The overall feeling or effect created by a writer's use of words, sentence structure, and attitude towards the audience, characters, or topic. This feeling, which pervades the work, may be serious, mock-serious, humorous, sarcastic, solemn, objective, etc.

Traditional literature – Stories passed down orally throughout history. (Examples include: folk tales, fairy tales, myths, legends, and epics.)

Turning Point - The moment in a story or a play when there is a definite change in direction and one becomes aware that it is now about to move toward the end.

Voice - The style and quality of the writing which includes word choice, a variety of sentence structures, and evidence of investment. Voice portrays the author's personality or the personality of the chosen persona. It is the fluency, rhythm, and liveliness in writing that makes it unique to the writer. A distinctive voice establishes personal expression and enhances the writing.

The following sources were referenced in developing the glossary:

- Fountas and Pinnell (2001) *Guiding Readers and Writers Grades 3-6: Teaching Comprehension, Genre, and Literacy.* Heinemann
- Kemper, Sebranek & Meyer (2001) *The Write Source*. Wilmigton: Houghton Mifflin
- Moats (2003) *LETRS: Language Essentials for Teachers of Reading and Spelling.* Sopris West
- Pennsylvania Department of Education (2003) *Reading Assessment Glossary*
- (2001) *Put Reading First*. National Institute for Literacy, US Department of Education
- (2004) *Tri-State New England Grade Level Expectations* for *Writing* - Appendix A: Writing Glossary

Appendix F: A Discussion of "Increasing Text Complexity"
(K. Hess and S. Biggam, 2004)

The instruction and assessment of reading comprehension presents unique challenges to classroom teachers and test developers alike; and the criteria used in selecting a variety and range of appropriate texts are essential to meeting those purposes. In the classroom, students learn to apply and practice a variety of reading strategies, for different purposes and with different text types. Over time, students who are exposed to a variety of text types with increasing complexity also learn how text features differ by genre, and they gain confidence in pealing back the layers of complexity for a deeper understanding of what is read. In test development, the overall number of test items is driven by the length and type of reading passages and the number of items possible accompanying each passage. Passages for reading assessment, drawn from "authentic" text whenever possible, should include both literary and informational texts. A series of questions accompanying each reading passage may include initial understanding of text, analysis and interpretation of text, or a combination of both types of questions, especially for longer text passages.

We have learned from NAEP research (1985) that difficulty of text passages was one of the three most important factors in reading comprehension performance of 4th, 8th, and 12th grade students. The other two factors were familiarity with subject matter presented in text and the type (literal, inferential, etc.) of question asked. (Chall and Conard, 1991) Other research suggests that at grades 2 and 3, word difficulty may influence text complexity more than other factors. (Anderson, 1992) Lipson and Wixon (2003) summarize the challenges of understanding text complexity this way:

"In the past, one of the few text features that was given much attention was its difficulty or readability, as measured by factors such as the number of syllables in the words and the number of words in the sentences. Current research has demonstrated that a number of other factors have a significant impact on both how much and what students understand and learn from a text. The presence or absence of these factors determines the extent to which a given text can be considered 'considerate' (to enable readers with minimal effort) or 'inconsiderate' (text requiring much greater effort). (Armbruster, 1984) "

A variety of factors influence text complexity. The complexity of text, or the degree of challenge of a particular text, is the result of specific combinations and interactions of these factors. For example, a text that has short simple sentences may, nevertheless, be challenging to read/comprehend when it contains ideas or concepts that are unfamiliar or requires a greater level of interpretation to unlock intended meaning. Pinnell and Fountas' text leveling system (2002), an extension of the system used by Reading Recovery developed for classroom use at grades 3-6, includes these factors for determining complexity: understanding the nature of print, repeated text, natural language versus book text, supportive text, and high frequency vocabulary. Their system also calls attention to differences between fiction and nonfiction texts in book leveling, and includes descriptors that "overlap" to the next level of difficulty.

Chall, Bissex, Conard, and Harris-Sharples (*Qualitative Assessment of Text Difficulty*, 1996) suggest that linguistic characteristics (vocabulary and sentence structure and variety) as well as concepts presented, text organization, and background knowledge required of readers all need to be considered in determining appropriateness of text for a given grade level. "Merely breaking up longer sentences and simplifying vocabulary does not guarantee that reading materials will be completely appropriate for lower reading levels." They also point out differences between popular fiction, literature, and informational texts with regard to text difficulty. For example, popular fiction tends to (a) use less figurative language than literature, (b) be more repetition of information, and (c) have more conventional language use; therefore demands on the reader of popular fiction are more about basic understanding of explicit messages than on interpretation of the message.

Criteria for increasing text complexity include factors that interact to affect the relative difficulty of reading particular material. The table on the following pages describes ways in which text materials generally increase in difficulty over the grade span of grades 1-12. The descriptors in the table build from one grade or grade cluster to the next. It is expected that students would have experience reading text described for their grades, as well as those of earlier grade clusters.

Factors that Influence Increasing Text Complexity:

- **Word Difficulty and Language Structure,** including vocabulary and sentence type and complexity (often determined through the use of multiple readability formulas)
- **Text Structure and Discourse Style** (e.g., satire, humor)
- **Genre and the Characteristic Features of the each type of text**
- **Background Knowledge and/or Degree of Familiarity with Content needed by the reader**
- **Level of Reasoning Required** (e.g., sophistication of themes and ideas presented)
- **Format and Layout,** including how text is organized/layout, size and location of print, graphics, and other book/print features
- **Length of Text**

Note: Sample grade-appropriate text titles are included at the end of the descriptors for each grade span as examples of text that would illustrate many of the characteristics described in the table. In many cases, particular teachers and schools will choose to introduce these specific texts at grade levels below or above the grade level indicated. While every descriptor might not be evident in a sample text passage, it is expected that the sample texts reflect the intent of the descriptors, and many of the indicators.

Text Complexity Descriptors End of Grade 1	Text Complexity Descriptors End of Grade 2
❖ Includes a variety of literary texts (such as fantasy, realistic fiction, poetry), with some complexity in story structure (e.g., multiple episodes) and literary language ❖ Simple informational books/text ❖ Illustrations provide moderate support for the reader ❖ Texts have several sentences per page, with sentences of moderate length and generally simple sentence structure ❖ Very straightforward text structures ❖ Familiar content ❖ In narrative text, details related to story elements (setting, characterization, events, resolution) provide strong support for both literal and interpretive meanings (e.g., for drawing basic inferences or basic conclusions) ❖ Informational texts use clear and consistent formats (e.g., print location on page),illustrations, and simple graphics to support understanding of content ❖ Simple punctuation is used: period, question mark, exclamation point, quotation marks, commas	❖ Includes a variety of literary texts (such as realistic fiction, folktales, humorous stories, poetry)with elaborated episodes and events, and some extended descriptions ❖ Stories usually have well-developed characters and episodes ❖ Informational books/text ❖ Some use of unfamiliar vocabulary, supported by other text features (e.g., such as headings and chapter titles) ❖ Illustrations may or may not be present on each page, but usually provide low to moderate support for the reader. ❖ Sentence structure becomes more complex -- including causal phrases. ❖ Straightforward text structures in informational text ❖ Content usually familiar ❖ In narrative text, details related to story elements (setting, characterization, goals, attempts, consequences and resolutions) provide moderate support for both literal and interpretive meanings (e.g., for predicting logical outcomes or drawing inferences about problem/solution) ❖ Informational texts use clear formats (e.g., use of simple headings to organize information into categories), illustrations that extend meaning, and simple graphics to support understanding of content ❖ Full range of punctuation used, except dashes, colons, and semicolons
SAMPLE TEXTS AT THE END OF GRADE 1: *There's a Nightmare in My Closet; The Very Busy Spider; Nobody Listens to Andrew; Ants (Sunshine Science Series)*	*SAMPLE TEXTS AT THE END OF GRADE 2:* *George and Martha; Cam Jansen and the Mystery of the Dinosaur Bones; The Stories Julian Tells; Happy Birthday Martin Luther King (Scholastic)*

<table>
<tr><th colspan="2">Text Complexity Descriptors Grades 3-4</th><th colspan="2">Text Complexity Descriptors Grades 5-6</th></tr>
<tr><td colspan="2">❖ Includes a range of longer literary selections, including realistic fiction and fantasies. Narratives usually include familiar characters or settings.
❖ Informational/ functional text including short expository pieces, e.g., descriptive, compare/ contrast, directions, simple recipes, etc.
❖ Varied vocabulary, but generally familiar; some figurative language (e.g., similes). Increased use of challenging vocabulary (e.g., multi-syllabic words, words with multiple meanings). Technical words are defined or explained in context.
❖ Sentence structure becoming more elaborated and complex, including some use of passive voice, abstract or descriptive language.
❖ Relatively straightforward text structures. Texts include more information, more complex ideas and relationships (e.g., examples, comparisons).
❖ Content usually builds from shared/ somewhat familiar experiences.
❖ In narrative text, the story elements (plot, setting, characterization) provide support for both literal and interpretive meanings.
❖ Informational texts use clear formats, illustrations, and graphics to support understanding of content. Text features include timelines, captions, and maps.
❖ Full range of punctuation used.</td><td colspan="2">❖ Includes a range of literary selections, such as full-length novels, well-crafted short stories (with increasingly diverse characters and settings), historical fiction and myths.
❖ Includes more complex informational/ functional texts, such as persuasive essays, procedural “how to” guides, scientific and historical summaries (e.g., textbooks).
❖ More varied and challenging vocabulary, including use of figurative language (idioms, metaphors) and analogies. Some technical terms.
❖ Language in narrative text includes dialect and other linguistic variants to enhance characterization and setting.
❖ Ideas and content increase in number and density. Relationships between ideas become more complex (e.g., flashback may be introduces) in narrative text; graphs and charts are needed to convey key information in expository text.
❖ Content requires general background knowledge. Underlying themes become more complex and more universal.
❖ Interrelationships among story elements become more complex and require more interpretation. Literary elements include flashback, humor, suspense, personification, and exaggeration.
❖ Informational and functional texts use a variety of formats, illustrations, and graphics to support understanding. Texts features include chapter headings, glossaries, punctuation guides.</td></tr>
<tr><td><u>SAMPLE TEXTS AT GRADE 3: The Mouse and the Motorcycle; Sideways Stories; What’s the Big Idea; Ben Franklin; Time for Kids</u></td><td><u>SAMPLE TEXTS AT GRADE 4:</u> <u>Cricket in Times Square; Castle in the Attic; Wow</u> (National Wildlife Federation)</td><td><u>SAMPLE TEXTS AT GRADE 5: Tuck Everlasting; Shh! We’re Writing the Constitution</u>; <u>Cricket</u> magazine</td><td><u>SAMPLE TEXTS AT GRADE 6: True Confessions of Charlotte Doyle; Holes, The Grey King; Cobblestone</u> magazine</td></tr>
</table>

Text Complexity Descriptors Grades 7-8 and High School		
❖ Includes a full range of literary genres, including realistic and historical fiction, science fiction, fantasy, and folk literature ❖ Informational/functional texts include primary sources, personal narratives and autobiographies, schedules, and manuals, as well as synthesized information found in textbooks ❖ Increasing number of uncommon words, including words with non-literal meanings and more abstract vocabulary; Word choice can reflect diverse historical and cultural context; Text often includes technical words with specialized meaning(s) ❖ Language in narrative text is more elaborated and complex, and includes a wide range of dialogue, use of dialects, and varied sentence structure to convey specific meanings ❖ Prose style matches text purpose (informational, recreational, provocative, etc.) ❖ Relationships between ideas become less explicit and require more inference or interpretation ❖ Understanding content requires increasing cultural and historical breadth of knowledge ❖ More sophisticated themes ❖ Texts used often call for literary analysis ❖ Informational texts use format, illustrations, and graphics to support understanding of meaning ❖ Text features often include advance organizers, inset text, technology support		
SAMPLE TEXTS AT GRADE 7: *Roll of Thunder, Hear My Cry; Diary of a Young Girl; Muse magazine*	***SAMPLE TEXTS AT GRADE 8:*** *The Upstairs Room; Narrative of the Life of Frederick Douglass; The Giver; Science magazine*	***SAMPLE TEXTS AT HIGH SCHOOL:*** *To Kill a Mockingbird; Night; Into Thin Air; Newsweek magazine*

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Contributors

The federal law, *No Child Left Behind*, requires states to develop grade-level expectations in reading/language areas for grades 3-8. Grade-span expectations were developed also for grades 9-10 and 11-12 in reading and writing for high school. Both the grade-level expectations (GLEs) and the grade-span expectations (GSEs) have been incorporated into this revised version of the *K-12 English Language Arts Curriculum Framework.*

The following is a list of committee members representing the state of New Hampshire who developed the grade-level and grade-span expectations. Although this list represents those individual who formally served on the GLE and GSE committees, we are extremely grateful to the numerous people who provided feedback through technical review sessions, focus groups, on-line surveys, e-mails, and phone calls.

The assessment GLEs and GSEs were developed as a joint effort between the states of New Hampshire, Rhode Island, and Vermont. The local GLEs and GSEs were started as a joint effort between New Hampshire and Rhode Island. The contributors from RI and VT can be obtained by contacting the Rhode Island Department of Education and the Vermont Department of Education, respectively.

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K-12 Written and Oral Communication New Hampshire Curriculum Framework

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New Hampshire Curriculum Framework Written and Oral Communication

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New Hampshire Curriculum Framework Written and Oral Communication

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New Hampshire Curriculum Framework Written and Oral Communication

Introduction

The purpose of this framework is to serve (1) as the basis for the development of assessment instruments to be administered statewide and (2) as a guide for making local decisions about curriculum development and delivery, in accordance with RSA 193-C relative to the New Hampshire Educational Improvement and Assessment Program.

This framework establishes curriculum and expectations for English language arts. This is the accepted professional term for the subject area of reading and language arts as it is taught throughout the grades. "English" is more commonly used in high school; "language arts," in most elementary and middle/junior high schools. The English language arts consist of the interactive processes of reading, writing, speaking, listening, and viewing.

This framework will be used at the local level, in conjunction with assessment results, as a guide for making decisions about development of curriculum, delivery of instruction and utilization of classroom, school, and district assessments. Educators, school board members, and citizens are encouraged to work cooperatively to develop local educational improvement and assessment plans that build on and complement the state effort.

How this framework is organized

The *K-12 English Language Arts Curriculum Framework* is organized into Grade-Level Expectations (GLEs) and Grade-Span Expectations (GSEs). Both the GLEs and GSEs contain statements about what all New Hampshire students are expected to know and be able to do. The GLEs are delineated by grade level across grades K-8. The GSEs are organized by grade spans of 9-10 and 11-12. Both the GLEs and GSEs are built upon the *K-12 English Language Arts Curriculum Framework* (1995).

Both the GLEs and GSEs are organized into five content strands for Reading: Vocabulary, Initial Understanding of Literary Texts, Analysis and Interpretation of Literary Texts, Initial Understanding of Informational Texts and Analysis and Interpretation of Informational Texts. There are eight strands for Written and Oral Communication: Habit of Writing, Structures of Language, Writing in Response to Literary Text, Writing in Response to Informational Text, Narratives, Informational Writing, Writing Conventions and Oral Communication Strategies.

At the beginning of each strand is a purpose statement which places the strand in the context of the K-12 English Language Arts curriculum. Furthermore, each strand contains a number of big ideas referred to as stems. The stems articulate the main curricular focus across grades K-12.

There are two types of expectations throughout the document, those identified for state assessment purposes and those identified for local curriculum and assessment. The state assessment expectations appear in bold boxes; all other expectations are guidance for local curriculum and assessment.

New Hampshire Curriculum Framework Written and Oral Communication

K-12 Broad Goals for English-Language Arts

These goal statements establish general expectations of what New Hampshire students should know and be able to do in English language arts.

- Students will read fluently with understanding and appreciation.
- Students will write effectively for a variety of purposes and audiences.
- Students will speak purposefully and articulately.
- Students will listen and view attentively and critically.
- Students will understand, appreciate, interpret, and critically analyze classical and contemporary literature as well as works of nonfiction and informational texts.
- Students will use reading, writing, speaking, listening, and viewing to:
  gather and organize information;
  communicate effectively; and
  succeed in educational, occupational, civic, and social settings.

New Hampshire Curriculum Framework Written and Oral Communication

Reading

Purpose: The ability to read is essential for students to succeed as learners, both in school and throughout their lives, and to become contributing members of society. Students must be able to deal critically with a variety of complex texts including literary, informational, and practical. Good readers combine the inclination to read with the ability to use monitoring and discussion to develop understanding. They employ multiple strategies and processes to understand the written word. Throughout their formal instruction, students should read authentic materials including worthy examples of literature as well as texts that reinforce other content areas of the school's curriculum.

Writing

Purpose: Through writing students transmit information, construct meaning and communicate good ideas. Good writers employ language successfully in a wide range of settings for academic, personal, occupational, and public uses. Frequent writing practice across a variety of situations and tasks and in all content areas enables students to refine and expand both their knowledge base and their thinking skills.

English Language Uses

Purpose: Students needs to learn how to use language to communicate in multiple ways and for multiple purposes. To this end, the language processes of reading, writing, speaking, listening, and viewing must become integral parts of their lives. By systematically employing these interactive processes, students are able to gather needed information and to prioritize and organize this material. The skillful use of these language processes provides students with the means of acquiring, constructing, and expressing knowledge in all school content areas and in the human experience. In order to be successful, students must become powerful users of language.

Introduction

The New England Common Assessment Program (NECAP) Writing GLEs/GSEs have been developed as a means to identify the writing content knowledge and skills expected of all students, for large-scale assessment of writing in grade levels 5 and 8 and 11. **GLEs and GSEs *are meant to capture the "big ideas" of writing that can be assessed, without narrowing the curriculum locally***. They *are not intended* to represent the full curriculum for instruction and assessment locally, at each grade. The set of GLEs/GSEs includes concepts and skills intended to be assessed on demand, in a large-scale assessment (indicated by "State") and other GLEs/GSEs indicated by ("Local") are for local assessment purposes only. All of the Writing GLEs/GSEs described in this document are expected to be assessed locally, even if indicated for large-scale assessment. "Local GLEs" in writing include those concepts and skills not easily assessed in an on-demand setting (e.g., writing process) and those GLEs/GSEs not designated for large-scale assessment at some or all grade levels (e.g., oral communication, poetry writing, etc.). Grade Level/Span Expectations – at any grade – represent writing content knowledge and skills *introduced instructionally at least one to two years before* students are expected to demonstrate confidence in applying them independently in an on-demand assessment.

The GLEs and GSEs in this document can be interpreted as describing the expectations for the end of the grade/grade span identified, or the beginning of the next grade/grade span. For example, grade 7 GLEs identify grade span expectations in writing for both the end of grade 7 and the beginning of grade 8, for large-scale assessment purposes.

When using Written and Oral Communications Grade Level and Grade Span Expectations, the following are important to understand:

1. **Writing Dimensions: Purpose, Organization, Details, Voice/Tone** are addressed throughout the set of Writing GLEs/GSEs using descriptions appropriate to the related writing genres. Writing Dimensions are not addressed, nor intended to be assessed with a single GLE.

2. All of the concepts and skills identified at a given grade level are "fair game" for large-scale assessment purposes if "(State)" appears at the end of the GLE/GSE. Conjunctions used throughout this document have specific meaning. The use of the conjunction "or" means that a student can be assessed on all or just some of the elements of the GLE/GSE in a given year. The use of "and" between elements of a GLE/GSE means that the *intent* is to assess each element every year. In some situations, "or" is used when students have choices about how they will provide supporting evidence for their response (e.g., when writing in response to text, a student might choose to support an opinion or judgment about text with appropriate examples, OR quotations, OR citations).

3. Each GLE/GSE includes three parts.
   a. **A statement in bold,** called the "stem," is at the beginning of each GLE/GSE. Each "stem" is the same or similar across the grades for a given GLE/GSE, and is meant to communicate the main curriculum and instructional focus of the GLE/GSE across the grades.
   b. The non-bold text within a GLE/GSE indicates how the GLE/GSE is specified at a given grade level or grade span. There are often several indicators for each GLE/GSE stem. Each indicator is coded and indicated as fair game for "state" or "local" assessment.
   c. Differences between adjacent grades are <u>underlined</u>. (Note: Sometimes nothing is underlined within a GLE/GSE. In these situations, differences in adjacent grades assume "applying writing skills with increasing complexity.")

4. Each GLE/GSE is coded for the content area, the grade span, the GSE "stem" number, and the specific indicator for that GSE stem. [E.g., "W (Writing) – SL (means Structures of Language) - 2 (grade 2) - 1 (1st stem) – 6 (the sixth specific indicator for the 1st GSE stem).]

Stem – The BIG Idea

Bold lines around a cell/box indicate a State assessed GLE/GSE

Reading Connection **Writing in Response to Literary or Informational Text – Showing Understanding of Ideas in Text (RC:1)**		
W:RC:8:1.1: In response to literary or informational text, students show understanding of plot /ideas/concepts by…		
Grade 8	**Grade 10**	**Grade 12**
W:RC:8:1.1: Selecting and summarizing key ideas to set context (Local)	W:RC:10:1.1: Selecting and summarizing key ideas to set context, <u>appropriate to audience</u> (State)	W:RC:12:1.1: Selecting and summarizing key ideas to set context, appropriate to audience (Local)

Specific indicator for assessment at this grade, followed by "(Local)" or

<u>Differences</u> between this grade span and prior grade are underlined.

The GLE/GSE stem identifies "the what" – meaning, "What is the big idea for instruction and assessment?"
The indicators following each stem identify "the how" – meaning, "How will students demonstrate what they know?"

Overview of New Hampshire Grade Level and Grade Span Expectations (GLEs/GSEs) for Written & Oral Communication

Content Clusters for Written & Oral Communication	Focus of GLE/GSE	GLE/GSE Number*	K-2 Page	3-5 Page	6-8 Page	9-12 Page
Structures of Language	Applying Understanding of Sentences, Paragraphs, Text Structures	**SL:1**	10	23	36	52
Reading Connection	Writing in Response to Literary or Informational Text – Showing Understanding of Ideas in Text	**RC:1**	11	24	37	53
	Writing in Response to Literary or Informational Text – Making Analytical Judgments about Text	**RC:2**	12	25	38	54
Expressive Writing	Narrative Writing – Creating a Story Line and Applying Narrative Strategies	**EW:1**	13	26	39	55
	Narrative Writing – Applying Narrative Strategies	**EW:2**	14	27	40	56
	Poetry	**EW:3**			41	57
	Poetry	**EW:4**			42	58
	Reflective Essay	**EW:5**			43	59
Informational Writing	Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information	**IW:1**	15	28	44	60
	Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information	**IW:2**	16	29	45	61
	Reports, Procedures, or Persuasive Writing – Using Elaboration Strategies	**IW:3**	17	30	46	62
Conventions	Applying Rules of Grammar, Usage, and Mechanics	**C:1**	18	31	47	63
Habits of Writing	Uses a Writing Process	**HW:1**	19	32	48	64
	Writing Extensively	**HW:2**	20	33	49	65
Oral Communications	Interactive Listening	**OC:1**	21	34	50	66
	Make Oral Presentations	**OC:2**	22	35	51	67
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Structures of Language Applying Understanding of Sentences, Paragraphs, Text Structures (SL)		
W:SL:1: Students demonstrate command of the structures of sentences, paragraphs, and text by…		
Grade K	**Grade 1**	**Grade 2**
W:SL:K:1.1: Expresses an idea using pictures and letters (Local) W:SL:K:1.2: Not assessed at this grade level W:SL:K:1.3: Not assessed at this grade level W:SL:K:1.4: Not assessed at this grade level W:SL:K:1.5: Not assessed at this grade level W:SL:K:1.6: Not assessed at this grade level	W:SL:1:1.1: Writing recognizable short sentences (Local) W:SL:1:1.2: Not assessed at this grade level W:SL:1:1.3: Not assessed at this grade level W:SL:1:1.4: Not assessed at this grade level W:SL:1:1.5: Distinguishing between letters, words, and sentences (Local) W:SL:1:1.6: Applying directionality as appropriate to text (e.g., left to right, top to bottom) (Local)	W:SL:2:1.1: Writing short sentences (Local) W:SL:2:1.2: Not assessed at this grade level W:SL:2:1.3: Not assessed at this grade level W:SL:2:1.4: Not assessed at this grade level W:SL:2:1.5: Distinguishing between letters, words, sentences, and paragraphs (Local) W:SL:2:1.6: Applying directionality as appropriate to text (e.g., left to right, top to bottom, front and back)

Reading Connection Writing in Response to Literary or Informational Text – Showing Understanding of Ideas in Text (RC:1)		
W:RC:1: In response to literary or informational text, students show understanding of plot /ideas/concepts by…		
Grade K	**Grade 1**	**Grade 2**
W:RC:K:1.1: Representing understanding of text through pictures (pictures may include labels, which might only include beginning sounds and/or ending sounds) (Local) W:RC:K:1.2: Not assessed at this grade level W:RC:K:1.3: Not assessed at this grade level	W:RC:1:1.1: Representing understanding of text through pictures, "words," "sentences," or some combination (Local) W:RC:1:1.2: Not assessed at this grade level W:RC:1:1.3: Not assessed at this grade level	W:RC:2:1.1: Selecting information to set context/background (Local) EXAMPLE: When setting context include author and title W:RC:2:1.2: Not assessed at this grade level W:RC:2:1.3: Not assessed at this grade level

Reading Connection Writing in Response to Literary or Informational Text – Making Analytical Judgments about Text (RC:2)		
W:RC:2: In response to literary or informational text read aloud, students make and support analytical judgments about text by…		
Grade K	**Grade 1**	**Grade 2**
W:RC:K:2.1: Using prior knowledge or reference to text to respond to a question using pictures (pictures may include labels, which might only include beginning sounds and/or ending sounds) (Local) W:RC:K:2.2: Not assessed at this grade level W:RC:K:2.3: Not assessed at this grade level W:RC:K:2.4: Not assessed at this grade level	W:RC:1:2.1: Using prior knowledge or references to text to respond to a question (evidence may take the form of pictures, words, sentences, or some combination) (Local) W:RC:1:2.2: Not assessed at this grade level W:RC:1:2.3: Not assessed at this grade level W:RC:1:2.4: Organizing ideas by using a beginning and an ending given a structure (Local)	W:RC:2:2.1: Stating a focus (purpose), when responding to a given question (Local) W:RC:2:2.2: Not assessed at this grade level W:RC:2:2.3: Using details or references to text to support a given focus (Note: support may include prior knowledge) (Local) W:RC:2:2.4: Organizing ideas by using a beginning, middle, and concluding statement/sentence given a structure (Local) EXAMPLES: template, frame, graphic organizer

Expressive Writing Narrative Writing – Creating a Story Line and Applying Narrative Strategies (EW:1)		
W:EW:K:1: Students organize and relate a story line/plot/series of events by… **W:EW:1:1: In written narratives, students organize and relate a story line/plot/series of events by…** **W:EW:2:1: In written narratives, students organize and relate a story line/plot/series of events by…**		
Grade K	**Grade 1**	**Grade 2**
W:EW:K:1.1: Using pictures to create an understandable story line, when given a structure (pictures may include labels) (Local) EXAMPLES: Draw a picture that tells a story about your family. Given a picture, a student is asked to tell a story about what's happening in the picture. W:EW:K:1.2: Not assessed at this grade level W:EW:K:1.3: Not assessed at this grade level	W:EW:1:1.1: Creating an understandable story line, when given a structure (may take form of words or pictures or some combination) (Local) W:EW:1:1.2: Not assessed at this grade level W:EW:1:1.3: Not assessed at this grade level	W:EW:2:1.1: Creating a clear understandable story line, with a beginning, middle, and end, when given a structure (Local) W:EW:2:1.2: Not assessed at this grade level W:EW:2:1.3: Not assessed at this grade level

Expressive Writing Narrative Writing – Creating a Story Line and Applying Narrative Strategies (EW:2)		
W:EW:2: Students demonstrate use of narrative strategies by…		
Grade K	**Grade 1**	**Grade 2**
W:EW:K:2.1: Not assessed at this grade level	W:EW:1:2.1: Not assessed at this grade level	W:EW:2:2.1: Not assessed at this grade level
W:EW:K:2.2: Not assessed at this grade level	W:EW:1:2.2: Not assessed at this grade level	W:EW:2:2.2: Not assessed at this grade level
W:EW:K:2.3: Using pictures to create character(s) (Local)	W:EW:1:2.3: Creating character(s) (may take form of words or pictures or some combination) (Local)	W:EW:2:2.3: Creating character(s) through description (Local)
W:EW:K:2.4: Not assessed at this grade level	W:EW:1:2.4: Not assessed at this grade level	W:EW:2:2.4: Not assessed at this grade level
W:EW:K:2.5: Expressing ideas and recognizing that experiences and stories can be written about (Local)	W:EW:1:2.5: Writing about observations and experiences (Local)	W:EW:2:2.5: Writing about observations and experiences (Local)
W:EW:K:2.6: Not assessed at this grade level	W:EW:1:2.6: Extending ideas (Local)	W:EW:2:2.6: Extending and elaborating ideas (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:1)		
W:IW:1: In informational writing (reports or procedures), students organize ideas/concepts by …		
Grade K	**Grade 1**	**Grade 2**
W:IW:K:1.1: Naming or labeling objects or pictures (Local) W:IW:K:1.2: Representing facts through pictures (Local) W:IW:K:1.3: Not assessed at this grade level W:IW:K:1.4: Not assessed at this grade level W:IW:K:1.5: Not assessed at this grade level	W:IW:1:1.1: Sorting and classifying facts (Local) W:IW:1:1.2: Representing facts through pictures, "words," "sentences," or some combination (Local) W:IW:1:1.3: Listing steps of a procedure in a logical order, with instructional support (Local) W:IW:1:1.4: Not assessed at this grade level W:IW:1:1.5: Not assessed at this grade level	W:IW:2:1.1: Using a given organizational structure for grouping facts (e.g., template, frame, graphic organizer), with instructional support (Local) W:IW:2:1.2: Selecting facts to set context/background (Local) W:IW:2:1.3: Listing steps of a procedure in a logical order (Local) W:IW:2:1.4: Not assessed at this grade level W:IW:2:1.5: Providing a list of resources (e.g. materials to be used in a task) (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:2)		
W:IW:2: In informational writing (reports or procedures only), students effectively convey purpose by…		
Grade K	**Grade 1**	**Grade 2**
W:IW:K:2.1: Not assessed at this grade level W:IW:K:2.2: Not assessed at this grade level	W:IW:1:2.1: Using pictures to create meaning (Local) W:IW:1:2.2: Not assessed at this grade level	W:IW:2:2.1: Establishing a topic (Local) W:IW:2:2.2: Restating a given focus/controlling idea on a topic (purpose) (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Using Elaboration Strategies (IW:3)		
W:IW:3: In informational writing(reports or procedures only), students demonstrate use of a range of elaboration strategies by:		
Grade K	**Grade 1**	**Grade 2**
W:IW:K:3.1: Using pictures to illustrate details/information related to topic (pictures may include labels) (Local) W:IW:K:3.2: Not assessed at this grade level	W:IW:1:3.1: Including details/information relevant to topic (details/information may take the form of pictures with captions, "words", "sentences", or some combination) (Local) W:IW:1:3.2: Not assessed at this grade level	W:IW:2:3.1: Including details/information relevant to topic and/or focus (Local) W:IW:2:3.2: Using sufficient details/pictures to illustrate facts (Local)

Writing Conventions – Applying Rules of Grammar, Usage, and Mechanics (C)		
W:C:1: In independent writing, students demonstrate command of appropriate English conventions by…		
Grade K	**Grade 1**	**Grade 2**
W:C:K:1.1: Not assessed at this grade level W:C:K:1.2: Not assessed at this grade level W:C:K:1.3: Not assessed at this grade level W:C:K:1.4: Not assessed at this grade level W:C:K:1.5: Using phonemic awareness and letter knowledge to spell independently (using phonetic or temporary spelling) and logically representing consonant sounds (e.g., initial or final sounds) (Local)	W:C:1:1.1: Not assessed at this grade level W:C:1:1.2: Not assessed at this grade level W:C:1:1.3: Not assessed at this grade level W:C:1:1.4: Not assessed at this grade level W:C:1:1.5a: Using phonemic awareness and letter knowledge to spell independently (using phonetic or temporary spelling when needed) (Local) W:C:1:1.5b: Correctly spelling many common words (e.g., had, can, including own first name) (Local)	W:C:2:1.1: Not assessed at this grade level W:C:2:1.2: Using capital letters for the beginning of sentences and names (Local) W:C:2:1.3: Not assessed at this grade level W:C:2:1.4: Using correct ***end*** punctuation in simple sentences (e.g., period) (Local) W:C:2:1.5a: Correctly spelling grade-appropriate, high-frequency words (Local) W:C:2:1.5b: Correctly spelling most words with regularly spelled patterns (e.g., consonant-vowel consonant, CVC with silent e, one syllable words with blends) (Local) W:C:2:1.5c: Giving a readable and accurate phonetic spelling for words that have not been taught (Local)

Habit of Writing: Uses a Writing Process (HW)		
W:HW:1: Students use pre-writing, drafting, revising, editing, and critiquing to produce final drafts of written products.		
Grade K	**Grade 1**	**Grade 2**
Note: students at this level will only be pre-writing and drafting. See Appendix B for Writing Process	Note: students at this level will only be pre-writing and drafting. See Appendix B for Writing Process	See Appendix B for Writing Process

Habit of Writing: Writing Extensively (HW:2)		
W:HW:2: Demonstrates the habit of writing extensively by…		
Grade K	**Grade 1**	**Grade 2**
Not assessed at this grade level	Not assessed at this grade level	Not assessed at this grade level

Oral Communication Strategies (OC:1)		
W:OC:1: In oral communication, students demonstrate interactive listening by …		
Grade K	**Grade 1**	**Grade 2**
W:OC:K:1.1: Following simple verbal instructions and directions W:OC:K:1.2: Listening and responding to stories, songs, or poems W:OC:K:1.3: Not assessed at this grade level W:OC:K:1.4: Not assessed at this grade level W:OC:K:1.5a: Understanding that communicating is verbal and nonverbal W:OC:K:1.5b: Attending to speaker and waiting for appropriate turn to speak	W:OC:1:1.1: Following simple verbal instructions and directions to answer questions W:OC:1:1.2: Responding to or reacting to stories, songs or poems by using simple words, phrases, and sentences W:OC:1:1.3: Not assessed at this grade level W:OC:1:1.4: Not assessed at this grade level W:OC:1:1.5a: Understanding that communicating is verbal and nonverbal W:OC:1:1.5b: Attending to speaker and waiting for appropriate turn to speak	W:OC:2:1.1: Following multi-step verbal instructions and directions to answer questions W:OC:2:1.2: Conversing, and asking questions to what has been heard (e.g., stories, songs or poems) W:OC:2:1.3: Not assessed at this grade level W:OC:2:1.4: Not assessed at this grade level W:OC:2:1.5a: Understanding that meaning can be conveyed by facial expressions W:OC:2:1.5b: Attending to speaker and waiting for appropriate turn to speak

Oral Communication Strategies (OC:2)		
W:OC:2: In oral communication, students make oral presentations by…		
Grade K	**Grade 1**	**Grade 2**
W:OC:K:2.1: Speaking clearly and distinctly, orally sharing information and experiences W:OC:K:2.2: Demonstrating an awareness of options of language (e.g., imitating speech patterns and identifying source of sounds, interpreting nonverbal messages through pictures) W:OC:K:2.3: Telling stories about pictures, books or experiences W:OC:K:2.4: Not assessed at this grade level W:OC:K:2.5: Not assessed at this grade level	W:OC:1:2.1: Orally ordering ideas in a sequence or tell a familiar story W:OC:1:2.2: Using various forms of linguistic elements and structures (e.g., saying "Please" in a command, asking about the weather as a form of polite address;, stating a question in affirmative form, etc.) W:OC:1:2.3: Telling/ retelling stories using details W:OC:1:2.4: Not assessed at this grade level W:OC:1:2.5: Not assessed at this grade level	W:OC:2:2.1: Orally ordering ideas in a sequence, carrying on a conversation, asking and answering questions W:OC:2:2.2: Using various linguistic elements and structures to convey meaning W:OC:2:2.3: Telling stories or giving information using details W:OC:2:2.4: Not assessed at this grade level W:OC:2:2.5: Using eye-contact and adjustment of rate and volume

Structures of Language Applying Understanding of Sentences, Paragraphs, Text Structures (SL)		
W:SL:1: Students demonstrate command of the structures of sentences, paragraphs, and text by…		
Grade 3	**Grade 4**	**Grade 5**
W:SL:3:1.1: Writing a variety of complete simple sentences (Local) EXAMPLES: declarative, exclamatory, and interrogative W:SL:3:1.2: Recognizing indentations for new paragraphs) (Local) W:SL:3:1.3: Not assessed at this grade level W:SL:3:1.4: Not assessed at this grade level W:SL:3:1.5: Recognizing complete sentences (Local) EXAMPLES: simple and compound sentences W:SL:3:1.6: Applying directionality as appropriate to text (Local)	W:SL:4:1.1: Writing a variety of complete simple and compound sentences (State) W:SL:4:1.2: Using the paragraph form: indenting, main idea, supporting details (State) W:SL:4:1.3: Not assessed at this grade level W:SL:4:1.4: Not assessed at this grade level W:SL:4:1.5: Subsumed in W:SL:4:1.1 W:SL:4:1.6: Applying directionality as appropriate to text (Local)	W:SL:5:1.1: Using varied sentence length and structure to enhance meaning (e.g., including phrases and clauses) (Local) W:SL:5:1.2: Using the paragraph form: indenting, main idea, supporting details (Local) W:SL:5:1.3: Recognizing organizational structures ***within*** paragraphs (Local) EXAMPLES (of text structures): description, sequential, chronology, proposition/support, compare/contrast EXAMPLE: When given a paragraph and a list of text structures W:SL:5:1.4: Not assessed at this grade level W:SL:5:1.5: Subsumed in W:SL:5:1.1 W:SL:5:1.6: Applying directionality as appropriate to text (Local) EXAMPLE: double-columned text

Reading Connection Writing in Response to Literary or Informational Text – Showing Understanding of Ideas in Text (RC:1)		
W:RC:1: In response to literary or informational text, students show understanding of plot /ideas/concepts by…		
Grade 3	**Grade 4**	**Grade 5**
W:RC:3:1.1: Selecting appropriate information to set context/background (Local) EXAMPLE: When setting context, include author, title, brief summary W:RC:3:1.2: Selecting ideas that support the development of a summary W:RC:3:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge, which might include other texts (Local)	W:RC:4:1.1a: Selecting appropriate information to set context/background (State) W:RC:4:1.1b: Writing an introduction that sets context/background (Local) W:RC:4:1.2: Summarizing ideas (Local) W:RC:4:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge, which might include other texts (State)	W:RC:5:1.1: Selecting appropriate information to set context/background (Local) EXAMPLE: When setting context, include introduction of a character to make sure the reader understands who the character is W:RC:5:1.2: Summarizing key ideas (Local) W:RC:5:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge or other texts, by referring to relevant ideas (Local)

Reading Connection Writing in Response to Literary or Informational Text – Making Analytical Judgments about Text (RC:2)		
W:RC:2: In response to literary or informational text read aloud, students make and support analytical judgments about text by…		
Grade 3	**Grade 4**	**Grade 5**
W:RC:3:2.1: Stating a focus (purpose), when responding to a given question (Local) W:RC:3:2.2: Making inferences about content, events, characters, or setting (Local) W:RC:3:2.3: Using details or references to text to support focus (Note: support may include prior knowledge) (Local) W:RC:3:2.4: Organizing ideas, using basic transition words (e.g., first, next, then, finally) and having a concluding statement (Local)	W:RC:4:2.1: Stating and maintaining a focus (purpose) when responding to a given question (State) W:RC:4:2.2: Making inferences about content, events, characters, setting, or common themes (State) EXAMPLE (of theme): honesty isn't always easy W:RC:4:2.3: Using specific details and references to text to support focus (State) W:RC:4:2.4: Organizing ideas, using transition words/phrases and writing a conclusion (State)	W:RC:5:2.1: Stating and maintaining a focus (purpose) when responding to a given a question (Local) W:RC:5:2.2: Making inferences about the content, events, characters, setting, or common themes (Local) W:RC:5:2.3: Using specific details and references to text or citations to support focus (Local) W:RC:5:2.4: Organizing ideas, using transition words/phrases and writing a conclusion that provides closure (Local)

Expressive Writing Narrative Writing – Creating a Story Line and Applying Narrative Strategies (EW:1)		
W:EW:1: In written narratives, students organize and relate a story line/plot/series of events by…		
Grade 3	**Grade 4**	**Grade 5**
W:EW:3:1.1: Creating a clear, understandable story line with a beginning, middle, and end (Local) W:EW:3:1.2: Not assessed at this grade level W:EW:3:1.3: Using basic transition words, when appropriate	W:EW:4:1.1: Creating a clear, understandable story line with a beginning, middle, and end (State) W:EW:4:1.2: Establishing a problem and solution (State) W:EW:4:1.3: Establishing transitions by using signal words/phrases (Local)	W:EW:5:1.1: Creating a clear and coherent (logically consistent) story line (Local) W:EW:5:1.2: Establishing context (setting or background information), problem/conflict/challenge, and resolution (Local) W:EW:5:1.3: Using transition words/phrases to establish clear chronology and to enhance meaning (Local)

Expressive Writing Narrative Writing – Creating a Story Line and Applying Narrative Strategies (EW:2)		
W:EW:2: Students demonstrate use of narrative strategies by…		
Grade 3	**Grade 4**	**Grade 5**
W:EW:3:2.1: Using details (Local) W:EW:3:2.2: Not assessed at this grade level W:EW:3:2.3: Creating character(s) through description of physical attributes (Local) W:EW:3:2.4: Not assessed at this grade level W:EW:3:2.5: Writing about observations and experiences (Local) W:EW:3:2.6: Extending and elaborating ideas with purpose (Local)	W:EW:4:2.1: Using relevant and descriptive details (State) W:EW:4:2.2: Not assessed at this grade level W:EW:4:2.3a: Identifying characters (State) W:EW:4:2.3b: Creating character(s) through description of physical attributes and behaviors (Local) W:EW:4:2.4: Not assessed at this grade level W:EW:4:2.5: Writing about observations and experiences (Local) W:EW:4:2.6: Selecting and elaborating important ideas (Local)	W:EW:5:2.1: Using relevant and descriptive details and sensory language to advance the plot/story line (Local) W:EW:5:2.2: Using dialogue to advance plot/story line (Local) W:EW:5:2.3: Developing characters through description (Local) W:EW:5:2.4: Not assessed at this grade level W:EW:5:2.5: Establishing a focus when writing about observations and experiences (Local) W:EW:5:2.6: Selecting and elaborating important ideas; and excluding extraneous details (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:1)		
W:IW:1: In informational writing (reports or procedures), students organize ideas/concepts by …		
Grade 3	**Grade 4**	**Grade 5**
W:IW:3:1.1: Using a given organizational structure for grouping facts and ideas (e.g., template, frame, graphic organizer) (Local) W:IW:3:1.2: Selecting appropriate facts to set context/background (Local) W:IW:3:1.3a: Using basic transition words, when appropriate (Local) W:IW:3:1.3b: Using numbering or words to arrange the steps in a logical manner (Local) W:IW:3:1.4: Providing a concluding statement (Local) W:IW:3:1.5: Providing a list of resources (e.g. materials to be used in a task) (Local)	W:IW:4:1.1: Grouping ideas logically (e.g., predictable categories, steps of a procedure, reasons/arguments) (State) W:IW:4:1.2a: Writing an introduction that sets the context (including materials list in procedures) (State) W:IW:4:1.2b: Selecting appropriate information to set context/background (Local) W:IW:4:1.3a: Using transition words or phrases (State) W:IW:4:1.3b: Using numbering or words to arrange the steps in a logical manner (Local) W:IW:4:1.4: Writing a conclusion (State) W:IW:4:1.5: Providing a list of resources (e.g. materials used in a tasks; sources used for reference) (Local)	W:IW:5:1.1: Using an organizational text structure appropriate to focus/controlling idea (Local) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast W:IW:5:1.2: Selecting appropriate information to set the context W:IW:5:1.3: Using transition words or phrases appropriate to organizing text structure (Local) EXAMPLES: for procedures – using numbering, ordering; for compare/contrast - using "on the other hand" W:IW:5:1.4: Writing a conclusion that provides closure (Local) W:IW:5:1.5: Providing a list of resources (e.g. materials used in a tasks; sources used for reference) (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:2)		
W:IW:2: In informational writing (reports or procedures only), students effectively convey purpose by…		
Grade 3	**Grade 4**	**Grade 5**
W:IW:3:2.1: Establishing a topic (Local) W:IW:3:2.2: Stating a focus/controlling idea on a topic (Local) EXAMPLES: "Dogs" = topic; "Dogs make good pets" = focus	W:IW:4:2.1: Establishing a topic (State) W:IW:4:2.2: Stating and maintaining a focus/controlling idea on a topic (State)	W:IW:5:2.1: Establishing a topic (Local) W:IW:5:2.2: Stating and maintaining a focus/controlling idea on a topic (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Using Elaboration Strategies (IW:3)		
W:IW:3: In informational writing(reports or procedures only), students demonstrate use of a range of elaboration strategies by:		
Grade 3	**Grade 4**	**Grade 5**
W:IW:3:3.1: Including details/information relevant to topic and/or focus (Local) W:IW:3:3.2: Including sufficient details for appropriate depth of information: naming, describing, explaining, comparing, using visual images (Local)	W:IW:4:3.1: Including facts and details relevant to focus/controlling idea (State) W:IW:4:3.2: Including sufficient details or facts for appropriate depth of information: naming, describing, explaining, comparing, using visual images (State)	W:IW:5:3.1: Including facts and details relevant to focus/controlling idea, and excluding extraneous information (Local) W:IW:5:3.2: Including sufficient details or facts for appropriate depth of information: naming, describing, explaining, comparing, using visual images (Local)

Writing Conventions – Applying Rules of Grammar, Usage, and Mechanics (C)		
W:C:1: In independent writing, students demonstrate command of appropriate English conventions by…		
Grade 3	**Grade 4**	**Grade 5**
W:C:3:1.1: Not assessed at this grade level W:C:3:1.2: Using capital letters for the beginning of sentences and names (Local) W:C:3:1.3: Not assessed at this grade level W:C:3:1.4: Using ***end*** punctuation correctly in simple sentences (i.e., period, question mark, exclamation point) (Local) W:C:3:1.5: Correctly spelling grade-appropriate, high-frequency words and using within-word patterns to correct spelling EXAMPLES: single syllable words, regular long and short vowels	W:C:4:1.1: Identifying grammatical errors, when given examples (State) EXAMPLES: he don't; Him and me went W:C:4:1.2: Applying basic capitalization rules (State) EXAMPLES: names, beginning sentences, proper nouns, titles W:C:4:1.3: Using commas correctly in dates and in a series (Note: either form is correct – *x, y, and z* or *x, y and z*) (State) W:C:4:1.4: Using ***end*** punctuation correctly in a variety of sentence structures (State) W:C:4:1.5: Correctly spelling grade-appropriate, high-frequency words and recognizing syllables and affix patterns/rules that are characteristic of the English spelling system (State) EXAMPLES: consonant doubling, change y to i, drop silent e, spelling rules for affixes	W:C:5:1.1: Identifying or correcting grammatical errors (Local) EXAMPLES: subject-verb agreement W:C:5:1.2: Applying basic capitalization rules W:C:5:1.3: Subsumed in W:C:5:1.4 W:C:5:1.4: Using punctuation to clarify meaning (Local) EXAMPLES: commas, apostrophes, quotation marks W:C:5:1.5: Correctly spelling grade-appropriate, high-frequency words, including homonyms and homophones and applying syllables and affix spelling patterns/rules EXAMPLES: consonant doubling, consonant patterns, units of meaning – common roots, base words, pre/suffixes

Habit of Writing: Uses a Writing Process (HW)		
W:HW:1: Students use pre-writing, drafting, revising, editing, and critiquing to produce final drafts of written products.		
Grade 3	**Grade 4**	**Grade 5**
See Appendix B for Writing Process	See Appendix B for Writing Process	See Appendix B for Writing Process

Habit of Writing: Writing Extensively (HW:2)		
W:HW:2: Demonstrates the habit of writing extensively by…		
Grade 3	**Grade 4**	**Grade 5**
W:HW:3:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:3:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:3:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook W:HW:3:2.4: Not assessed at this grade level	W:HW:4:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:4:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:4:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, and letters and personal notes W:HW:4:2.4: Writing in a variety of genres (Local)	W:HW:5:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:5:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:5:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, letters and personal notes, reading response journals W:HW:5:2.4: Writing in a variety of genres (Local)

Oral Communication Strategies (OC:1)		
W:OC:1: In oral communication, students demonstrate interactive listening by …		
Grade 3	**Grade 4**	**Grade 5**
W:OC:3:1.1: Following multi-step verbal instructions and directions to answer questions, or to solve problems W:OC:3:1.2: Understanding content to summarize and question about what has been presented (e.g., stories, songs, or poems) W:OC:3:1.3: Not assessed at this grade level W:OC:3:1.4: Participating in large group discussions to show understanding of how other group members think W:OC:3:1.5a: Understanding how alternative nonverbal actions reinforce a verbal message (e.g., use of gestures) W:OC:3:1.5b: Attending to speaker and waiting for appropriate turn to speak	W:OC:4:1.1: Following verbal instructions to perform tasks, to answer questions, or to solve problems W:OC:4:1.2: Identifying cue words to categorize and understand content to summarize, question or contribute to information presented W:OC:4:1.3: Not assessed at this grade level W:OC:4:1.4: Participating in large and small group discussions to show understanding how other group members think. W:OC:4:1.5a: Identifying choices, alternatives and consequences for problem solving W:OC:4:1.5b: Attending to speaker and waiting for appropriate turn to speak	W:OC:5:1.1: Following verbal instructions to perform specific tasks, to answer questions, or to solve problems (Local) W:OC:5:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented (Local) W:OC:5:1.3: Not assessed at this grade level W:OC:5:1.4: Participating in large and small group discussions showing respect for a range of individual ideas (Local) W:OC:5:1.5: Reaching consensus to solve a problem, make a decision, or achieve a goal (Local)

Oral Communication Strategies (OC:2)		
W:OC:2: In oral communication, students make oral presentations by…		
Grade 3	**Grade 4**	**Grade 5**
W:OC:3:2.1: Identifying standards for good speaking in different kinds of small groups and cultural settings W:OC:3:2.2: Using various linguistic elements and structures to convey meaning W:OC:3:2.3: Telling stories, giving information using details and providing a conclusion W:OC:3:2.4: Not assessed at this grade level W:OC:3:2.5: Using eye contact and adjusting rate, pace and volume	W:OC:4:2.1: Identifying rules that regulate social conventions in small groups (e.g., interviews, small group discussions, etc.) W:OC:4:2.2: Identifying how different verbal and nonverbal choices alter the meanings conveyed to others W:OC:4:2.3: Telling stories, giving information using details, providing conclusions that include inflectional tone to convey meaning EXAMPLE: using books, pictures, graphics, or artifacts W:OC:4:2.4: Providing effective and appropriate feedback W:OC:4:2.5: Using variety of strategies to engage audience (e.g., eye contact, voice tone, and gestures)	W:OC:5:2.1: Demonstrating skills required in interpersonal, small group, and public exchanges (e.g., discussions, interviews) W:OC:5:2.2: Using verbal and nonverbal choices to convey consistent focus W:OC:5:2.3: Telling stories, giving information using details and providing a coherent conclusion EXAMPLE: using books, pictures, displays, graphics, or artifacts W:OC:5:2.4: Providing effective and appropriate feedback to audience and small groups W:OC:5:2.5: Using variety of strategies to engage audience (e.g., eye contact, voice tone, and gestures)

Structures of Language Applying Understanding of Sentences, Paragraphs, Text Structures (SL)		
W:SL:1: Students demonstrate command of the structures of sentences, paragraphs, and text by…		
Grade 6	**Grade 7**	**Grade 8**
W:SL:6:1.1: Using varied sentence length and structure to enhance meaning (e.g., including phrases and clauses) (Local) W:SL:6:1.2: Using the paragraph form: indenting, main idea, supporting details (Local) W:SL:6:1.3: Recognizing organizational structures ***within*** paragraphs (Local) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast W:SL:6:1.4: Applying a format and text structure appropriate to the purpose of the writing (Local) EXAMPLE: Given a paragraph, students write the next paragraph, using appropriate and consistent text structure W:SL:6:1.5: Subsumed in W:SL:6:1.1 W:SL:6:1.6: Applying directionality as appropriate to text (Local)	W:SL:7:1.1: Using varied sentence length and structure to enhance meaning (e.g., including phrases and clauses) (State) W:SL:7:1.2: Using the paragraph form: indenting, main idea, supporting details (State) W:SL:7:1.3: Recognizing organizational structures within paragraphs <u>or within texts</u> (State) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast, problem/solution EXAMPLE: When given a paragraph or text and a description of text structures, students identify structure used or their purposes W:SL:7:1.4: Applying a format and text structure appropriate to the purpose of the writing (State) W:SL:7:1.5: Subsumed in W:SL:7:1.1 W:SL:7:1.6: Applying directionality as appropriate to text (Local)	W:SL:8:1.1: Using varied sentence length and structure to enhance meaning (e.g., including phrases and clauses) (Local) W:SL:8:1.2: Using the paragraph form: indenting, main idea, supporting details (Local) W:SL:8:1.3: Recognizing organizational structures within paragraphs or within texts (Local) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast, problem/solution, <u>cause/effect, investigation</u> W:SL:8:1.4: Applying a format and text structure appropriate to the purpose of the writing (Local) W:SL:8:1.5: Subsumed in W:SL:8:1.1 W:SL:8:1.6: Applying directionality as appropriate to text (Local)

Reading Connection Writing in Response to Literary or Informational Text – Showing Understanding of Ideas in Text (RC:1)		
W:RC:1: In response to literary or informational text, students show understanding of plot /ideas/concepts by…		
Grade 6	**Grade 7**	**Grade 8**
W:RC:6:1.1: Selecting appropriate information to set context/background (Local) W:RC:6:1.2: Summarizing key ideas (Local) W:RC:6:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge or other texts, by referring to relevant ideas (Local) W:RC:6:1.4: Not assessed at this grade level	W:RC:7:1.1: Selecting and summarizing key ideas to set context (State) W:RC:7:1.2: Subsumed in W:RC:7:1.1 W:RC:7:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge, other texts, or the broader world of ideas, by referring to and explaining relevant ideas (State) W:RC:8:1.4: Not assessed at this grade level	W:RC:8:1.1: Selecting and summarizing key ideas to set context (Local) W:RC:8:1.2: Subsumed in W:RC:8:1.1 W:RC:8:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge, other texts, or the broader world of ideas, by referring to and explaining relevant ideas (Local) W:RC:8:1.4: Not assessed at this grade level

Reading Connection Writing in Response to Literary or Informational Text – Making Analytical Judgments about Text (RC:2)		
W:RC:2: In response to literary or informational text read aloud, students make and support analytical judgments about text by…		
Grade 6	**Grade 7**	**Grade 8**
W:RC:6:2.1: Stating and maintaining a focus (purpose), a firm judgment, or point of view when responding to a given question (Local) W:RC:6:2.2: Making inferences about content, events, characters, setting, or common themes and the relationship(s) among them (Local) EXAMPLE: Identifying theme and then making links between content/events and theme W:RC:6:2.3: Using specific details and references to text or relevant citations to support focus or judgment (Local) W:RC:6:2.4: Organizing ideas, using transition words/phrases and writing a conclusion that provides closure (Local)	W:RC:7:2.1: Stating and maintaining a focus (purpose), a firm judgment, or point of view when responding to a given question (State) W:RC:7:2.2: Making inferences about the relationship(s) among content, events, characters, setting, theme, or author's craft (State) EXAMPLES: Making links between characterization and author's choice of words; making links to characteristics of literary forms or genres W:RC:7:2.3: Using specific details and references to text or relevant citations to support focus or judgment (State) W:RC:6:2.4: Organizing ideas, using transitional words/phrases and writing a conclusion that provides closure (State)	W:RC:8:2.1: Stating and maintaining a focus (purpose), a firm judgment, or point of view when responding to a given question (Local) W:RC:8:2.2: Making inferences about the relationship(s) among content, events, characters, setting, theme, or author's craft (Local) EXAMPLES: Making links to author's choice of words, style, bias, literary techniques, or point of view; making links to characteristics of literary forms or genres W:RC:8:2.3: Using specific details and references to text or relevant citations to support focus or judgment (Local) W:RC:8:2.4: Organizing ideas, using transitional words/phrases and drawing a conclusion by synthesizing information (e.g., demonstrate a connection to the broader world of ideas) (Local)

Expressive Writing Narrative Writing – Creating a Story Line and Applying Narrative Strategies (EW:1)		
W:EW:1: In written narratives, students organize and relate a story line/plot/series of events by…		
Grade 6	**Grade 7**	**Grade 8**
W:EW:6:1.1: Creating a clear and coherent (logically consistent) story line W:EW:6:1.2: Establishing context, problem/conflict/ challenge, and resolution, and maintaining point of view, (1st person, 3rd person, or omniscient) W:EW:6:1.3: Using transition words/phrases to establish clear chronology and to enhance meaning W:EW:6:1.4: Not assessed at this grade level W:EW:6:1.5: Not assessed at this grade level W:EW:6:1.6: Not assessed at this grade level	W:EW:7:1.1: Creating a clear and coherent (logically consistent) story line (State) W:EW:7:1.2: Establishing context, character motivation, problem/conflict/challenge, and resolution and maintaining point of view (State) W:EW:7:1.3: Using a variety of effective transitional devices (e.g., ellipses, time transitions, white space, or words/phrases) to enhance meaning (State) W:EW:7:1.4: Not assessed at this grade level W:EW:7:1.5: Establishing and maintaining a theme (Local) W:EW:7:1.6: Providing a sense of closure (Local)	W:EW:8:1.1: Creating a clear and coherent (logically consistent) story line (Local) W:EW:8:1.2: Establishing context, character motivation, problem/conflict/challenge, and resolution, and maintaining point of view (Local) W:EW:8:1.3: Using a variety of effective transitional devices (e.g., ellipses, time transitions, white space, or words/phrases) to enhance meaning (Local) W:EW:8:1.4: Not assessed at this grade level W:EW:8:1.5: Establishing and maintaining a theme (Local) W:EW:8:1.6: Providing a sense of closure (Local)

Expressive Writing Narrative – Applying Narrative Strategies (EW:2)		
W:EW:2: Students demonstrate use of narrative strategies by…		
Grade 6	**Grade 7**	**Grade 8**
W:EW:6:2.1: Using relevant and descriptive details and sensory language to advance the plot/story line (Local) EXAMPLE: I could hear bells ringing. It sent shivers down my spine. W:EW:6:2.2: Using dialogue to advance plot/story line (Local) W:EW:6:2.3: Developing characters through description, dialogue, and actions (Local) W:EW:6:2.4: Using voice appropriate to purpose (Local) W:EW:6:2.5: Maintaining focus (Local) W:EW:6:2.6: Selecting and elaborating important ideas; and excluding extraneous details (Local) W:EW:6:2.7: Not assessed at this level	W:EW:7:2.1: Using relevant and descriptive details and sensory language to advance the plot/story line (State) W:EW:7:2.2: Using dialogue to advance plot/story line (State) W:EW:7:2.3: Developing characters through description, dialogue, and actions (State) W:EW:7:2.4: Using voice appropriate to purpose (State) W:EW:7:2.5: Maintaining focus (State) W:EW:7:2.6: Selecting and elaborating important ideas; and excluding extraneous details (Local) W:EW:7:2.7: Not assessed at this level	W:EW:8:2.1: Creating images, using details and sensory language to advance the plot/story line (Local) W:EW:8:2.2: Using dialogue to advance plot/story line (Local) W:EW:8:2.3: Developing characters through description, dialogue, actions, and relationships with other characters, when appropriate (Local) W:EW:8:2.4: Using voice appropriate to purpose (Local) W:EW:8:2.5: Maintaining focus (Local) W:EW:8:2.6: Selecting and elaborating important ideas; and excluding extraneous details (Local) W:EW:8:2.7: Controlling the pace of the story (Local) EXAMPLE: Developing the narrative with greatest emphasis on the most important parts

Expressive Writing Poetry (EW:3)		
W:EW:3: In writing poetry, students demonstrate awareness of purpose by…		
Grade 6	**Grade 7**	**Grade 8**
W:EW:6:3.1: Not assessed at this grade level W:EW:6:3.2: Not assessed at this grade level W:EW:6:3.3: Not assessed at this grade level	W:EW:7:3.1: Not assessed at this grade level W:EW:7:3.2: Writing poems that express the speaker's moods, thoughts, or feelings (Local) W:EW:7:3.3: Choosing conventional or alternative text structures to achieve impact (Local) EXAMPLES (text structures): free verse, haiku, concrete poems	W:EW:8:3.1: Writing poems in a variety of voices for a variety of audiences (purpose) (Local) W:EW:8:3.2: Writing poems that express speaker's moods, thoughts, or feelings (Local) W:EW:8:3.3: Choosing conventional or alternative text structures to achieve impact (Local) EXAMPLES (Text structures): free verse, haiku, concrete poems

Expressive Writing Poetry (EW:4)		
W:EW:4: In writing poetry, use language effectively by…		
Grade 6	**Grade 7**	**Grade 8**
W:EW:6:4.1: Not assessed at this grade level W:EW:6:4.2: Not assessed at this grade level W:EW:6:4.3: Not assessed at this grade level W:EW:6:4.4: Not assessed at this grade level	W:EW:7:4.1: Not assessed at this grade level W:EW:7:4.2: Not assessed at this grade level W:EW:7:4.3: Not assessed at this grade level W:EW:7:4.4: Not assessed at this grade level	W:EW:8:4.1: Selecting vocabulary according to purpose and for effect on audience (Local) W:EW:8:4.2: Using rhyme, figurative language (Local) EXAMPLES (of figurative language): simile, personification, alliteration, onomatopoeia (Local) W:EW:8:4.3: Not assessed at this grade level W:EW:8:4.4: Using a variety of poetic forms (Local)

Expressive Writing Reflective Essay (EW:5)		
W:EW:5: In reflective writing, students explore and share thoughts, observations, and impressions by…		
Grade 6	**Grade 7**	**Grade 8**
W:EW:6:5.1: Not assessed at this grade level W:EW:6:5.2: Not assessed at this grade level W:EW:6:5.3: Not assessed at this grade level W:EW:6:5.4: Not assessed at this grade level W:EW:6:5.5: Not assessed at this grade level W:EW:6:5.6: Not assessed at this grade level	W:EW:7:5.1: Not assessed at this grade level W:EW:7:5.2: Not assessed at this grade level W:EW:7:5.3: Not assessed at this grade level W:EW:7:5.4: Not assessed at this grade level W:EW:7:5.5: Not assessed at this grade level W:EW:7:5.6: Not assessed at this grade level	W:EW:8:5.1: Engaging the reader by establishing context (purpose) (Local) W:EW:8:5.2: Analyzing a condition or situation of significance (e.g., reflecting on a personal learning or personal growth), or developing a commonplace, concrete occasion as the basis for the reflection (Local) W:EW:8:5.3: Not assessed at this grade level W:EW:8:5.4: Using a range of elaboration techniques (i.e., questioning, comparing, connecting, interpreting, analyzing, or describing) to establish a focus (Local) W:EW:8:5.5: Providing closure - leaving the reader with something to think about (Local) W:EW:8:5.6: Not assessed at this grade level

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:1)		
W:IW:1: In informational writing (reports or procedures), students organize ideas/concepts by …		
Grade 6	**Grade 7**	**Grade 8**
W:IW:6:1.1: Using an organizational text structure appropriate to focus/controlling idea (Local) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast W:IW:6:1.2: Selecting appropriate information to set context, which may include a lead/hook (Local) EXAMPLES (of lead/hook): startling statistic, anecdote/scenario, moving from the general to the specific, quotation	W:IW:7:1.1: Using an organizational text structure appropriate to focus/controlling idea (State) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast, problem/solution W:IW:7:1.2: Selecting appropriate information to set context, which may include a lead/hook (State)	W:IW:8:1.1: Using an organizational text structure appropriate to focus/controlling idea (Local) EXAMPLES (of text structures): sequence, chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation W:IW:8:1.2: Selecting appropriate information to set context, which may include a lead/hook (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:2)		
W:IW:2: In informational writing (reports or procedures only), students effectively convey purpose by…		
Grade 6	**Grade 7**	**Grade 8**
W:IW:6:2.1: Establishing a topic (Local) W:IW:6:2.2: Stating and maintaining a focus/controlling idea on a topic (Local) W:IW:6:2.3: Not assessed at this grade level W:IW:6:2.4: Not assessed at this grade level W:IW:6:2.5: Not assessed at this grade level	W:IW:7:2.1: Establishing a topic (State) W:IW:7:2.2: Stating and maintaining a focus/controlling idea (State) W:IW:7:2.3: Writing with a sense of audience, when appropriate (State) W:IW:7:2.4: Not assessed at this grade level W:IW:7:2.5: Not assessed at this grade level	W:IW:8:2.1: Establishing a topic (Local) W:IW:8:2.2: Stating and maintaining a focus/controlling idea/thesis (Local) W:IW:8:2.3: Writing with a sense of audience, when appropriate (Local) W:IW:8:2.4: Establishing an authoritative voice (Local) W:IW:8:2.5: Not assessed at this grade level

Informational Writing Reports, Procedures, or Persuasive Writing – Using Elaboration Strategies (IW:3)		
W:IW:3: In informational writing(reports or procedures only), students demonstrate use of a range of elaboration strategies by:		
Grade 6	**Grade 7**	**Grade 8**
W:IW:6:3.1: Including facts and details relevant to focus/controlling idea, and excluding extraneous information (Local) W:IW:6:3.2: Including sufficient details or facts for appropriate depth of information*:* naming, describing, explaining, comparing, using visual images (Local) W:IW:6:3.3: Addressing readers' concerns (including counterarguments – in persuasive writing; addressing potential problems –in procedures; providing context –in reports) (Local) W:IW:6:3.4: Not assessed at this grade level	W:IW:7:3.1: Including facts and details relevant to focus/controlling idea, and excluding extraneous information (State) W:IW:7:3.2: Including sufficient details or facts for appropriate depth of information*:* naming, describing, explaining, comparing, using visual images (State) W:IW:7:3.3: Addressing readers' concerns (including counterarguments – in persuasive writing; addressing potential problems –in procedures; providing context –in reports) (State) W:IW:7:3.4: Commenting on the significance of information, when appropriate (State)	W:IW:8:3.1: Including facts and details relevant to focus/controlling idea, and excluding extraneous information (Local) W:IW:8:3.2: Including sufficient details or facts for appropriate depth of information*:* naming, describing, explaining, comparing, using visual images (Local) W:IW:8:3.3: Addressing readers' concerns (including counterarguments – in persuasive writing; addressing potential problems –in procedures; providing context –in reports) (Local) W:IW:8:3.4: Commenting on the significance of the information, when appropriate (Local)

Writing Conventions – Applying Rules of Grammar, Usage, and Mechanics (C)		
W:C:1: In independent writing, students demonstrate command of appropriate English conventions by…		
Grade 6	**Grade 7**	**Grade 8**
W:C:6:1.1: Applying rules of standard English usage to correct grammatical errors EXAMPLES: subject-verb agreement, irregular plurals, sentence fragments and run-ons W:C:6:1.2: Applying basic capitalization rules W:C:6:1.3: Subsumed in W:C:6:1.4 W:C:6:1.4: Using punctuation to clarify meaning EXAMPLES: commas, apostrophes, quotation marks W:C:6:2.5: Correctly spelling grade-appropriate, high-frequency words, including homonyms and homophones and applying syllables and affix spelling patterns/rules (Local) EXAMPLES: consonant doubling, consonant patterns, units of meaning – common roots, base words, pre/suffixes	W:C:7:1.1: Applying rules of standard English usage to correct grammatical errors EXAMPLES: Clear pronoun referent, subject-verb agreement, consistency of verb tense, irregular forms of verbs and nouns (State) W:C:7:1.2: Applying capitalization rules (State) W:C:7:1.3: Subsumed in W:C:7:1.4 W:C:7:1.4: Applying appropriate punctuation to various sentence patterns to enhance meaning (State) EXAMPLES: colons, semicolons W:C:7:2.5: Correctly spelling grade-appropriate, high-frequency words and applying conventional spelling patterns/rules (State) EXAMPLES: consonant doubling, consonant patterns, units of meaning – common roots, base words, pre/suffixes	W:C:8:1.1: Applying rules of standard English usage to correct grammatical errors (Local) EXAMPLES: subject-verb agreement, pronoun-antecedent, consistency of verb tense, case of pronouns W:C:8:1.2: Applying capitalization rules (Local) W:C:8:1.3: Subsumed in W:C:8:1.4 W:C:8:1.4: Applying appropriate punctuation to various sentence patterns to enhance meaning (Local) EXAMPLES: hyphens, dashes, parentheses W:C:8:2.5: Applying conventional and word-derivative spelling patterns/rules (Local) EXAMPLES: identifying relationships among roots and common pre/suffixes, including foreign derivation

Habit of Writing: Uses a Writing Process (HW)		
W:HW:1: Students use a recursive process, including pre-writing, drafting, revising, editing, and critiquing to produce final drafts of written products.		
Grade 6	**Grade 7**	**Grade 8**
See Appendix B for Writing Process	See Appendix B for Writing Process	See Appendix B for Writing Process

Habit of Writing: Writing Extensively (HW:2)		
W:HW:2: Demonstrates the habit of writing extensively by…		
Grade 6	**Grade 7**	**Grade 8**
W:HW:6:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:6:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:6:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, letters and personal notes, reading response journals, sketch journals/cartooning, songs, lyrics W:HW:6:2.4: Writing in a variety of genres (Local)	W:HW:7:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:7:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:7:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, letters and personal notes, reading response journals, sketch journals/cartooning, songs, lyrics W:HW:7:2.4: Writing in a variety of genres (Local)	W:HW:8:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:8:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:8:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, letters and personal notes, reading response journals, sketch journals/cartooning, songs, lyrics, reflective writing, short plays W:HW:8:2.4: Writing in a variety of genres (Local)

Oral Communication Strategies (OC:1)		
W:OC:1: In oral communication, students demonstrate interactive listening by …		
Grade 6	**Grade 7**	**Grade 8**
W:OC:6:1.1: Following verbal instructions to perform specific tasks, to answer questions, or to solve problems (Local) W:OC:6:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented (Local) W:OC:6:1.3: Not assessed at this grade level W:OC:6:1.4: Participating in large and small group discussions showing respect for a range of individual ideas (Local) W:OC:6:1.5: Reaching consensus to solve a problem, make a decision, or achieve a goal (Local)	W:OC:7:1.1: Following verbal instructions to perform specific tasks, to answer questions, or to solve problems (Local) W:OC:7:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented (Local) W:OC:7:1.3: Not assessed at this grade level W:OC:7:1.4: Participating in large and small group discussions showing respect for a range of individual ideas (Local) W:OC:7:1.5: Reaching consensus to solve a problem, make a decision, or achieve a goal (Local)	W:OC:8:1.1: Following verbal instructions to perform specific tasks, to answer questions, or to solve problems (Local) W:OC:8:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented (Local) W:OC:8:1.3: Not assessed at this grade level W:OC:8:1.4: Participating in large and small group discussions showing respect for a range of individual ideas (Local) W:OC:8:1.5: Reaching consensus to solve a problem, make a decision, or achieve a goal (Local)

Oral Communication Strategies (OC:2)		
W:OC:2: In oral communication, students make oral presentations by …		
Grade 6	**Grade 7**	**Grade 8**
W:OC:6:2.1: Demonstrating skills and logical organization and language use in interpersonal, small group and public exchanges (e.g., discussions, interviews) W:OC:6:2.2: Using verbal and nonverbal choices to convey consistent focus W:OC:6:2.3: Telling stories, giving information using details /elaboration and providing a coherent conclusion EXAMPLE: using books, pictures displays, graphics or artifacts W:OC:6:2.4: Effectively responding to audience questions and feedback W:OC:6:2.5: Using a variety of strategies of address (e.g., eye contact, speaking rate, volume, articulation, , inflection, intonation, rhythm, and gesture) to communicate ideas effectively (Local) W:OC:6:2.6: Not assessed at this grade level	W:OC:7:2.1: Exhibiting logical organization and language use, appropriate to audience, context, and purpose (Local) W:OC:7:2.2: Maintaining a consistent focus (Local) W:OC:7:2.3: Including smooth transitions, supporting thesis with well-chosen details, and providing a coherent conclusion (Local) EXAMPLES (of support and elaboration): Using illustrations, visuals, detailed descriptions, restatements, paraphrases, examples, comparisons, artifacts W:OC:7:2.4: Effectively responding to audience questions and feedback (Local) W:OC:7:2.5: Using a variety of strategies of address (e.g., eye contact, speaking rate, volume, articulation, , inflection, , intonation, rhythm, and gesture) to communicate ideas effectively (Local) W:OC:7:2.6: Not assessed at this grade level	W:OC:8:2.1: Exhibiting logical organization and language use, appropriate to audience, context, and purpose (Local) W:OC:8:2.2: Maintaining a consistent focus (Local) W:OC:8:2.3: Including smooth transitions, supporting thesis with well-chosen details, and providing a coherent conclusion (Local) EXAMPLES (of support and elaboration): Using illustrations, visuals, detailed descriptions, restatements, paraphrases, examples, comparisons, artifacts W:OC:8:2.4: Effectively responding to audience questions and feedback (Local) W:OC:8:2.5: Using a variety of strategies of address (e.g., eye contact, speaking rate, volume, articulation, , inflection, , intonation, rhythm, and gesture) to communicate ideas effectively (Local) W:OC:8:2.6: Not assessed at this grade level

Structures of Language Applying Understanding of Sentences, Paragraphs, Text Structures (SL)		
W:SL:1: Students demonstrate command of the structures of sentences, paragraphs, and text by…		
Grade 8	**Grade 10**	**Grade 12**
W:SL:8:1.1: Using varied sentence length and structure to enhance meaning (e.g., including phrases and clauses) (Local) W:SL:8:1.2: Using the paragraph form: indenting, main idea, supporting details (Local) W:SL:8:1.3: Recognizing organizational structures within paragraphs or within texts (Local) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation W:SL:8:1.4: Applying a format and text structure appropriate to the purpose of the writing (Local) W:SL:8:1.5: Subsumed in W:SL:8:1.1 W:SL:8:1.6: Applying directionality as appropriate to text (Local)	W:SL:10:1.1: Using varied sentence length and structure to enhance meaning (e.g., including phrases and clauses) (State) W:SL:10:1.2: Using paragraph structures appropriately (e.g., block or indented format (Local) W:SL:10:1.3: Recognizing organizational structures within paragraphs or within texts (State) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation, deductive/inductive W:SL:10:1.4: Applying a format and text structure appropriate to purpose, audience, and context (State) W:SL:10:1.5: Subsumed in W:SL:10:1.1 W:SL:10:1.6: Applying directionality as appropriate to text (Local)	W:SL:12:1.1: Using varied sentence length and structure to enhance meaning (e.g., including phrases, clauses, and parallel structure) (Local) W:SL:12:1.2: Using paragraph structures appropriately (e.g., block or indented format) (Local) W:SL:12:1.3: Recognizing organizational structures within paragraphs or within texts (Local) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation, deductive/inductive (Local) W:SL:12:1.4: Applying a format and text structure appropriate to purpose, audience, and context (Local) EXAMPLES (of formats): academic essay, extended research essay, critical analysis W:SL:12:1.5: Subsumed in W:SL:12:1. W:SL:12:1.6: Applying directionality as appropriate to text (Local)

Reading Connection Writing in Response to Literary or Informational Text – Showing Understanding of Ideas in Text (RC:1)		
W:RC:1: In response to literary or informational text, students show understanding of plot /ideas/concepts by…		
Grade 8	**Grade 10**	**Grade 12**
W:RC:8:1.1: Selecting and summarizing key ideas to set context (Local) W:RC:8:1.2: Subsumed in W:RC:8:1.1 W:RC:8:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge, other texts, or the broader world of ideas, by referring to and explaining relevant ideas (Local) W:RC:8:1.4: Not assessed at this grade level	W:RC:10:1.1: Selecting and summarizing key ideas to set context, appropriate to audience (State) W:RC:10:1.2: Subsumed in W:RC:10:1.1 W:RC:10:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge, other texts, or the broader world of ideas, by referring to and explaining relevant ideas or themes (State) W:RC:10:1.4: Not assessed at this grade level	W:RC:12:1.1: Selecting and summarizing key ideas to set context, appropriate to audience (Local) W:RC:12:1.2: Subsumed in W:RC:12:1.1 W:RC:12:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge, other texts, or the broader world of ideas, by referring to and explaining relevant ideas, themes, motifs, or archetypes (Local) W:RC:12:1.4: Explaining the visual components (e.g., charts, diagrams, artwork) of the text, when appropriate (Local)

Reading Connection Writing in Response to Literary or Informational Text – Making Analytical Judgments about Text (RC:2)		
W:RC:2: In response to literary or informational text read aloud, students make and support analytical judgments about text by…		
Grade 8	**Grade 10**	**Grade 12**
W:RC:8:2.1: Stating and maintaining a focus (purpose), a firm judgment, or point of view when responding to a given question (Local) W:RC:8:2.2: Making inferences about the relationship(s) among content, events, characters, setting, theme, or author's craft (Local) EXAMPLES: Making links to author's choice of words, style, bias, literary techniques, or point of view; making links to characteristics of literary forms or genres W:RC:8:2.3: Using specific details and references to text or relevant citations to support focus or judgment (Local) W:RC:8:2.4: Organizing ideas, using transitional words/phrases and drawing a conclusion by synthesizing information (e.g., demonstrate a connection to the broader world of ideas) (Local)	W:RC:10:2.1a: Establishing an interpretive claim/assertion in the form of a thesis (purpose), when responding to a given prompt (State) W:RC:10:2.1b: Establishing an interpretive claim/assertion in the form of a thesis (purpose) (Local) W:RC:10:2.2: Making inferences about the relationship(s) among content, events, characters, setting, theme, or author's craft (State) EXAMPLES: Making links to author's choice of words, style, bias, literary techniques, or point of view; making links to characteristics of literary forms or genres W:RC:10:2.3: Using specific details and references to text or relevant citations to support thesis, interpretations, or conclusions (State) W:RC:10:2.4: Organizing ideas, using transitional words/phrases and drawing a conclusion by synthesizing information (e.g., demonstrate a connection to the broader world of ideas) (State)	W:RC:12:2.1: Establishing an interpretive claim/assertion in the form of a thesis (purpose) (Local) W:RC:12:2.2: Making inferences about the relationship(s) among content, events, characters, setting, theme, or author's craft (Local) EXAMPLES: Making links to author's choice of words, style, bias, literary techniques, or point of view; making links to characteristics of literary forms or genres W:RC:12:2.3: Using specific details and references to text or relevant citations to support thesis, interpretations, or conclusions (Local) W:RC:12:2.4: Organizing ideas, using transitional words/phrases and drawing a conclusion by synthesizing information (e.g., demonstrate a connection to the broader world of ideas) (Local)

Expressive Writing Narrative Writing – Creating a Story Line and Applying Narrative Strategies (EW:1)		
W:EW:1: In written narratives, students organize and relate a story line/plot/series of events by…		
Grade 8	**Grade 10**	**Grade 12**
W:EW:8:1.1: Creating a clear and coherent (logically consistent) story line (Local) W:EW:8:1.2: Establishing context, character motivation, problem/conflict/challenge, and resolution, and maintaining point of view (Local) W:EW:8:1.3: Using a variety of effective transitional devices (e.g., ellipses, time transitions, white space, or words/phrases) to enhance meaning (Local) W:EW:8:1.4: Not assessed at this grade level W:EW:8:1.5: Establishing and maintaining a theme (Local) W:EW:8:1.6: Providing a sense of closure (Local)	W:EW:10:1.1: Creating a clear and coherent (logically consistent) story line (Local) W:EW:10:1.2: Establishing context, character motivation, problem/conflict/challenge, and resolution, significance of setting, and maintaining point of view (Local) W:EW:10:1.3: Using a variety of effective transitional devices (e.g., ellipses; time transitions: such as flashback or foreshadowing; white space; or words/phrases) to enhance meaning (Local) W:EW:10:1.4: Using a variety of effective literary devices (i.e., flashback or foreshadowing, figurative language imagery) to enhance meaning (Local) W:EW:10:1.5: Establishing and maintaining a theme (Local) W:EW:10:1.6: Providing a sense of closure (Local)	W:EW:12:1.1: Creating a clear and coherent, logically consistent structure (Local) EXAMPLES: Biographical or historical accounts, fiction or non-fiction stories, personal narratives, narrative poems or songs, parodies of particular narrative styles (fable, soap opera) W:EW:12:1.2: Establishing context, character motivation, problem/conflict/challenge, and resolution, significance of setting, and maintaining point of view (Local) W:EW:12:1.3: Using a variety of effective transitional devices (e.g., ellipses; time transitions: such as flashback or foreshadowing; white space; or words/phrases) to enhance meaning (Local) W:EW:12:1.4: Using a variety of effective literary devices (i.e., flashback or foreshadowing, figurative language imagery) to enhance meaning (Local) W:EW:12:1.5: Establishing and maintaining a theme (Local) W:EW:12:1.6: Providing a sense of closure (Local)

Expressive Writing Narrative Writing – Applying Narrative Strategies (EW:2)		
W:EW:8:2: Students demonstrate use of narrative strategies by… **W:EW:10:2: Students demonstrate use of narrative strategies to engage the reader by…** **W:EW:12:2: Students demonstrate use of narrative strategies to engage the reader by…**		
Grade 8	**Grade 10**	**Grade 12**
W:EW:8:2.1: Creating images, using details and sensory language to advance the plot/story line (Local) W:EW:8:2.2: Using dialogue to advance plot/story line (Local) W:EW:8:2.3: Developing characters through description, dialogue, actions, and relationships with other characters, when appropriate (Local) W:EW:8:2.4: Using voice appropriate to purpose (Local) W:EW:8:2.5: Maintaining focus (Local) W:EW:8:2.6: Selecting and elaborating important ideas; and excluding extraneous details (Local) W:EW:8:2.7: Controlling the pace of the story (Local) EXAMPLE: Developing the narrative with greatest emphasis on the most important parts	W:EW:10:2.1: Creating images, using relevant and descriptive details and sensory language to advance the plot/story line (Local) W:EW:10:2.2: Using dialogue to advance plot/story line (Local) W:EW:10:2.3: Developing characters through description, dialogue, actions, and relationships with other characters, when appropriate (Local) W:EW:10:2.4: Using voice appropriate to purpose (Local) W:EW:10:2.5: Maintaining focus (Local) W:EW:10:2.6: Selecting and elaborating important ideas; and excluding extraneous details (Local) W:EW:10:2.7: Controlling the pace of the story (Local) EXAMPLE: Intentional use of sentence length and punctuation	W:EW:12:2.1: Creating images, using relevant and descriptive details and sensory language to advance the plot/story line (Local) W:EW:12:2.2: Using dialogue to advance plot/story line (Local) W:EW:12:2.3: Developing characters through description, dialogue, actions (including gestures, expressions), and relationships with other characters, when appropriate (Local) W:EW:12:2.4: Using voice appropriate to purpose (Local) W:EW:12:2.5: Maintaining focus (Local) W:EW:12:2.6: Selecting and elaborating important ideas; and excluding extraneous details (Local) W:EW:12:2.7: Controlling the pace of the story (Local) EXAMPLE: Developing tension or suspense

Expressive Writing Poetry (EW:3)		
W:EW:3: In writing poetry, students demonstrate awareness of purpose by…		
Grade 8	**Grade 10**	**Grade 12**
W:EW:8:3.1: Writing poems in a variety of voices for a variety of audiences (purpose) (Local) W:EW:8:3.2: Writing poems that express speaker's moods, thoughts, or feelings (Local) W:EW:8:3.3: Choosing conventional or alternative text structures to achieve impact (Local) EXAMPLES (text structures): free verse, haiku, concrete poems	W:EW:10:3.1: Writing poems in a variety of voices for a variety of audiences (purpose) (Local) W:EW:10:3.2: Writing poems that express speaker's moods, thoughts, or feelings (Local) W:EW:10:3.3: Choosing conventional or alternative text structures to achieve impact (Local) EXAMPLES (text structures): sonnet, free verse, haiku, ballad, ode, concrete poems	W:EW:12:3.1: Writing poems in a variety of voices for a variety of audiences (purpose) (Local) W:EW:12:3.2: Writing poems that express speaker's moods, thoughts, or feelings (Local) W:EW:12:3.3: Choosing conventional or alternative text structures to achieve impact (Local)

Expressive Writing Poetry (EW:4)		
W:EW:4: In writing poetry, use language effectively by…		
Grade 8	**Grade 10**	**Grade 12**
W:EW:8:4.1: Selecting vocabulary according to purpose and for effect on audience (Local) W:EW:8:4.2: Using rhyme, figurative language (Local) EXAMPLES (of figurative language): simile, personification, alliteration, onomatopoeia W:EW:8:4.3: Not assessed at this grade level W:EW:8:4.4: Using a variety of poetic forms (Local)	W:EW:10:4.1: Selecting vocabulary according to purpose and for effect on audience (Local) W:EW:10:4.2: Using rhyme, rhythm, meter, literary elements (e.g., setting, plot, characters) or figurative language (Local) EXAMPLES (of figurative language): simile, personification, alliteration, onomatopoeia, metaphor W:EW:10:4.3: Selecting and manipulating words, phrases, or clauses, for connotation/shades of meaning and impact (Local) W:EW:10:4.4: Using a variety of poetic forms (Local)	W:EW:12:4.1: Selecting vocabulary according to purpose and for effect on audience (Local) W:EW:12:4.2: Using rhyme, rhythm, meter, literary elements (e.g., setting, plot, characters) or figurative language (Local) EXAMPLES (of figurative language): simile, personification, alliteration, onomatopoeia, metaphor W:EW:12:4.3: Selecting and manipulating words, phrases, or clauses, for connotation/shades of meaning and impact (Local) W:EW:12:4.4: Using a variety of poetic forms (Local)

Expressive Writing Reflective Essay (EW:5)		
W:EW:5: In reflective writing, students explore and share thoughts, observations, and impressions by…		
Grade 8	**Grade 10**	**Grade 12**
W:EW:8:5.1: Engaging the reader by establishing context (purpose) (Local) W:EW:8:5.2: Analyzing a condition or situation of significance (e.g., reflecting on a personal learning or personal growth), or developing a commonplace, concrete occasion as the basis for the reflection (Local) W:EW:8:5.3: Not assessed at this grade level W:EW:8:5.4: Using a range of elaboration techniques (i.e., questioning, comparing, connecting, interpreting, analyzing, or describing) to establish a focus (Local) W:EW:8:5.5: Providing closure - leaving the reader with something to think about (Local) W:EW:8:5.6: Not assessed at this grade level	W:EW:10:5.1: Engaging the reader by establishing context (purpose) (State) W:EW:10:5.2: Analyzing a condition or situation of significance (e.g., reflecting on a personal learning or personal growth), or developing a commonplace, concrete occasion as the basis for the reflection (State) W:EW:10:5.3: Using an organizational structure that allows for a progression of ideas to develop (State) W:EW:10:5.4: Using a range of elaboration techniques (i.e., questioning, comparing, connecting, interpreting, analyzing, or describing) to establish a focus (State) W:EW:10:5.5: Providing closure - leaving the reader with something to think about (State) W:EW:10:5.6: Not assessed at this grade level	W:EW:12:5.1: Engaging the reader by establishing context (purpose) (Local) W:EW:12:5.2: Analyzing a condition or situation of significance or developing a commonplace, concrete occasion as the basis for the reflection (Local) W:EW:12:5.3: Using an organizational structure that allows for a progression of ideas to develop (Local) W:EW:12:5.4: Using a range of elaboration techniques (i.e., questioning, comparing, connecting, interpreting, analyzing, or describing) to establish a focus (Local) W:EW:12:5.5: Providing closure - leaving the reader with something to think about (Local) W:EW:12:5.6: Making connections between personal ideas and experiences and more abstract aspects of life, leading to new perspectives or insights (Local) EXAMPLE: In a reflection upon a personal friendship, a student identifies a new insight about the relationship.

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:1)		
W:IW:1: In informational writing (reports or procedures), students organize ideas/concepts by …		
Grade 8	**Grade 10**	**Grade 12**
W:IW:8:1.1: Using an organizational text structure appropriate to focus/controlling idea (Local) EXAMPLES (of text structures): sequence, chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation W:IW:8:1.2: Selecting appropriate information to set context, which may include a lead/hook (Local)	W:IW:10:1.1: Using a text structure appropriate to focus/controlling idea or thesis (e.g., purpose, audience, context) (State) EXAMPLES (of text structures): sequence (in procedures), chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation, deductive/inductive reasoning W:IW:10:1.2: Selecting appropriate and relevant information (excluding extraneous details) to set context (State)	W:IW:12:1.1: Using a text structure appropriate to focus/controlling idea or thesis (e.g., purpose, audience, context) (Local) EXAMPLES (of text structures): sequence (in procedures), chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation, deductive/inductive reasoning W:IW:12:1.2: Selecting appropriate and relevant information (excluding extraneous details) to set context (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:2)		
W:IW:2: In informational writing (reports or procedures only), students effectively convey purpose by…		
Grade 8	**Grade 10**	**Grade 12**
W:IW:8:2.1: Establishing a topic (Local) W:IW:8:2.2: Stating and maintaining a focus/controlling idea/thesis (Local) W:IW:8:2.3: Writing with a sense of audience, when appropriate (Local) W:IW:8:2.4: Establishing an authoritative voice (Local) W:IW:8:2.5: Not assessed at this grade level	W:IW:10:2.1: Establishing a topic (State) W:IW:10:2.2: Stating and maintaining a focus/controlling idea/thesis (State) W:IW:10:2.3: Writing with a sense of audience, when appropriate (State) W:IW:10:2.4: Establishing an authoritative voice (State) W:IW:10:2.5: Using precise and descriptive language that clarifies and supports intent (State)	W:IW:12:2.1: Establishing a topic (Local) W:IW:12:2.2: Stating and maintaining a focus/controlling idea/thesis (Local) W:IW:12:2.3: Selecting and using formal, informal, literary, or technical language appropriate to audience and context (Local) W:IW:12:2.4: Establishing an authoritative voice (Local) W:IW:12:2.5: Using precise and descriptive language that clarifies and supports intent and enhances meaning (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Using Elaboration Strategies (IW:3)		
W:IW:3: In informational writing(reports or procedures only), students demonstrate use of a range of elaboration strategies by:		
Grade 8	**Grade 10**	**Grade 12**
W:IW:8:3.1: Including facts and details relevant to focus/controlling idea, and excluding extraneous information (Local) W:IW:8:3.2: Including sufficient details or facts for appropriate depth of information*:* naming, describing, explaining, comparing, using visual images (Local) W:IW:8:3.3: Addressing readers' concerns (including counterarguments – in persuasive writing; addressing potential problems –in procedures; providing context –in reports) (Local) W:IW:8:3.4: Commenting on the significance of the information, when appropriate (Local)	W:IW:10:3.1: Including facts and details relevant to focus/controlling idea or thesis, and excluding extraneous information (State) W:IW:10:3.2: Including sufficient details or facts for appropriate depth of information*:* naming, describing, explaining, comparing, contrasting, or using visual images to support intended purpose (State) W:IW:10:3.3: Addressing readers' concerns (anticipating and addressing potential problems, mistakes, or misunderstandings that might arise for the audience) (State) W:IW:10:3.4: Commenting on the significance of the information (in reports, throughout the piece; in procedural or persuasive writing, as appropriate) (State)	W:IW:12:3.1: Including facts and details relevant to focus/controlling idea or thesis, and excluding extraneous information (Local) W:IW:12:3.2: Including sufficient details or facts for appropriate depth of information*:* naming, describing, explaining, comparing, contrasting, or using visual images to support intended purpose (Local) W:IW:12:3.3: Addressing readers' concerns (anticipating and addressing potential problems, mistakes, or misunderstandings that might arise for the audience) (Local) W:IW:12:3.4: Commenting on the significance of the information (in reports, throughout the piece; in procedural or persuasive writing, as appropriate) (Local)

Writing Conventions – Applying Rules of Grammar, Usage, and Mechanics (C)		
W:C:1: In independent writing, students demonstrate command of appropriate English conventions by…		
Grade 8	**Grade 10**	**Grade 12**
W:C:8:1.1: Applying rules of standard English usage to correct grammatical errors (Local) EXAMPLES: subject-verb agreement, pronoun-antecedent, consistency of verb tense, case of pronouns	W:C:10:1.1: Applying rules of standard English usage to correct grammatical errors (State) EXAMPLES: subject-verb agreement, pronoun-antecedent, consistency of verb tense, case of pronouns	W:C:12:1.1: Applying rules of standard English usage to correct grammatical errors (Local) EXAMPLES: subject-verb agreement, pronoun-antecedent, consistency of verb tense, case of pronouns
W:C:8:1.2: Applying capitalization rules (Local)	W:C:10:1.2: Applying capitalization rules (Local)	W:C:12:1.2: Applying capitalization rules (Local)
W:C:8:1.3: Subsumed in W:C:8:1.4	W:C:10:1.3: Subsumed in W:C:10:1.4	W:C:12:1.3: Subsumed in W:C:12:1.4
W:C:8:1.4: Applying appropriate punctuation to various sentence patterns to enhance meaning (Local) EXAMPLES: hyphens, dashes, parentheses	W:C:10:1.4: Applying appropriate punctuation to various sentence patterns to enhance meaning (State) EXAMPLES: hyphens, dashes, parentheses	W:C:12:1.4: Applying appropriate punctuation to various sentence patterns to enhance meaning (Local) EXAMPLES: brackets
W:C:8:1:5: Applying conventional and word-derivative spelling patterns/rules (Local) EXAMPLES: identifying relationships among roots and common pre/suffixes, including foreign derivation	W:C:10:1.5: Applying conventional and word-derivative spelling patterns/rules (Local) EXAMPLES: identifying relationships among roots and common pre/suffixes, including foreign derivation	W:C:12:1.5: Applying conventional and word-derivative spelling patterns/rules (Local) EXAMPLES: identifying relationships among roots and common pre/suffixes, including foreign derivation

Habit of Writing: Uses a Writing Process (HW:1)		
W:HW:1: Students use pre-writing, drafting, revising, editing, and critiquing to produce final drafts of written products.		
Grade 8	**Grade 10**	**Grade 12**
See Appendix B for Writing Process	See Appendix B for Writing Process	See Appendix B for Writing Process

Habit of Writing: Writing Extensively (HW:2)		
W:HW:2: Demonstrates the habit of writing extensively by…		
Grade 8	**Grade 10**	**Grade 12**
W:HW:8:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:8:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:8:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, letters and personal notes, reading response journals, sketch journals/cartooning, songs, lyrics, reflective writing, short plays W:HW:8:2.4: Writing in a variety of genres (Local)	W:HW:10:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:10:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:10:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, letters and personal notes, reading response journals, sketch journals/cartooning, songs, lyrics, reflective writing, short plays W:HW:10:2.4: Writing in a variety of genres (Local)	W:HW:12:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:12:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:12:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, letters and personal notes, reading response journals, sketch journals/cartooning, songs, lyrics, reflective writing, short plays W:HW:12:2.4: Writing in a variety of genres (Local)

Oral Communication Strategies (OC:1) Interactive Listening		
W:OC:1: In oral communication, students demonstrate interactive listening by …		
Grade 8	**Grade 10**	**Grade 12**
W:OC:8:1.1: Following verbal instructions to perform specific tasks, to answer questions, or to solve problems (Local) W:OC:8:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented (Local) W:OC:8:1.3: Not assessed at this grade level W:OC:8:1.4: Participating in large and small group discussions showing respect for a range of individual ideas (Local) W:OC:8:1.5: Reaching consensus to solve a problem, make a decision, or achieve a goal (Local)	W:OC:10:1.1: Following verbal instructions, to perform specific tasks, to answer questions, or to solve problems (Local) W:OC:10:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented (Local) W:OC:10:1.3: Identifying the thesis of a presentation, determining the essential elements of elaboration, and interpreting or evaluating the message (Local) W:OC:10:1.4: Participating in large and small group discussions showing respect for a range of individual ideas (Local) W:OC:10:1.5: Reaching consensus to solve a problem, make a decision, or achieve a goal (Local)	W:OC:12:1.1: Following verbal instructions to perform specific tasks, to answer questions, or to solve problems (Local) W:OC:12:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented to advance understanding (Local) W:OC:12:1.3: Identifying the thesis of a presentation, determining the essential elements of elaboration, and interpreting or evaluating the message (Local) W:OC:12:1.4: Participating in large and small group discussions showing respect for individual ideas (Local) W:OC:12:1.5: Reaching consensus to solve a problem, make a decision, or achieve a goal (Local)

Oral Communication Strategies (OC:2) Make Oral Presentations		
W:OC:2: In oral communication, students make oral presentations by …		
Grade 8	**Grade 10**	**Grade 12**
W:OC:8:2.1: Exhibiting logical organization and language use, appropriate to audience, context, and purpose (Local) W:OC:8:2.2: Maintaining a consistent focus (Local) W:OC:8:2.3: Including smooth transitions, supporting thesis with well-chosen details, and providing a coherent conclusion (Local) EXAMPLES (of support and elaboration): Using illustrations, visuals, detailed descriptions, restatements, paraphrases, examples, comparisons, artifacts W:OC:8:2.4: Effectively responding to audience questions and feedback (Local) W:OC:8:2.5: Using a variety of strategies of address (e.g., eye contact, speaking rate, volume, articulation, , inflection, intonation, rhythm, and gesture) to communicate ideas effectively (Local) W:OC:8:2.6: Not assessed at this grade level	W:OC:10:2.1: Exhibiting logical organization and language use, appropriate to audience, context, and purpose (Local) W:OC:10:2.2: Maintaining a consistent focus (Local) W:OC:10:2.3: 3 Including smooth transitions, supporting thesis with well-chosen details, and providing a coherent conclusion (Local) EXAMPLES (of support and elaboration): Using anecdotes, analogies, illustrations, visuals, detailed descriptions, restatements, paraphrases, examples, comparisons, artifacts W:OC:10:2.4: Effectively responding to audience questions and feedback (Local) W:OC:10:2.5: Using a variety of strategies of address (e.g., eye contact, speaking rate, volume, articulation, enunciation, pronunciation, inflection, voice modulation, intonation, rhythm, and gesture) to communicate ideas effectively (Local) W:OC:10:2.6: Using tools of technology to enhance message (Local)	W:OC:12:2.1: Exhibiting logical organization and language use, appropriate to audience, context, and purpose (Local) W:OC:12:2.2: Maintaining a consistent focus (Local) W:OC:12:2.3: Including smooth transitions, supporting thesis with well-chosen details, and providing a coherent conclusion (Local) EXAMPLES (of support and elaboration): Using anecdotes, analogies, illustrations, visuals, detailed descriptions, restatements, paraphrases, examples, comparisons, artifacts W:OC:12:2.4: Effectively responding to audience questions and feedback (Local) W:OC:12:2.5: Using a variety of strategies of address (e.g., eye contact, speaking rate, volume, articulation, enunciation, pronunciation, inflection, voice modulation, intonation, rhythm, and gesture) to communicate ideas effectively (Local) W:OC:12:2.6: Using tools of technology to enhance message (Local)

Appendix A: GLOSSARY of Terms Used in WRITING Instruction and Assessment

NECAP States have grouped the Writing GLEs/GSEs into six writing content clusters:

Habit of Writing: Writing Process and Writing Extensively (Applies to all Genres of Writing)
Structures of Language (Applies to all Genres of Writing)
Reading-Writing Connection: Writing in Response to Literary or Informational Text
Expressive Writing: Narratives, Poetry, Reflective Writing
Informational Writing: Reports, Procedures, Persuasive Writing
Writing Conventions (Applies to all Genres of Writing)

Writing Genres Defined

NARRATIVE – Writing that tells a story or recounts an event.

REFLECTIVE ESSAY – A form of writing in which the student explores and shares the meaning of a personal experience, belief, or idea.

PERSUASIVE – Persuasive writing is writing that aims to convince people to accept a point of view, to change their minds about something or to act in a certain way. A persuasive essay is a form of writing in which a writer supports an opinion and tries to persuade an audience.

PROCEDURE – Procedural writing a procedure is writing to explain a process or to inform an audience of how to do something. A procedure piece presents the steps of the process in a clear, logical, easy-to-follow manner; includes all necessary steps; and defines any terms the audience may not know.

REPORT – Writing that results from gathering, investigating, and organizing facts and thoughts on a focused topic.

RESPONSE TO LITERARY OR INFORMATIONAL TEXT – Writing in which the writer analyzes plot/ideas/concepts, making inferences about content, characters, philosophy, theme, author's craft, or other elements within a piece of literature or informational text.

Source: Adapted from Vermont Writing GLE Development, Kurzman, Gephart, Hawkins, 2000

Glossary of Writing Terms

Analysis – A separating of a whole into its parts with an examination of these parts to find out their nature and function

Antithesis - A contrast or opposition of thought, the opposite. In persuasive writing, it is the idea that every argument generates a counter argument. In effective persuasive writing, opposing arguments should be addressed and rebutted.

Audience – Those who read or hear what is written**.** Many qualities of writing must be appropriate to the audience: voice and tone, language, etc.

Author's Craft – The techniques the author chooses to enhance writing. Examples: style, bias, point of view, flashback, foreshadowing, symbolism, figurative language, sensory details, soliloquy, stream of consciousness, etc.

Citation – A direct quote from the text; acknowledgment and documentation of sources of information.

Climax – The high point or turning point in the plot of the story.

Coherence – The quality achieved when all the ideas are clearly arranged and connected. The arrangement of ideas, within and among paragraphs, should be organized in such a way that the reader can easily move from one point to another. When all ideas are arranged and connected, a piece of writing has coherence.

Context - The background information a reader needs to know. It may be a set of facts or circumstances surrounding an event or a situation, explanation of characters, or definition of important terms.

Concrete or Specific Details – Details are concrete when they can be seen, heard, smelled, tasted, or touched. The use of factual details to create a picture (e.g., ten antique, light brown wooden desks, each with a built-in ink well, were lined in two straight rows.)

Controlling Idea – This is the main idea/focus that runs throughout the paper.

Conventions - Features of standard written English that usually include sentence formation, grammar, spelling, usage, punctuation, and capitalization.

Counter Argument – See antithesis.

Diction – The writer's choice of words based on their effectiveness.

Elaboration – Words used to explain and in some way support the central idea; the development and expansion of ideas and arguments. Elaboration varies with the type of writing. (For example, a report may have statistics, examples, anecdotes, and facts, while a narrative would have description, dialogue**,** show-not-tell, etc.)

Embedded Phrases and Clauses – Grammatical structures which are placed in simple sentences to enhance sentence variety (e.g., The bird sat on the fence…chirping loudly in the early morning mist; the bird with the colorful feathers sat on the fence which divided the pasture from the yard, while the cat looked longingly from the window.)

Figurative Language – Techniques used in writing (particularly expressive writing) to create images (e.g., similes, metaphors, alliteration, assonance, personification, onomatopoeia).

Focus – The specific idea(s) within the topic that the writer is addressing. (For example, if the topic is "horses," the focus might be: Horses are very expensive to own.)

Inference - A deduction or conclusion made from facts that are suggested or implied rather than overtly stated (Example: Mom said that I should study more and watch television less. I inferred that I should get better grades or the television would be taken out of my room.)

Occasion – The happening or event that makes the response possible.

Organization – The **clear** evidence of a plan or foundation on which writing is built; includes intentional introduction, conclusion, and internal/external transitions to connect ideas.

Pacing – The rate of movement and action of a narrative. (Examples of a problem with pacing: The story may take a long time to build to the climax, it may have only one or two sentences about the climax, or it may end abruptly.)

Pedestrian – Commonplace, usual; when applied to vocabulary, over-used ("good things," "nice stuff").

Purpose – The specific reason for writing; the goal of the writing (to entertain, express, inform, explain, persuade, etc.). Purpose has to do with the topic and the focus the writer is addressing, its central idea, theme, or message.

Reference to Text – Mentioning or alluding to something in the text without directly quoting the text (For example: Pip was frightened when he met the convict in the graveyard.)

Resolution - The portion of a play or story in which the problem is resolved. It comes after the climax and falling action, and is intended to bring the story to a satisfying end.

Retelling - A restatement of the events in the story.

Sensory Description – Elaboration on a key part or character of the story that includes the five senses: sight, smell, touch, taste, and sound. All five senses do not have to be used, just the ones that naturally fit into the description. Feelings and thoughts, as well as dialogue, may be embedded.

Stance – The attitude or position the author has adopted; literally, how an author stands on the topic.

Stereotype – A pattern or form that does not change. A character is "stereotyped" if she or he has no individuality and fits a mold.

Summary – Writing that presents the main points of a larger work in condensed form.

Text Structures – The organizational structures used within paragraphs or within texts, appropriate to writing genre and purpose. Examples of text structures include: description, sequential chronology, proposition/support, compare/contrast, problem/solution, cause/effect, and investigation.

Theme – The central idea, message, concern, or purpose in a literary work, which may be stated directly or indirectly.

Thesis – The controlling idea about a topic that the writer is attempting to prove; a sentence that announces the writer's main, unifying, controlling idea about a topic. A thesis statement usually contains two main elements: a limited subject (Internet), a strong verb, and the reason for it - the "why"- (The Internet provides information of varying depth and quality).

Tone – The overall feeling or effect created by a writer's attitude, use of words, and sentence structure. This feeling may be serious, mock-serious, humorous, sarcastic, solemn, objective, etc.

Topic – The general subject matter covered in a piece of writing.

Transitions – Words or phrases that help tie ideas together (e.g., however, on the other hand, since, first, etc.); **Transitional devices** also include numbering, use of such things as space, ellipses to enhance meaning.

Voice – The style and quality of the writing which includes word choice, a variety of sentence structures, and evidence of investment. Voice portrays the author's personality. It is the fluency, rhythm, and liveliness in writing that makes it unique to the writer. A distinctive voice establishes personal expression and enhances the writing. (see Reading)

Appendix B: Overview of the Writing Process

Source: Adapted from New England Compact GLE Development; Stimson, Hyman and Bourassa, 2003

Aspects of the Writing Process	Strategies **Successful student writers learn through their own experiences with writing that writing is a recursive rather than a linear process, and that not all pieces of writing will be published. Classroom time for writing instruction should provide ample opportunities for prewriting activities, drafting multiple versions, revising, teacher and peer conferencing, self-assessment, and sharing of writing.**
Prewriting	• Establish a purpose and central/controlling idea or focus • Generate ideas – mapping, webbing, note taking, interviewing, researching, etc. • Organize ideas – consider other models of good writing, appropriate text structures to match purpose, various ways to organize information, etc.
Drafting	• Written draft(s) for an intended audience • Develop topic, elaborate, explore sentence variety and language use
Revising (Content/Ideas)	• Reflect, add, delete, define/redefine content by self, teacher, peer • Consider voice, tone, style, intended audience, coherence, transitions, pacing • Compare with rubric criteria and benchmark papers/models
Editing (Conventions and Mechanics)	• Check for correctness with self, teacher, peer • Compare with rubric criteria and benchmark papers/models • Use resources to support editing • Read aloud with self, teacher, peer
Publishing	• Share final draft with intended audience – orally, in print, electronically, etc.

Contributors

The federal law, *No Child Left Behind*, requires states to develop grade-level expectations in reading/language areas for grades 3-8. Grade-span expectations were developed also for grades 9-10 and 11-12 in reading and writing for high school. Both the grade-level expectations (GLEs) and the grade-span expectations (GSEs) have been incorporated into this revised version of the *K-12 English Language Arts Curriculum Framework*.

The following is a list of committee members representing the state of New Hampshire who developed the grade-level and grade-span expectations. Although this list represents those individual who formally served on the GLE and GSE committees, we are extremely grateful to the numerous people who provided feedback through technical review sessions, focus groups, on-line surveys, e-mails, and phone calls.

The assessment GLEs and GSEs were developed as a joint effort between the states of New Hampshire, Rhode Island, and Vermont. The local GLEs and GSEs were started as a joint effort between New Hampshire and Rhode Island. The contributors from RI and VT can be obtained by contacting the Rhode Island Department of Education and the Vermont Department of Education, respectively.

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K–12 Mathematics New Hampshire Curriculum Framework

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New Hampshire Curriculum Framework Mathematics

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The information on the following pages is also available on our website at www.ed.state.nh.us/frameworks.

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How this framework is organized

The material in the K-12 Mathematics Curriculum Framework is organized into Grade-Level Expectations (GLEs) and Grade-Span Expectations (GSEs). Both GLEs and GSEs contain statements about what ALL New Hampshire students are expected to know and be able to do. GLEs are standards that are delineated by grade level covering grades K-8. GSEs are standards that cover the high school span. Both the GLEs and GSEs are built upon the extensive work that went into the 1995 K-12 Mathematics Curriculum Framework and the earlier 1993 K-3 monograph.

Both the GLEs and GSEs are organized into four content strands (Number and Operations; Geometry and Measurement; Functions and Algebra; Data, Statistics, and Probability) and two process strands (Problem Solving, Reasoning, and Proof; Communication, Connections, and Representations).

At the beginning of each strand is a purpose statement which places the strand in the context of a K-12 mathematics program. Furthermore, each strand contains a number of big ideas referred to as stems. The stems articulate the main curricular focus and stay the same or similar across grades.

There are two types of standards throughout the document. Those identified for state assessment purposes and those identified for local curriculum and assessment. The state assessment standards appear in bold boxes; all other standards are guidance for local curriculum and assessment.

The organization of the GLEs and GSEs is further clarified in *About the Mathematics GLEs*, *Reading the Mathematics GLEs*, *About the Mathematics GSEs*, and *Reading the Mathematics GSEs*.

Rationale

In the early part of the 20th century, the needs of our society were dominated by an emerging industrial age driven by mass production. The needs of that society were served by mathematics education in which the acquisition of computational skills was the primary focus. Computational skills alone are no longer sufficient for the United States to remain competitive in the world marketplace. The economy is global, the economic environment is more competitive, the workforce is more mobile, and developments in technology are changing rapidly.

The level of mathematics needed for both intelligent citizenship and the workplace has increased dramatically. Although the acquisition of computational skills remains important, it is not sufficient. The definition of basics skills in mathematics must change to include mathematical problem solving, reasoning, the ability to communicate, and the use of appropriate technology in addition to being able to compute. Individuals need to be able to apply their understanding of mathematics to solve real-world problems for which there are no simple formulas and standard procedures. Individuals need to be able to use their knowledge of mathematics to make sense of complex situations and then communicate that understanding to others. Individuals need to be able to solve tomorrow's problems, as well as today's. Mathematics education in our schools must address these needs.

GOALS FOR MATHEMATICS EDUCATION

We commit to six primary goals. These goals are closely aligned with those espoused by various national commissions and groups in their efforts to reshape the teaching and learning of mathematics.

- All students will develop a firm grounding in number sense that includes computational fluency.
- All students will develop a basic understanding of key concepts and principles central to the study of geometry, algebra, probability, and data analysis, while appreciating the interrelationships of all areas of mathematics.
- All students will develop strong mathematical problem solving and reasoning abilities.
- All students will develop positive attitudes about mathematics.
- All students will develop the ability to use appropriate technology to solve mathematical problems.
- All students will develop the ability to communicate their understanding of mathematics effectively.

THE LEARNING ENVIRONMENT

The New Hampshire Mathematics Curriculum Framework provides a set of goals and standards for what ALL New Hampshire students are expected to know and be able to do. However, the "what" of the goals and standards needs to be considered in the context of the "how" of mathematics teaching and learning (i.e., what type of learning environments will foster students' mathematical development consistent with the goals and standards). Every school-learning environment has several key components including the teachers, the learners, and the curriculum.

Knowledge needs to be well connected. Students who have memorized facts and procedures without understanding often do not know when or how to apply them. When students learn mathematics by doing mathematics, by exploring and discussing concepts in the context of physical situations, what emerges from these experiences are skills that are anchored in understanding and clarity. The students not only know the basic procedures, but also know how to apply them to new situations.

The attitudes students form influence their thinking and performance, and later, influence their decisions about studying mathematics. Students are active individuals who build new knowledge from experience and prior knowledge. The learning of mathematics must be an active process. The teacher plays a key role in establishing a learning environment where discussion and collaboration are expected and fostered, students are expected to justify their thinking, construct mathematical arguments, and experiment with various approaches. Beyond the physical environment, an attitude needs to be prevalent that all students can learn and that they will all be supported in efforts to attain this goal.

A learning environment that supports the stated goals for mathematics education has the following characteristics:

- students are actively involved in doing mathematics;
- problem solving, thinking, reasoning, and communicating are everyday activities;
- central mathematical concepts are understood;
- an appropriate balance between application and acquisition of knowledge and skills exists;
- manipulatives are used, when appropriate, to connect conceptual to procedural understanding;
- technology is used in appropriate ways;
- the curriculum is coherent and well-articulated across grade levels; and
- assessment is an integral part of instruction.

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About the Mathematics GLEs

This set of New Hampshire Grade-Level Expectations (GLEs) for K-8 includes expectations that will be assessed on the state-level assessment and others that will be a local curriculum and assessment option (i.e., guidance for local curriculum and assessment but not assessed on the state assessment). Those GLEs that will be assessed on the state assessment are boxed with bold outlines. Furthermore, these assessment GLEs are common across NH, RI, and VT and will be assessed through the New England Common Assessment Program (NECAP). The assessment GLEs in this document can be interpreted as describing expectations for the end of the grade identified or the beginning of the next grade. The local content GLEs were developed in collaboration with the Rhode Island Department of Education. As you review the New Hampshire GLEs in Mathematics the following are important to understand.

1) The GLEs are organized into four content strands (Number and Operations; Functions and Algebra; Data, Statistics, and Probability; Geometry and Measurement) and two process strands (Problem-Solving, Reasoning, and Proof; Communications, Representations, and Connections).
2) Since it is crucial that process standards (problem-solving, reasoning, proof, communication, connections, and representations) are not seen separate from content standards, the process standards have been imbedded throughout the content strands (e.g., M:F&A:4:1 **Identifies and <u>extends to specific cases</u> a variety of patterns** (linear and <u>nonlinear</u>) represented in models, tables or sequences; and <u>writes a rule in words or[sc] symbols to find the next case.</u>). This mirrors classroom instruction as in most classes, as students are learning content knowledge, instruction is also focusing on improving their abilities in problem solving, reasoning, and communication; furthermore, students are looking for and making appropriate connections, and they are able to understand and use multiple representations of mathematical ideas. Since it is crucial that students are strong in both content and process knowledge, we have included two local process strands following the content strands. These process strands are in addition to the process standards that are embedded in the content standards and are included to help guide local curriculum, assessment, and instruction. The process standards have been separated by grade-spans (K–2, 3–5, 6–8, and 9–12). The K–2, 3–5, and 6–8 spans have been included in this section of the document. Each span should be thought of as building upon the skills and concepts in the previous span.
3) Each GLE includes a **bolded** statement called the "stem." Each "stem" is the same or similar across the grades for a given GLE, and is meant to communicate the main curricular and instructional focus of the GLE across the grades.
4) The unbolded text within a GLE indicates the expectations for that given grade-level.
5) The underlined text indicates the concepts and skills that are new to a given grade. (Note: Sometimes nothing is underlined within a GLE. In these situations, examine other GLEs across the strand to identify the differences or check the Depth of Knowledge table in the test specifications.
6) Each GLE is coded for the content strand, grade level, and the GLE "stem" number (e.g., M:F&A:7:3: The "M" stands for mathematics, the "F&A" stands for the Functions and Algebra strand, the "7" indicates a standard for grade 7 to be assessed in the fall of grade 8, and the "3" stands for stem 3 or the 3rd big idea in the Functions and Algebra strand). See the diagram on page 9.
7) Unless otherwise specified the number parameters defined in the Number and Operations strand for a particular grade-level apply to all GLEs at that grade-level.
8) All the concepts and skills identified at a given grade level that are boxed with bold outlines are "fair game" for state assessment purposes. However, conjunctions in this document have specific meaning. The conjunction "and" separates parts of a GLE that will be assessed every year (to the extent possible), while the conjunction "or" separates parts of the GLE that may be assessed each year, but will be more likely to be assessed over several years. In some situations "or[sc]" is used. While students will have choices on strategies they use or methods to communicate their thinking throughout the assessment, there are special cases that the NECAP states thought it was necessary to communicate to the test developer that students should not be required to use a specific method (e.g., "…writes in words or[sc] symbols…").

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STEM – Bolded statement communicating main curricular focus and is the same or similar across grades (K-12)

CONTENT AREA: "M" stands for mathematics

STRAND: In this case, "N&O" stands for Number and Operations

GRADE LEVEL: "8" indicates a standard for grade 8. Notice, how in this case, the standard is not in a bold box – indicating that this is a standard to guide local curriculum and assessment. In the column to the left, the state-assessment standard (the standard in the bold box) is a grade 7 standard to be assessed in the fall of grade 8.

Grade 6	Grade 7	Grade 8
M:N&O:6:4 **Accurately solves problems involving** single or multiple operations on fractions (proper, improper, and mixed), or decimals; and addition or subtraction of integers; percent of a whole; or problems involving greatest common factor or least common multiple. (IMPORTANT: *Applies the conventions of order of operations with and without parentheses.*)	M:N&O:7:4 **Accurately solves problems involving** the addition or subtraction of integers, raising numbers to whole number powers, and determining square roots of perfect square numbers and non-perfect square numbers. M:N&O:7:4 **Accurately solves problems involving** proportional reasoning; percents involving discounts, tax, or tips; and rates. (IMPORTANT: *Applies the conventions of order of operations including parentheses, brackets, or exponents.*)	M:N&O:8:4 **Accurately solves problems involving** proportional reasoning (percent increase or decrease, interest rates, markups, or rates); multiplication or division of integers; and squares, cubes, and taking square or cube roots. (IMPORTANT: *Applies the conventions of order of operations.*)

STEM Number: The big ideas in each strand are numbered. In this case, "4" indicates the 4th big idea in the Number and Operations strand.

UNDERLINING – Indicates concepts and skills that a new to the grade level

BOLD BOX – Indicates the standards to be assessed on the NECAP assessment; all other standards are guidance for local curriculum and assessment

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Number and Operations

Purpose: Numbers and operations remain a cornerstone for the study of mathematics in grades K – 12. Students use numbers to quantify sets, identify location, measure, quantify the probability of an event, analyze data, and describe and interpret real-world phenomena. Having students know basic facts and having students compute fluently (i.e., accurately and efficiently) continues to be an important goal in mathematics education. However, knowing basic facts should be incorporated into a rich mathematics curriculum that builds conceptual understanding of these facts.

Through the school years, the amount of time spent on numbers and their operations will decrease and the types of numbers studied will change. As students progress through the elementary grades and into middle school, they will need to develop an in-depth conceptual understanding of fractions, decimals, and percents prior to doing algorithmic computations with these numbers. Conceptual development of integers and meaningful computation with them are also goals for middle grade students. The study of irrational numbers and the real number system will begin in eighth grade and continue through high school. Imaginary and complex numbers are introduced in advanced mathematics. It is important for students to model and represent the different types of numbers they study.

Students cannot appreciate the power of numbers unless they also understand the operations upon those numbers. Students need to recognize which operation to apply to a given problem situation they encounter. They need to know what effect the various operations will have on different types of numbers. They need to know the relationships among the operations and among the operations and their properties. A deep understanding of the operations and their properties will help students make sense of computation algorithms and lead to fluency in computation. A firm understanding of numbers as well as operations and their properties will provide a good foundation for the study of algebra.

Grade K	Grade 1	Grade 2
M:N&O:K:1 **Demonstrates conceptual understanding of rational numbers with respect to:** **whole numbers** from 0 to 12 **through investigations** that apply the concepts of equivalency in composing or decomposing numbers **using models, explanations, or other representations;** and **positive fractional numbers** (1/2) as "fair share" (i.e., equal sized parts or sets) using **models, explanations, or other representations**.	M:N&O:1:1 **Demonstrates conceptual understanding of rational numbers with respect to:** **whole numbers** from 0 to 100 using place value, by applying the concepts of equivalency in composing or decomposing numbers; and in expanded notation using **models**, **explanations, or other representations;** and **positive fractional numbers** (benchmark fractions: *a*/2, *a*/3, or *a*/4, where *a* is a whole number greater than 0 and less than or equal to the denominator) as a part to whole relationship in area models where the denominator is equal to the number of parts in the whole **using models, explanations, or other representations**.	M:N&O:2:1 **Demonstrates conceptual understanding of rational numbers with respect to:** **whole numbers** from 0 to 199 using place value, by applying the concepts of equivalency in composing or decomposing numbers (e.g., 34 = 17 + 17; 34 = 29 + 5); and in expanded notation (e.g., 141 = 1 hundred + 4 tens + 1 one or 141 = 100 + 40 + 1) **using models, explanations, or other representations**; and **positive fractional numbers** (benchmark fractions: *a*/2, *a*/3, or *a*/4, where *a* is a whole number greater than 0 and less than or equal to the denominator) as a part to whole relationship in area and set models where the denominator is equal to the number of parts in the whole **using models, explanations, or other representations**.

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Number and Operations		
Grade K	**Grade 1**	**Grade 2**
M:N&O:K:2 **Demonstrates understanding of the relative magnitude of numbers** from 0 to 20 **through investigations** that demonstrate one-to-one correspondence; that compare whole numbers to each other or to benchmark whole numbers (5, 10); that demonstrate an understanding of the relation of inequality when comparing whole numbers by using "1 more" or "1 less"; that connect numbers orally and written as numerals to the quantities that they represent using models, representations, or number lines.	M:N&O:1:2 **Demonstrates understanding of the relative magnitude of numbers** from 0 to 100 by ordering whole numbers; by comparing whole numbers to each other or to benchmark whole numbers (5, 10, 25, 50, 75, 100); by demonstrating an understanding of the relation of inequality when comparing whole numbers by using "1 more", "1 less", "5 more", "5 less", "10 more", "10 less"; and by connecting number words (from 0 to 20) and numerals (from 0 to 100) to the quantities and positions that they represent using investigations, models, representations, or number lines.	M:N&O:2:2 **Demonstrates understanding of the relative magnitude of numbers** from 0 to 199 by ordering whole numbers; by comparing whole numbers to each other or to benchmark whole numbers (10, 25, 50, 75, 100, 125, 150, or 175); by demonstrating an understanding of the relation of inequality when comparing whole numbers by using "1 more", "1 less", "10 more", "10 less", "100 more", or "100 less"; or by connecting number words and numerals to the quantities they represent using models, number lines, or explanations.
M:N&O:K:3 **Demonstrates conceptual understanding of mathematical operations through investigations involving** addition and subtraction of whole numbers (from 0 to 10) by solving problems involving joining actions, separating actions, part-part whole relationships, and comparison situations; and addition of multiple one-digit whole numbers. (See Appendix A.)	M:N&O:1:3 **Demonstrates conceptual understanding of mathematical operations involving** addition and subtraction of whole numbers (from 0 to 30) by solving problems involving joining actions, separating actions, part-part whole relationships, and comparison situations; and addition of multiple one-digit whole numbers. (See Appendix A.)	M:N&O:2:3 **Demonstrates conceptual understanding of mathematical operations involving** addition and subtraction of whole numbers by solving problems involving joining actions, separating actions, part-part whole relationships, and comparison situations; and addition of multiple one-digit whole numbers. (See Appendix A.)
M:N&O:K:4 No standard at this grade	M:N&O:1:4 No standard at this grade	M:N&O:2:4 No standard at this grade
M:N&O:K:5 **Demonstrates understanding of monetary value through investigation involving** knowing the names and values for coins (penny, nickel and dime).	M:N&O:1:5 **Demonstrates understanding of monetary value by** knowing the names and values for coins (penny, nickel, dime, and quarter); and by adding collections of like coins together to a sum no greater than $1.00.	M:N&O:2:5 **Demonstrates understanding of monetary value** by adding coins together to a value no greater than $1.99 and representing the result in dollar notation; making change from $1.00 or less, or recognizing equivalent coin representations of the same value (values up to $1.99).

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Number and Operations		
Grade K	**Grade 1**	**Grade 2**
M:N&O:K:6 **Mentally adds and subtracts whole numbers** by naming the number that is one more or one less than the original number. (IMPORTANT: *The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:1:6 **Mentally adds and subtracts whole numbers** by naming the number that is one or two more or less than the original number; and adds and subtracts whole number facts through ten (addends whose sum is at most 10 and related subtraction facts). (IMPORTANT: *The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:2:6 **Mentally adds and subtracts whole number facts** through 20 (addends whose sum is at most 20 and related subtraction facts); names the number that is 10 more or less than the original number, and mentally adds and subtracts two-digit multiplies of ten (e.g., 60 + 80, 90 – 30). (IMPORTANT: *The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)
M:N&O:K:7 **Makes estimates** of the number of objects in a set (up to 20) by making and revising estimates as objects are counted (e.g., A student estimates the number of pennies in a jar as 20. Then the student counts the first 10 and makes another estimate based on those that have been counted and those that remain in the jar.). (IMPORTANT: *Estimation should be imbedded instructionally throughout all strands.*)	M:N&O:1:7 **Makes estimates** of the number of objects in a set (up to 30) and revises estimates as objects are counted (e.g., A student estimates the number of pennies in a jar as 28. Then the student counts the first 10 and makes another estimate based on those that have been counted and those that remain in the jar.). (IMPORTANT: *Estimation should be imbedded instructionally throughout all strands.*)	M:N&O:2:7 **Makes estimates** of the number of objects in a set (up to 50) by selecting an appropriate method of estimation. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)
	M:N&O:1:8 **Applies properties of numbers** (odd, even, composition, and decomposition [e.g., 5 is the same as 2 + 3]) and **field properties** (commutative and identity for addition) **to solve problems and to simplify computations involving whole numbers**.	M:N&O:2:8 **Applies properties of numbers** (odd and even) and **field properties** (commutative for addition, identity for addition, and associative for addition) **to solve problems and to simplify computations involving whole numbers**.

New Hampshire Curriculum Framework Mathematics

Number and Operations		
Grade 3	**Grade 4**	**Grade 5**
M:N&O:3:1 **Demonstrates conceptual understanding of rational numbers with respect to:** **whole numbers** from 0 to 999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations**; and **positive fractional numbers** (benchmark fractions: *a*/2, *a*/3, *a*/4, *a*/6, or *a*/8, where *a* is a whole number greater than 0 and less than or equal to the denominator) as a part to whole relationship in area and set models where the number of parts in the whole is equal to the denominator; and **decimals** (within a context of money) as a part of 100 **using models, explanations, or other representations**.	M:N&O:4:1 **Demonstrates conceptual understanding of rational numbers with respect to:** **whole numbers** from 0 to 999,999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations**; and **positive fractional numbers** (benchmark fractions: *a*/2, *a*/3, *a*/4, *a*/5, *a*/6, *a*/8, or *a*/10, where *a* is a whole number greater than 0 and less than or equal to the denominator) as a part to whole relationship in area, set, or linear models where the number of parts in the whole are equal to, and a multiple or factor of the denominator; and **decimals** as hundredths within the context of money, or tenths within the context of metric measurements (e.g., 2.3 cm) **using models, explanations, or other representations**.	M:N&O:5:1 **Demonstrates conceptual understanding of rational numbers with respect to:** **whole numbers** from 0 to 9,999,999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations**; and **positive fractional numbers** (proper, mixed number, and improper) (halves, fourths, eighths, thirds, sixths, twelfths, fifths, or powers of ten (10, 100, 1000)), **decimals** (to thousandths), or **benchmark percents** (10%, 25%, 50%, 75% or 100%) as a part to whole relationship in area, set, or linear models **using models, explanations, or other representations**.
M:N&O:3:2 **Demonstrates understanding of the relative magnitude of numbers** from 0 to 999 by ordering whole numbers; by comparing whole numbers to benchmark whole numbers (100, 250, 500, 750); or by comparing whole numbers to each other; and comparing or identifying equivalent positive fractional numbers (*a*/2, *a*/3, *a*/4, where *a* is a whole number greater than 0 and less than or equal to the denominator) using models, number lines, or explanations.	M:N&O:4:2 **Demonstrates understanding of the relative magnitude of numbers** from 0 to 999,999 by ordering or comparing whole numbers; and ordering, comparing, or identifying equivalent proper positive fractional numbers; or decimals using models, number lines, or explanations.	M:N&O:5:2 **Demonstrates understanding of the relative magnitude of numbers** by ordering, comparing, or identifying equivalent positive fractional numbers, decimals, or benchmark percents within number formats (fractions to fractions, decimals to decimals, or percents to percents); or integers in context using models or number lines.

New Hampshire Curriculum Framework Mathematics

Number and Operations		
Grade 3	**Grade 4**	**Grade 5**
M:N&O:3:3 **Demonstrates conceptual understanding of mathematical operations** by describing or illustrating the inverse relationship between addition and subtraction of whole numbers; and the relationship between repeated addition and multiplication using models, number lines, or explanations.	M:N&O:4:3 **Demonstrates conceptual understanding of mathematical operations** by describing or illustrating the relationship between repeated subtraction and division (no remainders); the inverse relationship between multiplication and division of whole numbers; or the addition or subtraction of positive fractional numbers with like denominators using models, number lines, or explanations.	M:N&O:5:3 **Demonstrates conceptual understanding of mathematical operations** by adding and subtracting decimals and positive proper fractions with unlike denominators. M:N&O:5:3 **Demonstrates conceptual understanding of mathematical operations** by describing or illustrating the meaning of a remainder with respect to division of whole numbers using models, explanations, or solving problems.
M:N&O:3:4 **Accurately solves problems involving** addition and subtraction with regrouping; the concept of multiplication; and addition or subtraction of decimals (in the context of money).	M:N&O:4:4 **Accurately solves problems involving** multiple operations on whole numbers or the use of the properties of factors and multiples; and addition or subtraction of decimals and positive proper fractions with like denominators. (Multiplication limited to 2 digits by 2 digits, and division limited to 1 digit divisors.) (IMPORTANT: *Applies the conventions of order of operations where the left to right computations are modified only by the use of parentheses.*)	M:N&O:5:4 **Accurately solves problems involving** multiple operations on whole numbers or the use of the properties of factors, multiples, prime, or composite numbers; and addition or subtraction of fractions (proper) and decimals to the hundredths place. (Division of whole numbers by up to a two-digit divisor.) (IMPORTANT: *Applies the conventions of order of operations with and without parentheses.*)
M:N&O:3:5 No standard at this grade	M:N&O:4:5 No standard at this grade	M:N&O:5:5 No standard at this grade

Number and Operations		
Grade 3	**Grade 4**	**Grade 5**
M:N&O:3:6 **Mentally adds and subtracts whole number facts** through 20 (addends whose sum is at most 20 and related subtraction facts); adds two-digit and one-digit whole numbers; adds combinations of two-digit and three-digit whole numbers that are multiples of ten (e.g., 60 + 50, 300 + 400, 320 + 90); subtracts a one-digit whole number from a two-digit whole number (e.g., 37 – 5); and subtracts two-digit whole numbers that are multiples of ten and three-digit whole numbers that are multiples one hundred (e.g., 50 – 20, 500 – 200). (IMPORTANT: *The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:4:6 **Mentally adds and subtracts whole number facts** through 20 (addends whose sum is at most 20 and related subtraction facts); multiplies whole number facts to a product of 100, and calculates related division facts; adds two-digit whole numbers, combinations of two-digit and 3-digit whole numbers that are multiples of ten, and 4-digit whole numbers that are multiples of 100 (limited to two addends) (e.g., 67 + 24; 320 + 430; 320 + 90; 1,300 + 1,400); and subtracts a one-digit whole number from a two-digit whole number (e.g., 67 – 9); and subtracts combinations of two-digit and three-digit whole numbers that are multiples of ten (e.g., 50 – 20, 230 – 80, 520 – 200). (IMPORTANT: *The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:5:6 **Mentally calculates** change back from $1.00, $5.00, and $10.00; calculates multiplication and related division facts to a product of 144; multiplies a two-digit whole number by a one-digit whole number (e.g., 45 × 5), two-digit whole numbers that are multiples of ten (e.g., 50 × 60), a three-digit whole number that is a multiple of 100 by a two- or three-digit number which is a multiple of 10 or 100, respectively (e.g., 400 × 50, 400 × 600); and divides 3- and 4-digit multiples of powers of ten by their compatible factors (e.g., 360 ÷ 6; 360 ÷ 60; 3600 ÷ 6; 3600 ÷ 60; 3600 ÷ 600; 360 ÷ 12; 360 ÷ 120; 3600 ÷ 12; 3600 ÷ 120; 3600 ÷ 1200). (IMPORTANT: *The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)
M:N&O:3:7 **Makes estimates** in a given situation by identifying when estimation is appropriate, selecting the appropriate method of estimation, and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:4:7 **Makes estimates** in a given situation by identifying when estimation is appropriate, selecting the appropriate method of estimation, and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:5:7 **Makes estimates** in a given situation by identifying when estimation is appropriate, selecting the appropriate method of estimation, determining the level of accuracy needed given the situation, analyzing the effect of the estimation method on the accuracy of results, and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)
M:N&O:3:8 **Applies properties of numbers** (odd, even, and multiplicative property of zero for single-digit whole numbers [6 x 0 = 0]) and **field properties** (commutative for addition, associative for addition, identity for multiplication, and commutative for multiplication for single-digit whole numbers [e.g., 3 × 4 = 4 × 3]) **to solve problems and to simplify computations involving whole numbers**.	M:N&O:4:8 **Applies properties of numbers** (odd, even, multiplicative property of zero, and remainders) and **field properties** (commutative, associative, and identity) **to solve problems and to simplify computations**.	M:N&O:5:8 **Applies properties of numbers** (odd, even, and divisibility) and **field properties** (commutative, associative, identity, and distributive) **to solve problems and to simplify computations**.

New Hampshire Curriculum Framework Mathematics

Number and Operations		
Grade 6	**Grade 7**	**Grade 8**
M:N&O:6:1 **Demonstrates conceptual understanding of rational numbers with respect to** ratios (comparison of two whole numbers by division a/b, $a : b$, and $a \div b$, where $b \neq 0$); and rates (e.g., a out of b, 25%) **using models, explanations, or other representations**.	M:N&O:7:1 **Demonstrates conceptual understanding of rational numbers with respect to** square roots of perfect squares, rates, and proportional reasoning. M:N&O:7:1 **Demonstrates conceptual understanding of rational numbers with respect to** percents as a means of comparing the same or different parts of the whole when the wholes vary in magnitude (e.g., 8 girls in a classroom of 16 students compared to 8 girls in a classroom of 20 students, or 20% of 400 compared to 50% of 100); and percents as a way of expressing multiples of a number (e.g., 200% of 50) **using models, explanations, or other representations**.	M:N&O:8:1 **Demonstrates conceptual understanding of rational numbers with respect to** absolute values, perfect square and cube roots, and percents as a way of describing change (percent increase and decrease) **using explanations, models, or other representations**.
M:N&O:6:2 **Demonstrates understanding of the relative magnitude of numbers** by ordering or comparing numbers with whole number bases and whole number exponents (e.g.,3^3, 4^3), integers, or rational numbers within and across number formats (fractions, decimals, or whole number percents from 1–100) using number lines or equality and inequality symbols.	M:N&O:7:2 **Demonstrates understanding of the relative magnitude of numbers** by ordering, comparing, or identifying equivalent rational numbers across number formats, numbers with whole number bases and whole number exponents (e.g., 3^3, 4^3), integers, absolute values, or numbers represented in scientific notation using number lines or equality and inequality symbols.	M(N&O):8:2 **Demonstrates understanding of the relative magnitude of numbers** by ordering or comparing rational numbers, common irrational numbers (e.g., $\sqrt{2}$, π), numbers with whole number or fractional bases and whole number exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality
M:N&O:6:3 **Demonstrates conceptual understanding of mathematical operations** by adding and subtracting positive fractions and integers; and multiplying and dividing fractions and decimals. M:N&O:6:3 **Demonstrates conceptual understanding of mathematical operations** by describing or illustrating the meaning of a power by representing the relationship between the base (whole number) and the exponent (whole number) (e.g.,3^3, 4^3); and the effect on the magnitude of a whole number when multiplying or dividing it by a whole number, decimal, or fraction.	M:N&O:7:3 **Demonstrates conceptual understanding of operations** with integers and whole number exponents (where the base is a whole number) using models, diagrams, or explanations.	M:N&O:8:3 No standard at this grade

New Hampshire Curriculum Framework Mathematics

Number and Operations		
Grade 6	**Grade 7**	**Grade 8**
M:N&O:6:4 **Accurately solves problems involving** single or multiple operations on fractions (proper, improper, and mixed), or decimals; and addition or subtraction of integers; percent of a whole; or problems involving greatest common factor or least common multiple. (IMPORTANT: *Applies the conventions of order of operations with and without parentheses.*)	M:N&O:7:4 **Accurately solves problems involving** the addition or subtraction of integers, raising numbers to whole number powers, and determining square roots of perfect square numbers and non-perfect square numbers. M:N&O:7:4 **Accurately solves problems involving** proportional reasoning; percents involving discounts, tax, or tips; and rates. (IMPORTANT: *Applies the conventions of order of operations including parentheses, brackets, or exponents.*)	M:N&O:8:4 **Accurately solves problems involving** proportional reasoning (percent increase or decrease, interest rates, markups, or rates); multiplication or division of integers; and squares, cubes, and taking square or cube roots. (IMPORTANT: *Applies the conventions of order of operations.*)
M:N&O:6:5 No standard at this grade	M:N&O:7:5 No standard at this grade	M:N&O:8:5 No standard at this grade
M:N&O:6:6 **Uses a variety of mental computation strategies to solve problems** (e.g., using compatible numbers, applying properties of operations, using mental imagery, using patterns) and to **determine the reasonableness of answers**; and **mentally calculates** change back from \$5.00, \$10.00, \$20.00, \$50.00, and \$100.00; multiplies a two-digit whole number by a one-digit number whole number (e.g., 45 × 5), two-digit whole numbers that are multiples of ten (e.g., 50 × 60), a three-digit whole number that is a multiple of 100 by a two- or three-digit number which is a multiple of 10 or 100, respectively (e.g., 400 × 50, 400 × 600); divides 3- and 4-digit multiples of powers of ten by their compatible factors (e.g., 360 ÷ 6; 360 ÷ 60; 3600 ÷ 6; 3600 ÷ 60; 3600 ÷ 600; 360 ÷ 12; 360 ÷ 120; 3600 ÷ 12; 3600 ÷ 120; 3600 ÷ 1200); and determines the part of a whole number using benchmark percents (1%, 10%, 25%, 50%, and 75%). (IMPORTANT: *The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:7:6 **Uses a variety of mental computation strategies to solve problems** (e.g., using compatible numbers, applying properties of operations, using mental imagery, using patterns) and to **determine the reasonableness of answers**; and **mentally calculates** benchmark perfect squares and related square roots (e.g., 1^2, 2^2, …,12^2, 15^2, 20^2, 25^2, 100^2, 1000^2); determines the part of a number using benchmark percents and related fractions (1%, 10%, 25%, $33\frac{1}{3}\%$, 50%, $66\frac{2}{3}\%$, 75%, and 100%) (e.g., 25% of 16; $33\frac{1}{3}\%$ of 330). (IMPORTANT: *The intent of this GSE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:8:6 **Uses a variety of mental computation strategies to solve problems** (e.g., using compatible numbers, applying properties of operations, using mental imagery, using patterns) and to **determine the reasonableness of answers**; and **mentally calculates** benchmark perfect squares and related square roots (e.g., 1^2, 2^2, … , 12^2, 15^2, 20^2, 25^2, 100^2, 1000^2); determines the part of a number using benchmark percents and related fractions (1%, 10%, 25%, $33\frac{1}{3}\%$, 50%, $66\frac{2}{3}\%$, 75%, and 100%) (e.g., 25% of 16; $33\frac{1}{3}\%$ of 330). (IMPORTANT: *The intent of this GSE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)

New Hampshire Curriculum Framework Mathematics

Number and Operations		
Grade 6	**Grade 7**	**Grade 8**
M:N&O:6:7 **Makes estimates** in a given situation by identifying when estimation is appropriate, selecting the appropriate method of estimation, determining the level of accuracy needed given the situation, analyzing the effect of the estimation method on the accuracy of results, and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:7:7 **Makes estimates** in a given situation (including tips, discounts, and tax) by identifying when estimation is appropriate, selecting the appropriate method of estimation, determining the level of accuracy needed given the situation, analyzing the effect of the estimation method on the accuracy of results, and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:8:7 **Makes estimates** in a given situation (including tips, discounts, tax, and the value of a non-perfect square root as between two whole numbers) by identifying when estimation is appropriate, selecting the appropriate method of estimation; determining the level of accuracy needed given the situation; analyzing the effect of the estimation method on the accuracy of results; and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)
M:N&O:6:8 **Applies properties of numbers** (odd, even, positive, negative, remainders, divisibility, and prime factorization) and **field properties** (commutative, associative, identity [including the multiplicative property of one, e.g., 1 = 2/2 and 2/2 × ¾ = 6/8, so ¾ = 6/8], distributive, and additive inverses) **to solve problems and to simplify computations**.	M:N&O:7:8 **Applies properties of numbers** (odd, even, positive, negative, remainders, divisibility, and prime factorization) and **field properties** (commutative, associative, identity, distributive, inverses) **to solve problems and to simplify computations**, and **demonstrates conceptual understanding of field properties** as they apply to subsets of the real numbers (e.g., the set of whole numbers does not have additive inverses, the set of integers does not have multiplicative inverses).	M:N&O:8:8 **Applies properties of numbers** (odd, even, positive, negative, remainders, divisibility, and prime factorization) and **field properties** (commutative, associative, identity [including the multiplicative property of one, e.g., $2^0 \times 2^3 = 2^{0+3} = 2^3$, so $2^0 = 1$], distributive, inverses) **to solve problems and to simplify computations**, and **demonstrates conceptual understanding of field properties** as they apply to subsets of real numbers when addition and multiplication are not defined in the traditional ways (e.g., If $a \Delta b = a + b - 1$, is Δ a commutative operation?)

New Hampshire Curriculum Framework Mathematics

Geometry and Measurement		
Purpose: Geometry and the related area of measurement help students represent, describe, and make sense of the world in which they live. Geometry is also a natural place for students to develop their reasoning and justification skills. We live in a three-dimensional world. To interpret, understand, and appreciate that world, students need to develop an understanding of space. In addition, success in mathematics depends, in part, on the development of spatial abilities. Spatial skills include making and interpreting drawings, forming mental images, and visualizing changes. Measurement is the process of assigning a numerical value to an attribute of an object. The study of measurement provides students with techniques and tools they will need to describe and analyze their world. It also provides an opportunity to make connections within mathematics and between mathematics and other curricular areas. High school students must develop more mature insights into the essential role of measurement as a link between the abstractness of mathematics and the concreteness of the real-world. In both areas, geometry and measurement, students need to investigate, experiment, and explore geometric properties using both technology and hands-on materials.		
Grade K	**Grade 1**	**Grade 2**
M:G&M:K:1 **Uses properties, attributes, composition, or decomposition to sort or classify** polygons (triangles, squares, rectangles, rhombi, trapezoids, and hexagons) or objects by using one non-measurable or measurable attribute; and recognizes, names, and builds polygons and circles in the environment.	M:G&M:1:1 **Uses properties, attributes, composition, or decomposition to sort or classify polygons** (triangles, squares, rectangles, rhombi, trapezoids, and hexagons) or objects by a combination of two non-measurable or measurable attributes; and recognizes, names, builds, and draws polygons and circles in the environment.	M:G&M:2:1 **Uses properties, attributes, composition, or decomposition to sort or classify** polygons or objects by a combination of two or more non-measurable or measurable attributes.
M:G&M:K:2 No standard at this grade	M:G&M:1:2 No standard at this grade	M:G&M:2:2 No standard at this grade
M:G&M:K:3 No standard at this grade	M:G&M:1:3 **Given an example of a three-dimensional geometric shape** (rectangular prisms, cylinders, or spheres) finds examples of objects in the environment that are of the same geometric shape (e.g., show a wooden cylinder and students identify common objects of the same shape).	M:G&M:2:3 No standard at this grade
M:G&M:K:4 No standard at this grade	M:G&M:1:4 **Demonstrates conceptual understanding of congruency** by making mirror images and creating shapes that have line symmetry.	M:G&M:2:4 **Demonstrates conceptual understanding of congruency** by composing and decomposing two-dimensional objects using models or explanations (e.g., using triangular pattern blocks to construct a figure congruent to the hexagonal pattern block); and uses line symmetry to demonstrate congruent parts within a shape.
M:G&M:K:5 No standard at this grade	M:G&M:1:5 No standard at this grade	M:G&M:2:5 No standard at this grade
M:G&M:K:6 No standard at this grade	M:G&M:1:6 **Demonstrates conceptual understanding of the length/height of a two-dimensional object** using non-standard units (e.g. comparing objects to trains of small cubes, using iterations of a small unit to measure an object).	M:G&M:2:6 **Demonstrates conceptual understanding of perimeter and area** by using models or manipulatives to surround and cover polygons.

New Hampshire Curriculum Framework Mathematics

Geometry and Measurement		
Grade K	**Grade 1**	**Grade 2**
M:G&M:K:7 **Demonstrates conceptual understanding of measurable attributes** using comparative language to describe and compare attributes of objects (length [longer, shorter], height [taller, shorter], weight [heavier, lighter], temperature [warmer, cooler], and capacity [more, less]); and compares objects visually and with direct comparison.	M:G&M:1:7 **Demonstrates conceptual understanding of measurable attributes** using comparative language to describe and compare attributes of objects (length [longer, shorter], height [taller, shorter], weight [heavier, lighter], temperature [warmer, cooler], and capacity [more, less]); compares objects visually, with direct comparison, and using non-standard units.	M:G&M:2:7 **Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands. Benchmarks in Appendix B.
M:G&M:K:8 **Determines elapsed and accrued time** as it relates to calendar patterns (days of the week, yesterday, today, and tomorrow), the sequence of events in a day; and identifies a clock and calendar as measurement tools (days of week, months of the year).	M:G&M:1:8 **Determines elapsed and accrued time** as it relates to calendar patterns (days of the week, months of the year), the sequence of events in a day; and recognizes an hour and "on the ½ hour".	M:G&M:2:8 No standard at this grade
M:G&M:K:9 **Demonstrates understanding of spatial relationships using location and position** by using positional words to locate and describe where an object is found in the environment.	M:G&M:1:9 **Demonstrates understanding of spatial relationships using location and position** by using positional words (e.g., close by, on the right, underneath, above, beyond) to describe one location in reference to another on a map, in a diagram, and in the environment.	M:G&M:2:9 **Demonstrates understanding of spatial relationships using location and position** by using positional language in two- and three-dimensional situations to describe and interpret relative positions (e.g., above the surface of the desk, below the triangle on the paper); and creates and interprets simple maps and names locations on simple coordinate grids.

New Hampshire Curriculum Framework Mathematics

Geometry and Measurement		
Grade 3	**Grade 4**	**Grade 5**
M:G&M:3:1 **Uses properties or attributes of angles** (number of angles) **or sides** (number of sides or length of sides) or composition or decomposition of shapes **to identify, describe, or distinguish among** triangles, squares, rectangles, rhombi, trapezoids, hexagons, or circles.	M:G&M:4:1 **Uses properties or attributes of angles** (number of angles) **or sides** (number of sides, length of sides, parallelism, or perpendicularity) **to identify, describe, or distinguish among** triangles, squares, rectangles, rhombi, trapezoids, hexagons, or octagons; or classify angles relative to 90° as more than, less than, or equal to.	M:G&M:5:1 **Uses properties or attributes of angles** (right, acute, or obtuse) **or sides** (number of congruent sides, parallelism, or perpendicularity) **to identify, describe, classify, or distinguish among** different types of triangles (right, acute, obtuse, equiangular, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).
M:G&M:3:2 No standard at this grade	M:G&M:4:2 No standard at this grade	M:G&M:5:2 No standard at this grade
M:G&M:3:3 No standard at this grade	M:G&M:4:3 **Uses properties or attributes** (shape of bases or number of lateral faces) **to identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, or spheres).	M:G&M:5:3 **Uses properties or attributes** (shape of bases, number of lateral faces, or number of bases) **to identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones).
M:G&M:3:4 **Demonstrates conceptual understanding of congruency** by matching congruent figures using reflections, translations, and rotations (flips, slides, and turns) (e.g., recognizing when pentominoes are reflections, translations and rotations of each other); composing and decomposing two- and three-dimensional objects using models or explanations (e.g., Given a cube, students use blocks to construct a congruent cube.); and by using line symmetry to demonstrate congruent parts within a shape.	M:G&M:4.4 **Demonstrates conceptual understanding of congruency** by matching congruent figures using reflections, translations, or rotations (flips, slides, or turns), or as the result of composing or decomposing shapes using models or explanations.	M:G&M:5:4 No standard at this grade
M:G&M:3:5 **Demonstrates conceptual understanding of similarity** by identifying similar shapes.	M:G&M:4:5 **Demonstrates conceptual understanding of similarity** by applying scales on maps, or applying characteristics of similar figures (same shape but not necessarily the same size) to identify similar figures, or to solve problems involving similar figures. Describes relationships using models or[sc] explanations.	M:G&M:5:5 **Demonstrates conceptual understanding of similarity** by describing the proportional effect on the linear dimensions of triangles and rectangles when scaling up or down while preserving angle measures, or by solving related problems (including applying scales on maps). Describes effects using models or[sc] explanations.

New Hampshire Curriculum Framework Mathematics

Geometry and Measurement		
Grade 3	**Grade 4**	**Grade 5**
M:G&M:3:6 **Demonstrates conceptual understanding of perimeter of** polygons, and **the area of** rectangles on grids using a variety of models or manipulatives. Expresses all measures using appropriate units.	M:G&M:4:6 **Demonstrates conceptual understanding of perimeter of** polygons, and **the area of** rectangles, polygons or irregular shapes on grids using a variety of models, manipulatives, or formulas. Expresses all measures using appropriate units.	M:G&M:5:6 **Demonstrates conceptual understanding of perimeter** of polygons, and **the area of** rectangles or right triangles through models, manipulatives, or formulas, the area of polygons or irregular figures on grids, and **volume of** rectangular prisms (cubes) using a variety of models, manipulatives, or formulas. Expresses all measures using appropriate units.
M:G&M:3:7 **Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands. Benchmarks in Appendix B.	M:G&M:4:7 **Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands. Benchmarks in Appendix B.	M:G&M:5:7 **Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands. Benchmarks in Appendix B.
M:G&M:3:8 No standard at this grade	M:G&M:4:8 No standard at this grade	M:G&M:5:8 No standard at this grade
M:G&M:3:9 **Demonstrates understanding of spatial relationships using location and position** by interpreting and giving directions from one location to another (e.g., classroom to the gym, from school to home) using positional words; and between locations on a map or coordinate grid (first quadrant) using positional words or compass directions.	M:G&M:4:9 **Demonstrates understanding of spatial relationships using location and position** by interpreting and giving directions between locations on a map or coordinate grid (first quadrant); plotting points in the first quadrant in context (e.g., games, mapping); and finding the horizontal and vertical distances between points on a coordinate grid in the first quadrant.	M:G&M:5:9 **Demonstrates understanding of spatial relationships using location and position** by interpreting and giving directions between locations on a map or coordinate grid (all four quadrants); plotting points in four quadrants in context (e.g., games, mapping, identifying the vertices of polygons as they are reflected, rotated, and translated); and determining horizontal and vertical distances between points on a coordinate grid in the first quadrant.
M:G&M:3:10 **Demonstrates conceptual understanding of spatial reasoning and visualization** by copying, comparing, and drawing models of triangles, squares, rectangles, rhombi, trapezoids, hexagons, and circles; and builds models of rectangular prisms from three-dimensional representations.	M:G&M:4:10 **Demonstrates conceptual understanding of spatial reasoning and visualization** by copying, comparing, and drawing models of triangles, squares, rectangles, rhombi, trapezoids, hexagons, octagons, and circles; and builds models of rectangular prisms from two- or three-dimensional representations.	M:G&M:5:10 **Demonstrates conceptual understanding of spatial reasoning and visualization** by building models of rectangular and triangular prisms, cones, cylinders, and pyramids from two- or three-dimensional representations.

New Hampshire Curriculum Framework Mathematics

Geometry and Measurement		
Grade 6	**Grade 7**	**Grade 8**
M:G&M:6:1 **Uses properties or attributes of angles** (right, acute, or obtuse) **or sides** (number of congruent sides, parallelism, or perpendicularity) **to identify, describe, classify, or distinguish** among different types of triangles (right, acute, obtuse, equiangular, scalene, isosceles, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).	M:G&M:7:1 **Uses properties of angle** relationships resulting from two or three intersecting lines (adjacent angles, vertical angles, straight angles, or angle relationships formed by two non-parallel lines cut by a transversal), or two parallel lines cut by a transversal to solve problems.	M:G&M:8:1 No standard at this grade
M:G&M:6:2 No standard at this grade	M:G&M:7:2 **Applies theorems or relationships** (triangle inequality or sum of the measures of interior angles of regular polygons) to solve problems.	M:G&M:8:2 **Applies the Pythagorean Theorem** to find a missing side of a right triangle, or in problem solving situations.
M:G&M:6:3 **Uses properties or attributes** (shape of bases, number of lateral faces, number of bases, number of edges, or number of vertices) **to identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones).	M:G&M:7:3 No standard at this grade	M:G&M:8:3 No standard at this grade
M:G&M:6:4 **Demonstrates conceptual understanding of congruency** by predicting and describing the transformational steps (reflections, translations, and rotations) needed to show congruence (including the degree of rotation) and as the result of composing and decomposing two- and three-dimensional objects using models or explanations; and using line and rotational symmetry to demonstrate congruent parts within a shape.	M:G&M:7:4 **Applies the concepts of congruency** by solving problems on a coordinate plane involving reflections, translations, or rotations.	M:G&M:8:4 No standard at this grade

New Hampshire Curriculum Framework Mathematics

Geometry and Measurement		
Grade 6	**Grade 7**	**Grade 8**
M:G&M:6:5 **Demonstrates conceptual understanding of similarity** by describing the proportional effect on the linear dimensions of polygons or circles when scaling up or down while preserving the angles of polygons, or by solving related problems (including applying scales on maps). Describes effects using models or[sc] explanations.	M:G&M:7:5 **Applies concepts of similarity** by solving problems involving scaling up or down and their impact on angle measures, linear dimensions and areas of polygons, and circles when the linear dimensions are multiplied by a constant factor. Describes effects using models or[sc] explanations.	M:G&M:8:5 **Applies concepts of similarity** to determine the impact of scaling on the volume or surface area of three-dimensional figures when linear dimensions are multiplied by a constant factor; to determine the length of sides of similar triangles, or to solve problems involving growth and rate.
M:G&M:6:6 **Demonstrates conceptual understanding of perimeter** of polygons, **the area of** quadrilaterals or triangles, and **the volume of** rectangular prisms by using models, formulas, or by solving problems; and **demonstrates understanding of the relationships of circle measures** (radius to diameter and diameter to circumference) by solving related problems. Expresses all measures using appropriate units.	M:G&M:7:6 **Demonstrates conceptual understanding of the area** of circles or the area or perimeter of composite figures (quadrilaterals, triangles, or parts of circles), and the **surface area of** rectangular prisms, **or volume of** rectangular prisms, triangular prisms, or cylinders using models, formulas, or by solving related problems. Expresses all measures using appropriate units.	M:G&M:8:6 **Demonstrates conceptual understanding of surface area or volume by solving problems involving surface area and volume** of rectangular prisms, triangular prisms, cylinders, pyramids, or cones. Expresses all measures using appropriate units.
M:G&M:6:7 **Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands. Benchmarks in Appendix B.	M:G&M:7:7 No standard at this grade	M:G&M:8:7 No standard at this grade

New Hampshire Curriculum Framework Mathematics

Geometry and Measurement		
Grade 6	**Grade 7**	**Grade 8**
M:G&M:6:8 No standard at this grade	M:G&M:7:8 No standard at this grade	M:G&M:8:8 No standard at this grade
M:G&M:6:9 No standard at this grade	M:G&M:7:9 No standard at this grade	M:G&M:8:9 No standard at this grade
M:G&M:6:10 No standard at this grade	M:G&M:7:10 **Demonstrates conceptual understanding of spatial reasoning and visualization** by sketching three-dimensional solids; and draws nets of rectangular and triangular prisms, cylinders, and pyramids and uses the nets as a technique for finding surface area.	M:G&M:8:10 No standard at this grade

New Hampshire Curriculum Framework Mathematics

Functions and Algebra		
Purpose: Algebra is the language through which much of mathematics is communicated. Students in Kindergarten begin to explore algebraic concepts using informal representations (e.g., words, physical models, tables, graphs). In later years students progress to more abstract representations. The study of patterns is one of the central themes of algebraic thinking and leads to an understanding of relations and functions. Students at all grade-levels should recognize, describe, and generalize patterns and build mathematical models to describe, interpret, and predict the behavior of real-world phenomenon. Algebraic processes are important tools that students can use throughout their lives.		
Grade K	**Grade 1**	**Grade 2**
M:F&A:K:1 **I Identifies and extends to specific cases a variety of patterns** (sequences of shapes, sounds, movement, colors, and letters) by extending the pattern to the next one, two or three elements, or by translating AB patterns across formats (e.g., an abb pattern can be represented as snap, clap, clap or red, yellow, yellow) or by identifying number patterns in the environment.	M:F&A:1:1 **Identifies and extends to specific cases a variety of patterns** (repeating and growing [numeric and non-numeric]) represented in models, tables, or sequences by extending the pattern to the next one, two, or three elements, by finding a missing element (e.g., 2, 4, 6, ___, 10), or by translating repeating patterns across formats (e.g., an abb pattern can be represented as snap, clap, clap; or red, yellow, yellow; or 1, 2, 2).	M:F&A:2:1 **Identifies and extends to specific cases a variety of patterns** (linear and non-numeric) represented in models, tables, or sequences by extending the pattern to the next element, or finding a missing element (e.g., 2, 4, 6, ___, 10).
M:F&A:K:2 No standard at this grade	M:F&A:1:2 No standard at this grade	M:F&A:2:2 No standard at this grade
M:F&A:K:3 No standard at this grade	M:F&A:1:3 No standard at this grade	M:F&A:2:3 No standard at this grade
M:F&A:K:4 No standard at this grade	M:F&A:1:4 **Demonstrates conceptual understanding of equality** by finding the value that will make an open sentence true (e.g., $2 + \square = 7$) using models, verbal explanations, or written equations. (limited to one operation and limited to use addition or subtraction)	M:F&A:2:4 **Demonstrates conceptual understanding of equality** by finding the value that will make an open sentence true (e.g., $2 + \square = 7$). (limited to one operation and limited to use addition or subtraction)

New Hampshire Curriculum Framework Mathematics

Functions and Algebra		
Grade 3	**Grade 4**	**Grade 5**
M:F&A:3:1 **Identifies and extends to specific cases a variety of patterns** (linear and non-numeric) represented in models, tables, or sequences by extending the pattern to the next one, two, or three elements, or finding missing elements.	M:F&A:4:1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables or sequences; and writes a rule in words or[sc] symbols to find the next case.	M:F&A:5:1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, or in problem situations; and writes a rule in words or[sc] symbols for finding specific cases of a linear relationship.
M:F&A:3:2 No standard at this grade	M:F&A:4:2 **Demonstrates conceptual understanding of linear relationships** ($y = kx$) **as a constant rate of change** by identifying, describing, or comparing situations that represent constant rates of change.	M:F&A:5:2 **Demonstrates conceptual understanding of linear relationships** ($y = kx$) **as a constant rate of change** by identifying, describing, or comparing situations that represent constant rates of change (e.g., tell a story given a line graph about a trip).
M:F&A:3:3 No standard at this grade	M:F&A:4:3 **Demonstrates conceptual understanding of algebraic expressions** by using letters or symbols to represent unknown quantities to write simple linear algebraic expressions involving any one of the four operations; or by evaluating simple linear algebraic expressions using whole numbers.	M:F&A:5:3 **Demonstrates conceptual understanding of algebraic expressions** by using letters to represent unknown quantities to write linear algebraic expressions involving any two of the four operations; or by evaluating linear algebraic expressions using whole numbers.
M:F&A:3:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions; or by finding the value that will make an open sentence true (e.g., $2 + \square = 7$). (limited to one operation and limited to use addition, subtraction, or multiplication)	M:F&A:4:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions, by simplifying numerical expressions where left to right computations may be modified only by the use of parentheses [e.g., $14 - (2 \times 5)$] (expressions consistent with the parameters of M:F&A:4–3), and by solving one-step linear equations of the form $ax = c$, $x \pm b = c$, where a, b, and c are whole numbers with $a \neq 0$.	M:F&A:5:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions (expressions consistent with the parameters of M:F&A:5–3), by solving one-step linear equations of the form $ax = c$, $x \pm b = c$, or $x/a = c$, where a, b, and c are whole numbers with $a \neq 0$; or by determining which values of a replacement set make the equation (multi-step of the form $ax \pm b = c$ where a, b, and c are whole numbers with $a \neq 0$) a true statement (e.g., $2x + 3 = 11$, $\{x: x = 2, 3, 4, 5\}$).

New Hampshire Curriculum Framework Mathematics

Functions and Algebra		
Grade 6	**Grade 7**	**Grade 8**
M:F&A:6:1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; or writes a rule in words or symbols for finding specific cases of a linear relationship; or writes a rule in words or[sc] symbols for finding specific cases of a nonlinear relationship; and writes an expression or[sc] equation using words or[sc] symbols to express the **generalization** of a linear relationship (e.g., twice the term number plus 1 or[sc] $2n + 1$).	M:F&A:7:1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; **and generalizes** a linear relationship using words and symbols; generalizes a linear relationship to find a specific case; or writes an expression or[sc] equation using words or[sc] symbols to express the **generalization** of a nonlinear relationship.	M:F&A:8:1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; **and generalizes** a linear relationship (non-recursive explicit equation); generalizes a linear relationship to find a specific case; **generalizes** a nonlinear relationship using words or[sc] symbols; or **generalizes** a common nonlinear relationship to find a specific case.
M:F&A:6:2 **Demonstrates conceptual understanding of linear relationships** ($y = kx$; $y = mx + b$) **as a constant rate of change** by constructing or interpreting graphs of real occurrences and describing the slope of linear relationships (faster, slower, greater, or smaller) in a variety of problem situations; **and describes how change in the value of one variable relates to change in the value of a second variable** in problem situations with constant rates of change.	M:F&A:7:2 **Demonstrates conceptual understanding of linear relationships** ($y = kx$; $y = mx + b$) **as a constant rate of change** by solving problems involving the relationship between slope and rate of change, by describing the meaning of slope in concrete situations, or informally determining the slope of a line from a table or graph; **and distinguishes between constant and varying rates** of change in concrete situations represented in tables or graphs; **or describes how change in the value of one variable relates to change in the value of a second variable** in problem situations with constant rates of change.	M:F&A:8:2 **Demonstrates conceptual understanding of linear relationships** ($y = kx$; $y = mx + b$) **as a constant rate of change** by solving problems involving the relationship between slope and rate of change; informally and formally determining slopes and intercepts represented in graphs, tables, or problem situations; or describing the meaning of slope and intercept in context; **and distinguishes between linear relationships (constant rates of change) and nonlinear relationships (varying rates of change)** represented in tables, graphs, equations, or problem situations; or **describes how change in the value of one variable relates to change in the value of a second variable** in problem situations with constant and varying rates of change.

New Hampshire Curriculum Framework Mathematics

Functions and Algebra		
Grade 6	**Grade 7**	**Grade 8**
M:F&A:6:3 **Demonstrates conceptual understanding of algebraic expressions** by using letters to represent unknown quantities to write linear algebraic expressions involving any of the four operations and consistent with order of operations expected at this grade level; or by evaluating linear algebraic expressions (including those with more than one variable); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y = 3x - 2$).	M:F&A:7:3 **Demonstrates conceptual understanding of algebraic expressions** by using letters to represent unknown quantities to write algebraic expressions (including those with whole number exponents or more than one variable); or by evaluating algebraic expressions (including those with whole number exponents or more than one variable); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y = 5x^3 - 2$).	M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y = 7\sqrt{x} + 2x$).
M:F&A:6:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions (expressions consistent with the parameters of M:F&A:6–3), solving multi-step linear equations of the form $ax \pm b = c$, where a, b, and c are whole numbers with $a \neq 0$.	M:F&A:7:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving multi-step linear equations of the form $ax \pm b = c$ with $a \neq 0$, $ax \pm b = cx \pm d$ with $a, c \neq 0$, and $(x/a) \pm b = c$ with $a \neq 0$, where a, b, c and d are whole numbers; or by translating a problem-solving situation into an equation consistent with the parameters of the type of equations being solved for this grade level.	M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.

New Hampshire Curriculum Framework Mathematics

Data, Statistics, and Probability		
Purpose: Collecting, organizing, and displaying data, as well as interpreting and analyzing the information to make decisions and predictions, have become very important in our society. Statistical instruction should be carried out in a spirit of investigation and exploration so students can answer and formulate questions about data. Probability should be studied in familiar contexts. Students need to investigate fairness, chances of winning, and uncertainty. Technology should be used as a tool throughout the investigation process.		
Grade K	**Grade 1**	**Grade 2**
M:DSP:K:1 **Interprets a given representation created by the class** (models and tally charts) to answer questions related to the data, or to analyze the data to formulate conclusions using words, diagrams, or verbal/scribed responses to express answers. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:K:2.*)	M:DSP:1:1 **Interprets a given representation created by the class** (models, tally charts, pictographs with one-to-one correspondence, and tables) to answer questions related to the data, or to analyze the data to formulate conclusions using words, diagrams, or verbal/scribed responses to express answers. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:1:2.*)	M:DSP:2:1 **Interprets a given representation** (pictographs with one-to-one correspondence, line plots, tally charts, or tables) to answer questions related to the data, or to analyze the data to formulate conclusions. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:2:2.*)
M:DSP:K:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** more, less, or equal (e.g., Have there been more, less, or the same number of cloudy days compared to sunny days this week?).	M:DSP:1:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** more, less, or equal.	M:DSP:2:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** more, less, or equal.
M:DSP:K:3 No standard at this grade	M:DSP:1:3 No standard at this grade	M:DSP:2:3 No standard at this grade
M:DSP:K:4 No standard at this grade	M:DSP:1:4 No standard at this grade	M:DSP:2:4 **Uses counting techniques to solve problems** involving combinations using a variety of strategies (e.g., student diagrams, organized lists, tables, tree diagrams, or[sc] others); (e.g., How many ways can you make 50 cents using nickels, dimes, and quarters?)

New Hampshire Curriculum Framework Mathematics

Data, Statistics, and Probability		
Grade K	**Grade 1**	**Grade 2**
M:DSP:K:5 No standard at this grade	M:DSP:1:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, groups use experiments** to describes the likelihood or chance of an event (using "more likely," "less likely", or "equally likely").	M:DSP:2:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, uses experiments** to describe the likelihood or chance of an event using "more likely," "less likely," "equally likely," certain or impossible.
M:DSP:K:6 No standard at this grade	M:DSP:1:6 No standard at this grade	M:DSP:2:6 **In response to a teacher or student generated question or hypothesis, groups** decide the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested, and when appropriate makes predictions. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:2:2.*)

New Hampshire Curriculum Framework Mathematics

Data, Statistics, and Probability		
Grade 3	**Grade 4**	**Grade 5**
M:DSP:3:1 **Interprets a given representation** (line plots, tally charts, tables, or bar graphs) to answer questions related to the data, to analyze the data to formulate conclusions, or to make predictions. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:3:2.*)	M:DSP:4:1 **Interprets a given representation** (line plots, tables, bar graphs, pictographs, or circle graphs) to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:4:2.*)	M:DSP:5:1 **Interprets a given representation** (tables, bar graphs, circle graphs, or line graphs) to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:5:2.*)
M:DSP:3:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** most frequent (mode), least frequent, largest, or smallest.	M:DSP:4:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of central tendency (median or mode), or range.	M:DSP:5:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of central tendency (mean, median, or mode) or range to analyze situations, or to solve problems.
M:DSP:3:3 **Organizes and displays data** using tables, tally charts, and bar graphs, to answer questions related to the data, to analyze the data to formulate conclusions, to make predictions, or to solve problems.	M:DSP:4:3 **Organizes and displays data** using tables, line plots, bar graphs, and pictographs to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:4:2.*)	M:DSP:5:3 **Organizes and displays data** using tables, bar graphs, or line graphs to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems.
M:DSP:3:3 **Identifies or describes representations or elements of representations that best display a given set of data or situation**, consistent with the representations required in M:DSP:3:1. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:3:2.*)		M:DSP:5:3 **Identifies or describes representations or elements of representations that best display a given set of data or situation**, consistent with the representations required in M:DSP:5:1. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:5:2.*)

New Hampshire Curriculum Framework Mathematics

Data, Statistics, and Probability		
Grade 3	**Grade 4**	**Grade 5**
M:DSP:3:4 **Uses counting techniques to solve problems** involving combinations and simple permutations using a variety of strategies (e.g., student diagrams, organized lists, tables, tree diagrams, or[sc] others).	M:DSP:4:4 **Uses counting techniques to solve problems** in context involving combinations or simple permutations (e.g., Given a map – Determine the number of paths from point A to point B.) using a variety of strategies (e.g., organized lists, tables, tree diagrams, or[sc] others).	M:DSP:5:4 No standard at this grade
M:DSP:3:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, predicts** the likelihood of an event using "more likely," "less likely," "equally likely," certain, or impossible and tests the prediction through experiments; and determines if a game is fair.	M:DSP:4:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, predicts** the likelihood of an event as a part to whole relationship (e.g., two out of five, zero out of five, five out of five) and tests the prediction through experiments; and determines if a game is fair.	M:DSP:5:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, predicts** the likelihood of an event as a fraction and tests the prediction through experiments; and determines if a game is fair.
M:DSP:3:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the likelihood of the occurrence of an event (using "more likely", "less likely", or "equally likely").	M:DSP:4:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the theoretical probability of an event and expresses the result as part to whole (e.g., two out of five).	M:DSP:5.5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the experimental or theoretical probability of an event and expresses the result as a fraction.
M:DSP:3:6 **In response to a teacher or student generated question or hypothesis, groups** decide the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested, and when appropriate makes predictions. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:3:2.*)	M:DSP:4:6 **In response to a teacher or student generated question or hypothesis, groups** decide the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested, and when appropriate makes predictions; and asks new questions and makes connections to real world situations. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:4:2.*)	M:DSP:5:6 **In response to a teacher or student generated question or hypothesis** decides the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested, and when appropriate makes predictions; and asks new questions and makes connections to real world situations. (IMPORTANT: *Analyzes data consistent with concepts and skills in M;DSP:5:2.*)

New Hampshire Curriculum Framework Mathematics

Data, Statistics, and Probability		
Grade 6	**Grade 7**	**Grade 8**
M:DSP:6:1 **Interprets a given representation** (circle graphs, line graphs, or stem-and-leaf plots) to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:6:2.*)	M;DSP:7:1 **Interprets a given representation** (circle graphs, scatter plots that represent discrete linear relationships, or histograms) to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:7:2.*)	M:DSP:8:1 **Interprets a given representation** (line graphs, scatter plots, histograms, or box-and-whisker plots) to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:8:2.*)
M:DSP:6:2 **Analyzes patterns, trends or distributions in data in a variety of contexts by determining or using** measures of central tendency (mean, median, or mode) or dispersion (range) to analyze situations, or to solve problems.	M:DSP:7:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by solving problems using** measures of central tendency (mean, median, or mode), dispersion (range or variation), or outliers to analyze situations to determine their effect on mean, median, or mode; and evaluates the sample from which the statistics were developed (bias).	M:DSP:8:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, or estimated line of best fit to analyze situations, or to solve problems; and evaluates the sample from which the statistics were developed (bias, random, or non-random).
M:DSP:6:3 **Organizes and displays data** using tables, line graphs, or stem-and-leaf plots to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:6:2.*)	M:DSP:7:3 **Organizes and displays data** using tables, line graphs, scatter plots, and circle graphs to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. M:DSP:7:3 **Identifies or describes representations or elements of representations that best display a given set of data or situation**, consistent with the representations required in M:DSP:7:1. (IMPORTANT: *Analyzes* data *consistent with concepts and skills in M:DSP:6:2.*)	M:DSP:8:3 **Organizes and displays data using** scatter plots to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems; or identifies representations or elements of representations that best display a given set of data or situation, consistent with the representations required in M:DSP:8:1. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:8:2.*)

New Hampshire Curriculum Framework Mathematics

Data, Statistics, and Probability		
Grade 6	**Grade 7**	**Grade 8**
M:DSP:6:4 **Uses counting techniques to solve problems** in context involving combinations or simple permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or[sc] others).	M:DSP:7:4 **Uses counting techniques to solve problems** in context involving combinations or permutations (e.g., How many different ways can eight students place first, second, and third in a race?) using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or[sc] others).	M:DSP:8:4 **Uses counting techniques to solve problems** in context involving combinations or permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or[sc] others).
M:DSP:6:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, predicts** the theoretical probability of an event and tests the prediction through experiments and simulations; and designs fair games.	M:DSP:7:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, predicts** the theoretical probability of an event and tests the prediction through experiments and simulations; and compares and contrasts theoretical and experimental probabilities.	M:DSP:8:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the experimental or theoretical probability of an event in a problem-solving situation; and **predicts** the theoretical probability of an event and tests the prediction through experiments and simulations; and compares and contrasts theoretical and experimental probabilities.
M:DSP:6:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the experimental or theoretical probability of an event in a problem-solving situation.	M:DSP:7:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the experimental or theoretical probability of an event in a problem-solving situation.	
M:DSP:6:6 **In response to a teacher or student generated question or hypothesis** decides the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested, and when appropriate makes predictions; and asks new questions and makes connections to real world situations. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:6:2.*)	M:DSP:7:6 **In response to a teacher or student generated question or hypothesis** decides the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested while considering the limitations that could affect interpretations; and when appropriate makes predictions; and asks new questions and makes connections to real world situations. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:7:2.*)	M:DSP:8:6 **In response to a teacher or student generated question or hypothesis** decides the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested while considering the limitations that could affect interpretations; and when appropriate makes predictions; and asks new questions and makes connections to real world situations. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:8:2.*)

New Hampshire Curriculum Framework Mathematics

Since it is crucial that process standards (problem-solving, reasoning, proof, communication, connections, and representations) are not seen separate from content standards the process standards have been imbedded throughout the Number and Operations, Geometry and Measurement, Functions and Algebra, and Data, Statistics, and Probability strands (e.g., M:F&A:4:1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables or sequences; and writes a rule in words or[sc] symbols to find the next case.). This mirrors classroom instruction as in most classes, as students are learning content knowledge, instruction is also focusing on improving their abilities in problem solving, reasoning, and communication; furthermore, students are looking for and making appropriate connections, and they are able to understand and use multiple representations of mathematical ideas. Since it is crucial that students are strong in both content and process knowledge, we have included two local process strands. These process strands are in addition to the process standards that are embedded in the content standards and are included to help guide local curriculum, assessment, and instruction. The process standards have been separated by grade-spans (K–2, 3–5, 6–8, and 9–12). Each span should be thought of as building upon the skills and concepts in the previous span.

Problem Solving, Reasoning, and Proof

Purpose: Problem solving should serve as the organizing feature of the mathematics curriculum as well as other areas of study and be applied to everyday activities. Thus, problem solving approaches should be used to investigate and understand new mathematical content, with students working sometimes independently and sometimes in groups. Students should have many experiences in posing and solving problems from their world, from data that are meaningful to them, and from mathematical investigations. Students should build a positive disposition toward problem solving, including the confidence needed to explore unique problems and increasingly complex tasks.

K – 2	3 – 5	6 – 8
M:PRP:2:1 **Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content** and be able to: • Formulate and solve multi-step problems from everyday and mathematical situations. • Solve problems using a variety of strategies (e.g., working backwards, looking for patterns and relationships; guess and check; making tables, charts, or organized lists; solving a simpler version of a problem, drawing a diagram; or creating a model) • Verify and interpret results with respect to the original problem. • Determine if the solution of a problem is reasonable. • Solve problems using manipulatives, graphs, charts, diagrams, and calculators. • Demonstrate that a problem may be solved in more than one way. • Exhibit confidence in their ability to solve problems independently and in groups. • Display increasing perseverance, and persistence in problem solving.	M:PRP:5:1 **Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content** and be able to: • Determine the reasonableness of solutions to real-world problems. • Generalize solutions and apply strategies to new problem situations. • Add to the repertoire of problem-solving strategies (e.g., looking for similar problems) and use those strategies in more sophisticated ways. • Solve problems with multiple solutions, recognize when a problem has no solution, and recognize problems where more information is needed. • Translate results of a computation into solutions that fit the real-world problem (e.g., when a computation shows that one needs 3.2 gallons of paint to paint a room, how much paint do you buy?).	M:PRP:8:1 **Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content** and be able to: Use problem-solving strategies appropriately and effectively for a given situation. • Determine, collect and organize the relevant information needed to solve real-world problems. • Apply integrated problem-solving strategies to solve problems in the physical, natural, and social sciences and in pure mathematics. • Use technology when appropriate to solve problems. • Reflect on solutions and the problem-solving process for a given situation and refine strategies as needed.

New Hampshire Curriculum Framework Mathematics

Problem Solving, Reasoning, and Proof		
K – 2	**3 – 5**	**6 – 8**
M:PRP:2:2 **Students will use mathematical reasoning and proof** and be able to: • Use models, known facts, properties, and relationships to explain their thinking. • Justify solution processes and answers (e.g., "I chose this method to solve the problem because..."). • Draw conclusions using inductive reasoning. • Identify the missing information needed to find a solution to a given story problem. • Use patterns and relationships to analyze mathematical situations (e.g., count by fives).	M:PRP:5:2 **Students will use mathematical reasoning and proof** and be able to: • Draw conclusions and solve problems using elementary deductive reasoning and reasoning by analogy. • Make and defend conjectures and generalizations. • Use models, known facts, properties, and relationships to explain thinking and to justify answers and solution processes. • Recognize the pervasive use and power of reasoning as a part of mathematics.	M:PRP:8:2 **Students will use mathematical reasoning and proof** and be able to: • Draw logical conclusions and make generalizations using deductive and inductive reasoning. • Formulate, test, and justify mathematical conjectures and arguments. • Construct and determine the validity of a mathematical argument or a solution. • Apply mathematical reasoning skills in other disciplines.

New Hampshire Curriculum Framework Mathematics

Communication, Connections, and Representations		
Purpose: Reading, writing, talking, listening, and modeling provide students with the opportunity to develop deeper mathematical understanding and to integrate the language of mathematics into their world. Actively exploring, investigating, describing, and explaining mathematical ideas promote communication which leads to a greater comprehension of mathematical concepts. Representing ideas and connecting the representations to mathematics lies at the heart of understanding mathematics. Representations make mathematical ideas more concrete and available for reflection, and they help students recognize the common mathematical nature of different situations. Students can develop and deepen their understanding of mathematical concepts and relationships as they create, compare, and use various representations. Mathematical topics, ideas, and procedures must be connected to each other and to the students' everyday experiences, both in and out of school. In particular, mathematics must be connected to all other curriculum areas. Mathematical connections will help students become aware of the usefulness of mathematics, serve to bridge the concrete and the abstract, and enable deeper understanding of important ideas.		
K – 2	**3 – 5**	**6 – 8**
M:CCR:2:1 **Students will communicate their understanding of mathematics** and be able to: • Demonstrate mathematical communication through discussion, reading, writing, listening, and responding, individually and in groups. • Discuss relationships between everyday language and mathematical language and symbols (e.g., words that mean something different in mathematics and in everyday life). • Explain conclusions, thought processes, and strategies in problem-solving situations. • Discuss, illustrate, and write about mathematical concepts and relationships. • Draw pictures and use objects to illustrate mathematical concepts.	M:CCR:5:1 **Students will communicate their understanding of mathematics** and be able to: • Discuss mathematical ideas and write convincing arguments. • Understand, explain, analyze, and evaluate mathematical arguments and conclusions presented by others. • Ask clarifying and extending questions related to mathematics they have heard or read about. • Understand and appreciate the economy and power of mathematical symbolism and its role in the development of mathematics. • Demonstrate an understanding of mathematical concepts and relationships through a variety of methods (e.g., writing, graphing, charts, diagrams, number sentences, or symbols). • Use a variety of technologies (e.g., computers, calculators, video, probes) to represent and communicate mathematical ideas.	M:CCR:8:1 **Students will communicate their understanding of mathematics** and be able to: • Articulate ideas clearly and logically in both written and oral form. • Present, share, explain, and justify thinking with others and build upon the ideas of others to solve problems. • Use mathematical symbols and notation. • Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.

New Hampshire Curriculum Framework Mathematics

Communication, Connections, and Representations		
K – 2	**3 – 5**	**6 – 8**
M:CCR:2:2 **Students will create and use representations to communicate mathematical ideas and to solve problems** and be able to: • Create and use age level appropriate representations to organize, record, and communicate mathematical ideas (e.g., students should recognize the relationship among seven counters, seven tally marks, and the symbol 7). • Select, apply, and translate among mathematical representations to solve problems (e.g., representing fractions with circles, with geoboards, and with pattern blocks). • Link different representations. • Use representations to model and interpret physical, social, and mathematical phenomena. • Use conventional and self-generated (invented) representations and connect them. • Realize that any representation is subject to multiple interpretations (e.g., drawings and graphs can be read in a different way).	M:CCR:5:2 **Students will create and use representations to communicate mathematical ideas and to solve problems** and be able to: • Use physical models and diagrams to represent important mathematical ideas (e.g., multiplication). • Use appropriate representations to solve problems or to portray, clarify, or extend a mathematical idea. • Recognize equivalent representations of concepts and procedures and translate among them as appropriate (for example, understand how the addition of whole numbers, fractions, and decimals are related).	M:CCR:8:2 **Students will create and use representations to communicate mathematical ideas and to solve problems** and be able to: • Use models and technology to develop equivalent representations of the same mathematical concept. • Use and create representations to solve problems and organize their thoughts and ideas. • Convert between representations (e.g., a table of values, an equation, and a graph may all be representations of the same function).

New Hampshire Curriculum Framework Mathematics

Communication, Connections, and Representations		
K – 2	**3 – 5**	**6 – 8**
M:CCR:2:3 **Students will recognize, explore, and develop mathematical connections** and be able to: • Link conceptual and procedural knowledge (e.g., they will know that when they "regroup," they are simply changing the representation of the minuend, but not its value). • Recognize and use mathematics in other curriculum areas (e.g., science, social studies). • Recognize and use mathematics in their daily lives (e.g., graphs, tables, or maps). • Identify mathematical situations occurring in literature for children. • Identify examples of geometry in nature, art, and architecture.	M:CCR:5:3 **Students will recognize, explore, and develop mathematical connections** and be able to: • See mathematics as an integrated whole. • Recognize relationships among different topics in mathematics. • Recognize and use mathematics in other curriculum areas and in their daily lives. • Link concepts and procedures. • Use mathematical skills, concepts, and applications in other disciplines (e.g., graphs in social studies, patterns in art, or music and geometry in technology education).	M:CCR:8:3 **Students will recognize, explore, and develop mathematical connections** and be able to: • Connect new mathematical ideas to those already studied and build upon them. • Understand that many real-world applications require an understanding of mathematical concepts (e.g., personal finance, running a business, building a house, following a recipe, or sending a rocket to the moon). • Explain in oral and written form the relationships between a real-world problem and an appropriate mathematical model. • Explain in oral and written form the relationships among various mathematical concepts (e.g., the relationship between exponentiation and multiplication).

Appendix A: M:N&O:2:3

M:N&O:2:3 Demonstrates conceptual understanding of mathematical operations involving addition and subtraction of whole numbers by solving problems involving joining actions, separating actions, part-part whole relationships, and comparison situations. (See Appendix A.)

Classification of word problems: Researchers have identified four basic categories of addition and subtraction problems: problems with joining actions, separating actions, part-part whole relationships, and comparison situations. Table 1 contains some examples to illustrate the distinctions in the categories identified by the researchers, but there may be additional ways to express the same actions, relationships, or situations. For example, the following are additional ways0 to ask questions related to the "Join – Start Unknown" category.

Example 1: "I am thinking of a number that when you add 5 to it, the answer is 13. What number am I thinking of?"

Example 2: John puts a five-pound toy inside an empty wooden box. The box and toy together weigh 7 pounds. How much does the empty box weigh?

In summary, students should have experiences with problem solving in addition and subtraction across a variety of problem types. It is important to remember that any problem situation that fits the equations given and the category can be asked, not just problems as stated in Table 1.

"Teaching students to add and subtract involves providing students with an opportunity to explore a rich set of problems with different semantic structures and to develop a variety of strategies to quantify, represent, calculate, express, and justify results." (Gutstein, E., Romberg, 1995)

Table 1: Classification of Word Problems[1]

Join	(Result Unknown) Connie had 5 marbles. Juan gave her 8 more marbles. How many marbles does Connie have altogether? 5 + 8 = □	(Change unknown) Connie has 5 marbles. How many more marbles does she need to have 13 marbles altogether? 5 + □ = 13	(Start Unknown) Connie has some marbles. Juan gave her 5 more marbles. Now she has 13 marbles. How many marbles did Connie have to start with? □ + 5 = 13
Separate	(Result Unknown) Connie had 13 marbles. She gave 5 marbles to Juan. How many marbles does she have left? 13 – 5 = □	(Change unknown) Connie has 13 marbles. She gave some to Juan. Now she has 5 marbles left. How many marbles did Connie give Juan? 13 – □ = 5	(Start Unknown) Connie has some marbles. She gave 5 to Juan. Now she has 8 marbles left. How many marbles did Connie have to start with? □ – 5 = 8
Part-Part-Whole	(Whole Unknown) Connie has 5 red marbles and 8 blue marbles. How many marbles does Connie have? 5 + 8 = □	(Part Unknown) Connie has 13 marbles. All the marbles are either blue or red. Connie has 5 red marbles. How many blue marbles does Connie have? 13 – 5 = □	
Compare	(Difference Unknown) Connie has 13 marbles. Juan has 5 marbles. How many more marbles does Connie have than Juan? 13 – 5 = □	(Compare Quantity Unknown) Juan has 5 marbles. Connie has 8 more marbles than Juan. How many marbles does Connie have? 5 + 8 = □	(Referent Unknown) Connie has 13 marbles. She has 5 more marbles than Juan. How many marbles does Juan have? 13 – 5 = □

[1] Carpenter, Fennema, Peterson, Chiang, and Loef (1989) cited in Gutstein, E., Romberg, T., *Teaching Children to Add and Subtract*, Journal of Mathematical Behavior, 14, 283-324 (1995).

Appendix B: Measurement Benchmarks

The following is a list of the measurement benchmarks and equivalences that ***can be used*** in problems across the content strands at each grade level to address the expectations in M:G&M:X:7 for the New England Common Assessment Program[2].

M:G&M:X:7 **Uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands.

The type of measure (e.g., length, time, etc.), the unit (e.g., inches, feet, etc.), the degree of accuracy where appropriate (e.g., ½ inch); and equivalences (e.g., 12 inches in a foot) are identified for grades 2 – 8. In addition to measurement benchmarks identified below students will be expected to use the appropriate units when solving problems involving area, volume, surface area, conversions, and rates (e.g., miles per hour, price per pound, pounds per square inch) on the NECAP Assessment.

Measures	Grade 2	Grade 3	Grade 4
Length	**Unit (accuracy):** Inch (to whole inch); Foot (to whole inch); Centimeter (to whole centimeter); Meter (to whole centimeter) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter	**Unit (accuracy):** Inch (to 1/2 inch); Foot (to whole inch); Centimeter (to whole centimeter); Meter (to whole centimeter) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter	**Unit (accuracy):** Inch (to 1/4 inch); Foot; Centimeter (to 0.5 centimeter); Meter (to 0.5 centimeter); Yard; Mile (use in scale questions); Kilometer (use in scale questions) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter; 3 feet in 1 yard; 36 inches in 1 yard
Time	**Unit (accuracy):** Hour (to 15 minute interval) **Equivalencies:** 60 minutes in 1 hour	**Unit (accuracy):** Hour (to 5 minute interval); Day; Year **Equivalencies:** 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year	**Unit (accuracy):** Hour (to 5 minute interval); Day; Year **Equivalencies:** 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year; 60 seconds in 1 minute; 60 minutes in 1 hour
Temperature	**Unit (accuracy):** Degree (to 1 degree)	**Unit (accuracy):** C° and F° (to 1 degree)	**Unit (accuracy):** C° and F° (to 1 degree)
Capacity		**Units (accuracy):** Quart (to whole quart)	**Unit (accuracy):** Quart (to whole quart)
Mass		**Unit (accuracy):** Kilogram (to whole kilogram); Gram (to whole gram)	**Unit (accuracy):** Kilogram (to whole kilogram); Gram (to whole gram)
Weight		**Unit (accuracy):** Pound (to whole pound)	**Unit (accuracy):** Pound (to whole pound)

[2] Contractors will be asked to devise a system to measure the degree to which students use units of measures and make conversions consistently and appropriately when applicable to problems across content strands.

Measures	Grade 5	Grades 6 – 8
Length	**Units (accuracy):** Inch (to 1/8 inch); Foot; Centimeter (to 0.5 centimeter); Meter (to 0.5 centimeter); Yard; Mile (use in scale questions); Kilometer (use in scale questions) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter; 3 feet in 1 yard; 36 inches in 1 yard; 10 millimeters in 1 centimeter	**Units (accuracy):** Inch (to 1/16 inch); Foot; Centimeter (to 1/10 centimeter); Meter (to 1/100 meter); Yard; Mile (use in scale and rate questions); Kilometer (use in scale and rate questions) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter; 3 feet in 1 yard; 36 inches in 1 yard; 10 millimeters in 1 centimeter; 1000 millimeters in 1 meter
Time	**Unit (accuracy):** Hour (to 1 minute); Day; Year **Equivalencies:** 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year; 60 seconds in 1 minute; 60 minutes in 1 hour	**Unit (accuracy):** Hour (to 1 minute); Day; Year **Equivalencies:** 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year; 60 seconds in 1 minute; 60 minutes in 1 hour
Temperature	**Unit (accuracy):** C° and F° (to 1 degree)	**Unit (accuracy):** C° and F° (to 1 degree)
Capacity	**Unit (accuracy):** Quart (to 1 ounce); Gallon; Pint **Equivalencies:** 32 ounces in 1 quart; 4 quarts in 1 gallon; 2 pints in 1 quart	**Unit (accuracy):** Quarts (to 1 ounce); Gallon; Pint; Liter **Equivalencies:** 32 ounces in 1 quart; 4 quarts in 1 gallon; 2 pints in 1 quart; 1000 milliliters in 1 liter
Mass	**Unit (accuracy):** Kilogram; Gram (to whole gram)	**Unit (accuracy):** Kilogram; Gram (to 1/10 gram)
Weight	**Unit (accuracy):** Pound (to 1 ounce) **Equivalencies:** 16 ounces in 1 pound	**Unit (accuracy):** Pound (to 1 ounce) **Equivalencies:** 16 ounces in 1 pound
Angles and Rotation	**Unit (accuracy):** Degree (to 2 degrees)	**Unit (accuracy):** Degree (to 2 degrees) **Equivalencies:** 360° in 1 circle; 90° in 1 right angle

About the Mathematics GSEs

This set of New Hampshire Grade-Span Expectations (GSEs) for high school includes expectations that will be assessed on the state-level assessment and others that will be a local curriculum and assessment option (i.e., guidance for local curriculum and assessment but not assessed on the state assessment). Those GSEs that will be assessed on the state assessment are boxed with bold outlines. Furthermore, these assessment GSEs are common across NH, RI, and VT and will be assessed through the New England Common Assessment Program (NECAP). **The assessment GSEs in this document can be interpreted as describing expectations for the end of grade 10, or the beginning of grade 11.** The local content GSEs were developed in collaboration with the Rhode Island Department of Education. As you review the New Hampshire GSEs in Mathematics the following are important to understand.

1) The grade 8 Grade-Level Expectations (GLEs) are included in this document in order to see how the concepts and skills develop from grade 8 to high school.
2) The GSEs and GLEs are organized into four content strands (Number and Operations; Functions and Algebra; Data, Statistics, and Probability; Geometry and Measurement) and two process strands (Problem-Solving, Reasoning, and Proof; Communications, Representations, and Connections).
3) Since it is crucial that process standards (problem-solving, reasoning, proof, communication, connections, and representations) are not seen as completely separate from content standards, the process standards have been imbedded throughout the content strands (e.g., M:F&A:10:1 **Identifies, extends, and generalizes a variety of patterns** (linear and nonlinear) represented by models, tables, sequences, or graphs in problem solving situations). This mirrors classroom instruction in most classes. As students are learning content knowledge, instruction is focusing on improving their abilities in problem solving, reasoning, and communication. Students should be looking for and making appropriate connections, and should be able to understand and use multiple representations of mathematical ideas. Since it is crucial that students are strong in both content and process knowledge, we have included two local process strands following the content strands. These process strands are in addition to the process standards that are embedded in the content standards and are included to help guide local curriculum, assessment, and instruction. The process standards have been separated by grade-spans (K–2, 3–5, 6–8, and 9–12). The 6–8 and 9–12 spans have been included in this section of the document. Each grade span should be thought of as building upon the skills and concepts in the previous grade span.
4) Each GSE and GLE includes a **bolded** statement called the "stem" which is the same or similar across the grades for a given GSE or GLE. Each stem is meant to communicate the main curricular and instructional focus of the GSE or GLE across the grades.
5) The unbolded text within a GSE or GLE indicates the expectations for that given grade-level or grade-span.
6) The <u>underlined text</u> at grade 8 indicates the concepts and skills that are new to grade 8 from grade 7. (Note: Sometimes nothing is underlined within a GLE. In these situations examine other GLEs across the strand to identify the differences or check the Depth of Knowledge table in the test specifications.)
7) Each GSE is coded for the content strand, grade level, and the GSE "stem" number (e.g., M:F&A:X:3 where X = 10, HS, or AM: The "M" stands for mathematics, the "F&A" stands for the Functions and Algebra strand, the "10" indicates that the standard is a state assessment standard for the end of grade 10 or beginning of grade 11, "HS" indicates a local high school expectation for all students, an "AM" indicates a local expectation for students preparing for advanced mathematics courses (e.g., calculus), and the "3" stands for stem 3 or the 3rd big idea in the Functions and Algebra strand). See the diagram on page 45.
8) Unless otherwise specified the number parameters defined in the Number and Operations strand for a particular grade-level or grade-span apply to all GLEs at that grade-level or all GSEs at that grade-span.
9) All the concepts and skills identified in the assessment GSEs are fair game for assessment purposes. However, while all parts of a GSE may be assessed each year, it is more likely that all parts of a GSE will be assessed over several years.
10) In some places you will see "or^{sc}" ("sc" stands for "student choice"). While, in general, students have choices as to the strategies that they use to solve problems, "or^{sc}" was used to explicitly state to the testing contractor that a particular strategy could not be required. For example, as in GSE M:DSP:10:4: "…using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or^{sc} others)."
11) While the use of dynamic software will not be assessed on the state-level assessment at this time, it is expected that students at the high school level would receive ample opportunity to solve problems using dynamic software at the local level.

Reading the Mathematics GSEs

STEM – Bolded statement communicating main curricular focus and is the same or similar across grades (K-12)

CONTENT AREA: "M" stands for mathematics

STRAND: In this case, "DSP" stands for Data, Statistics, and Probability

GRADE LEVEL: "10" indicates a state assessment standard for the end of grade 10 or beginning of grade 11; "HS" indicates a local high school expectation for all students; "AM" indicates a local expectation for students preparing for an advanced mathematics course (e.g., calculus)

Grade 8	High School	Advanced Mathematics
M(DSP)–8–2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, or estimated line of best fit to analyze situations, or to solve problems; and evaluates the sample from which the statistics were developed (bias, random, or non-random).	M(DSP)–HS–2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of dispersion (standard deviation, variance, and percentiles).	M(DSP)–AM–2 **Analyzes and interprets measures of dispersion** (standard deviation, variance, and percentiles) and **central tendency** for the normal distribution; and **interprets** the correlation coefficient and the coefficient of determination in the context of data.
	M(DSP)–10–2 Analyzes patterns, trends, or distributions in data in a variety of contexts by determining, using, or analyzing measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, estimated line of best fit, regression line, or correlation (strong positive, strong negative, or no correlation) to solve problems; and solve problems involving conceptual understanding of the sample from which the statistics were developed.	

UNDERLINING – Indicates concepts and skills that are new to the grade level in the K-8 GLEs

STEM Number: The big ideas in each strand are numbered. In this case, "2" indicates the 2nd big idea in the Data, Statistics, and Probability strand.

BOLD BOX – Indicates the standards to be assessed on the NECAP assessment; all other standards are guidance for local curriculum and assessment

Number and Operations

Purpose: Numbers and operations remain a cornerstone for the study of mathematics in grades K – 12. Students use numbers to quantify sets, identify location, measure, quantify the probability of an event, analyze data, and describe and interpret real-world phenomena. Having students know basic facts and having students compute fluently (i.e., accurately and efficiently) continues to be an important goal in mathematics education. However, knowing basic facts should be incorporated into a rich mathematics curriculum that builds conceptual understanding of these facts.

Through the school years, the amount of time spent on numbers and their operations will decrease and the types of numbers studied will change. As students progress through the elementary grades and into middle school, they will need to develop an in-depth conceptual understanding of fractions, decimals, and percents prior to doing algorithmic computations with these numbers. Conceptual development of integers and meaningful computation with them are also goals for middle grade students. The study of irrational numbers and the real number system will begin in eighth grade and continue through high school. Imaginary and complex numbers are introduced in advanced mathematics. It is important for students to model and represent the different types of numbers they study.

Students cannot appreciate the power of numbers unless they also understand the operations upon those numbers. Students need to recognize which operation(s) to apply to a given problem situation they encounter. They need to know what effect the various operations will have on different types of numbers. They need to know the relationships among the operations and among the operations and their properties. A deep understanding of the operations and their properties will help students make sense of computation algorithms and lead to fluency in computation. A firm understanding of numbers as well as operations and their properties will provide a good foundation for the study of algebra.

Grade 8	High School	Advanced Mathematics
M:N&O:8:1 **Demonstrates conceptual understanding of rational numbers with respect to** absolute values, perfect square and cube roots, and percents as a way of describing change (percent increase and decrease) **using explanations, models, or other representations.**	M:N&O:HS:1 **Demonstrates conceptual understanding of rational numbers** by knowing why a real number is rational if and only if the number's decimal expansion eventually repeats or terminates.	M:N&O:AM:1 **Demonstrates conceptual understanding of the real number system** as an extension of the rational numbers by representing real numbers as infinite decimal expansions (that provide successive rational approximations to the number) and as points on a number line. Determines whether the decimal expansion of a rational number given in fractional form eventually repeats or terminates (without using a calculator).
M:N&O:8:2 **Demonstrates understanding of the relative magnitude of numbers** by ordering or comparing rational numbers, common irrational numbers (e.g., $\sqrt{2}$, π), numbers with whole number or fractional bases and whole number exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality symbols.	M:N&O:HS:2 **Demonstrates understanding of the relative magnitude of real numbers** by solving problems that involve ordering or comparing elements of any subset of the real numbers. M:N&O:10:2 **Demonstrates understanding of the relative magnitude of real numbers** by solving problems involving ordering or comparing rational numbers, common irrational numbers (e.g., $\sqrt{2}$, π), rational bases with integer exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality symbols.	M:N&O:AM:2 No standard at this level
M:N&O:8:3 No standard at this grade	M:N&O:HS:3 No standard at this level	M:N&O:AM:3 No standard at this level

Number and Operations		
Grade 8	**High School**	**Advanced Mathematics**
M:N&O:8:4 **Accurately solves problems involving** proportional reasoning (percent increase or decrease, interest rates, markups, or rates); multiplication or division of integers; and squares, cubes, and taking square or cube roots. (IMPORTANT: *Applies the conventions of order of operations.*)	M:N&O:HS:4 **Accurately solves problems.** • Interprets and computes with rational exponents and their relation to radicals, by hand in simple cases (e.g., $4^{3/2}$), and using a calculator when appropriate. • Interprets and computes in scientific notation with and without a calculator. • Solves compound interest problems using $A = P\left(1+\frac{r}{n}\right)^{nt}$, where n is finite. M:N&O:10:4 **Accurately solves problems involving** rational numbers within mathematics, across content strands, disciplines or contexts (with emphasis on, but not limited to, proportions, percents, ratios, and rates).	M:N&O:AM:4 **Accurately solves problems.** • Solves problems involving scientific notation and assesses the precision of the answer in terms of significant digits. • Solves problems involving complex numbers by adding, multiplying, dividing, and computing conjugates; interprets complex numbers geometrically; and understands complex numbers as an extension of the real numbers (e.g., arising in solutions of polynomial equations). • Manipulates complex numbers using rectangular and polar coordinates. • Finds the nth roots of a complex number using De Moivre's Theorem. • Solves compound interest problems including continuously compounded interest.
M:N&O:8:5 No standard at this grade	M:N&O:HS:5 No standard at this level	M:N&O:AM:5 No standard at this level
M:N&O:8:6 **Uses a variety of mental computation strategies to solve problems** (e.g., using compatible numbers, applying properties of operations, using mental imagery, using patterns) and to **determine the reasonableness of answers**; **mentally calculates** benchmark perfect squares and related square roots (e.g., 1^2, 2^2, … , 12^2, 15^2, 20^2, 25^2, 100^2, 1000^2); determines the part of a number using benchmark percents and related fractions (1%, 10%, 25%, $33\frac{1}{3}\%$, 50%, $66\frac{2}{3}\%$, 75%, and 100%) (e.g., 25% of 16; $33\frac{1}{3}\%$ of 330). (IMPORTANT: *The intent of this GSE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:HS:6 **Uses a variety of mental computation strategies to solve problems** (e.g., using compatible numbers, applying properties of operations, using mental imagery, using patterns) and to **determine the reasonableness of answers.** (IMPORTANT: *The intent of this GSE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:AM:6 No standard at this level

Number and Operations		
Grade 8	**High School**	**Advanced Mathematics**
M:N&O:8:7 **Makes estimates** in a given situation (including tips, discounts, tax, and the value of a non-perfect square root as between two whole numbers) by identifying when estimation is appropriate, selecting the appropriate method of estimation; determining the level of accuracy needed given the situation; analyzing the effect of the estimation method on the accuracy of results; and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.)*	M:N&O:HS:7 **Makes estimates** in a given situation (e.g., tips, discounts, tax, the value of a non-perfect square root or cube root) by identifying when estimation is appropriate, selecting the appropriate method of estimation; determining the level of accuracy needed given the situation; analyzing the effect of the estimation method on the accuracy of results; evaluating the reasonableness of solutions appropriate to GSEs across content strands. (IMPORTANT: *The intent of this GSE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:AM:7 No standard at this level
M:N&O:8:8 **Applies properties of numbers** (odd, even, remainders, divisibility, and prime factorization) and **field properties** (commutative, associative, identity [including the multiplicative property of one, e.g., $2^0 \times 2^3 = 2^{0+3} = 2^3$, so $2^0 = 1$], distributive, inverses) **to solve problems and to simplify computations**, and **demonstrates conceptual understanding of field properties** as they apply to subsets of real numbers when addition and multiplication are not defined in the traditional ways (e.g., If $a\Delta b = a + b - 1$, is Δ a commutative operation?)	M:N&O:HS:8 **Applies properties of numbers** and **field properties** (including determining whether a given subset of numbers is closed under a given arithmetic operation) **to solve problems or to simplify computations**; and **compares and contrasts the properties of numbers and number systems**; adds and multiplies numerical matrices with attention to the arithmetic properties of these operations.	M:N&O:AM:8 **Explores field properties** with vectors and matrices; **algebraically/geometrically interpret** vectors, vector addition, and scalar multiplication in the plane; and **solves problems** using matrices (e.g., inverses, identity, determinants, and augmented matrices).

Geometry and Measurement		
Purpose: Geometry and the related area of measurement help students represent, describe, and make sense of the world in which they live. Geometry is also a natural place for students to develop their reasoning and justification skills. We live in a three-dimensional world. To interpret, understand, and appreciate that world, students need to develop an understanding of space. In addition, success in mathematics depends, in part, on the development of spatial abilities. Spatial skills include making and interpreting drawings, forming mental images, and visualizing changes. Measurement is the process of assigning a numerical value to an attribute of an object. The study of measurement provides students with techniques and tools they will need to describe and analyze their world. It also provides an opportunity to make connections within mathematics and between mathematics and other curricular areas. High school students must develop more mature insights into the essential role of measurement as a link between the abstractness of mathematics and the concreteness of the real-world. In both areas, geometry and measurement, students need to investigate, experiment, and explore geometric properties using both technology and hands-on materials.		
Grade 8	**High School**	**Advanced Mathematics**
M:G&M:8:1 **Uses properties of angle** relationships resulting from two or three intersecting lines (adjacent angles, vertical angles, straight angles, or angle relationships formed by two non-parallel lines cut by a transversal), or two parallel lines cut by a transversal to solve problems.	M:G&M:HS:1 No standard at this level	M:G&M:AM:1 No standard at this level
M:G&M:8:2 **Applies the Pythagorean Theorem** to find a missing side of a right triangle, or in problem solving situations.	M:G&M:HS:2 **Creates formal proofs** of propositions (e.g., angles, lines, circles, distance, midpoint and polygons including triangle congruence and similarity). (IMPORTANT: *It is the intent that students are creating formal proofs as articulated in the process standards, independent of the topic being studied. Furthermore, students should not be limited to any particular method of proof, but rather use a variety of strategies and those that work best for them. Some topics may be treated more formally than others.*) M:G&M:10:2 **Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems** involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).	M:G&M:AM:2 **Extends and deepens knowledge and usage of proofs and proof techniques**; and uses geometric models to represent and distinguish between Euclidean and Non-Euclidean Systems.
M:G&M:8:3 No standard at this grade	M:G&M:HS.3 No standard at this level	M:G&M:AM:3 No standard at this level

Geometry and Measurement		
Grade 8	**High School**	**Advanced Mathematics**
M:G&M:8:4 No standard at this grade	M:G&M:HS:4 **Applies the concepts of congruency** by using matrices to represent reflections, translations, and rotations. M:G&M:10:4 **Applies the concepts of congruency by solving problems** on or off a coordinate plane involving reflections, translations, or rotations; or solves problems using congruency involving problems within mathematics or across disciplines or contexts.	M:G&M:AM:4 No standard at this level
M:G&M:8:5 **Applies concepts of similarity** to determine the impact of scaling on the volume or surface area of three-dimensional figures when linear dimensions are multiplied by a constant factor; to determine the length of sides of similar triangles, or to solve problems involving growth and rate.	M:G&M:HS:5 **Applies concepts of similarity** to define the trigonometric functions as ratios of sides of right triangles; **uses the ratios of the sides of special right triangles** (30° - 60° - 90° and 45° - 45° - 90°) to determine the sine, cosine and tangent of 30°, 45°, and 60°; and solves related problems. M:G&M:10:5 **Applies concepts of similarity by solving problems** within mathematics or across disciplines or contexts.	M:G&M:AM:5 No standard at this level
M:G&M:8:6 **Demonstrates conceptual understanding of surface area or volume by solving problems involving surface area and volume** of rectangular prisms, triangular prisms, cylinders, pyramids, or cones. Expresses all measures using appropriate units.	M:G&M:HS:6 **Applies trigonometric formulas** (e.g., Law of Sines, Law of Cosines, $A = \frac{1}{2}ab\sin C$) to find angles, lengths and areas of polygons. M:G&M:10:6 **Solves problems involving perimeter, circumference, or area** of two-dimensional figures (including composite figures) or **surface area or volume** of three-dimensional figures (including composite figures) within mathematics or across disciplines or contexts.	M:G&M:AM:6 **Derives and uses formulas for lengths of arcs and areas of sectors and areas of segments of circles.**

Geometry and Measurement		
Grade 8	**High School**	**Advanced Mathematics**
M:G&M:8:7 No standard at this grade	M:G&M:HS:7 **Applies informal concepts of successive approximation, upper and lower bounds, and limits in measurement situations** (e.g., use successive approximation to find the area of a pond); and **uses measurement conversion strategies** (e.g., unit/dimensional analysis). M:G&M:10:7 **Uses units of measure appropriately and consistently when solving problems across content strands; makes conversions within or across systems and makes decisions concerning an appropriate degree of accuracy in problem situations** involving measurement in other GSEs.	M:G&M:AM:7 **Uses radian measure appropriately** when solving problems; **converts** between radian measure and degree measure; and understands why radian measure is useful.
M:G&M:8:8 No standard at this grade	M:G&M:HS:8 No standard at this level	M:G&M:AM:8 No standard at this level
M:G&M:8:9 No standard at this grade	M:G&M:10:9 **Solves problems on and off the coordinate plane** involving distance, midpoint, perpendicular and parallel lines, or slope.	M:G&M:AM:9 **Solves problems using analytic geometry** (including three-dimensions) **and circular trigonometry** (e.g., find the equation of a circle inscribed in a triangle; find the distance between opposite vertices in a rectangular solid); **explores and interprets the characteristics of conic sections graphically and algebraically** including understanding how different planar slices of a double cone yield different conic sections; knows the characterization of conic sections as loci of points in the plane satisfying certain distance requirements, and uses the distance formula to obtain equations for the conic sections.
M:G&M:8:10 No standard at this grade	M:G&M:HS:10 **Demonstrates conceptual understanding of spatial reasoning and visualization** by sketching or using dynamic geometric software to generate three-dimensional objects from two-dimensional perspectives, or to generate two-dimensional perspectives from three-dimensional objects, and by solving related problems; perform and justify constructions with a compass and straightedge or dynamic geometric software.	M:G&M:AM:10 No standard at this level

Functions and Algebra		
Purpose: Algebra is the language through which much of mathematics is communicated. Students in Kindergarten begin to explore algebraic concepts using informal representations (e.g., words, physical models, tables, graphs). In later years students progress to more abstract representations. The study of patterns is one of the central themes of algebraic thinking and leads to an understanding of relations and functions. Students at all grade-levels should recognize, describe, and generalize patterns and build mathematical models to describe, interpret, and predict the behavior of real-world phenomenon. Algebraic processes are important tools that students can use throughout their lives.		
Grade 8	**High School**	**Advanced Mathematics**
M:F&A:8:1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; **and generalizes** a linear relationship (non-recursive explicit equation); generalizes a linear relationship to find a specific case; **generalizes** a nonlinear relationship using words or[sc] symbols; or **generalizes** a common nonlinear relationship to find a specific case.	M:F&A:HS:1 **Identifies arithmetic and geometric sequences** and finds the nth term; then **uses the generalization** to find a specific term. M:F&A:10:1 **Identifies, extends, and generalizes a variety of patterns** (linear and nonlinear) represented by models, tables, sequences, or graphs in problem solving situations.	M:F&A:AM:1 Computes partial sums of infinite arithmetic and geometric sequences, determines when an infinite geometric series converges, and finds its sum. Connects arithmetic and geometric sequences to linear and exponential functions, respectively. Works between recursive and explicit representations.

Functions and Algebra		
Grade 8	**High School**	**Advanced Mathematics**
M:F&A:8:2 **Demonstrates conceptual understanding of linear relationships** ($y = kx$; $y = mx + b$) **as a constant rate of change** by solving problems involving the relationship between slope and rate of change; informally and formally determining slopes and intercepts represented in graphs, tables, or problem situations; or describing the meaning of slope and intercept in context; **and distinguishes between linear relationships (constant rates of change) and nonlinear relationships (varying rates of change)** represented in tables, graphs, equations, or problem situations; or **describes how change in the value of one variable relates to change in the value of a second variable** in problem situations with constant and varying rates of change.	M:F&A:HS:2 **Demonstrates conceptual understanding of linear and nonlinear functions and relations.** • Analyzes characteristics of classes of functions (polynomial, rational, and exponential) to include domain, range, intercepts, increasing and decreasing intervals and rates of change. • Understands one-to-one (injective) functions and that a function that is one-to-one has a converse that is also a function; and finds inverses algebraically and graphically. • Graphs polynomial, rational and exponential functions, including vertical and horizontal shifts, stretches, and compressions as well as reflections across vertical and horizontal axes. • Applies knowledge of functions to interpret and understand situations, design mathematical models, and solve problems in mathematics as well as in the natural and social sciences. M:F&A:10:2 **Demonstrates conceptual understanding of linear and nonlinear functions and relations** (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).	M:F&A:AM:2 **Demonstrates conceptual understanding of linear and nonlinear functions and relations.** • Understands functions and relations from a set-theoretic perspective, and operations on functions including composition. • Analyzes characteristics of classes of functions and inverse functions (exponential, logarithmic, trigonometric) to include domain, range, intercepts, increasing and decreasing intervals and rates of change, periodicity, end behavior, maximum and minimum values, continuity, and asymptotes; graphs classes of functions; and understands domain restrictions and their effects on functions. • Analyzes properties of functions including onto (surjectivity), critical points and inflection points. Determine graphically and analytically whether a function is even, odd or neither. • Analyzes informally the idea of continuity and limits.

Functions and Algebra		
Grade 8	**High School**	**Advanced Mathematics**
M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y = 7\sqrt{x} + 2x$).	M:F&A:HS:3 **Demonstrates conceptual understanding of algebraic expressions.** • Manipulates, evaluates, and simplifies algebraic and numerical expressions. • Adds, subtracts, multiplies and divides polynomials and rational expressions. • Factors quadratic and higher degree polynomials. • Understands properties of logarithms and converts between logarithmic and exponential forms. • Manipulates, evaluates, and simplifies expressions involving rational exponents and radicals and converts between expressions with rational exponents and expressions with radicals. • Understands the effect of simplifying rational expressions on the domain of the related functions (e.g., $x^2/x = x$ for $x \neq 0$).	M:F&A:AM:3 **Demonstrates conceptual understanding of algebraic expressions.** • Simplifies complex fractions. • Uses the Remainder Theorem, the Factor Theorem and Rational Root Theorem for polynomials. • Knows the Fundamental Theorem of Algebra and that non-constant polynomials always factor into linear factors over the complex numbers. • Understands the difference between factoring polynomials over integer, rational, real, and complex numbers.
	M:F&A:10:3 **Demonstrates conceptual understanding of algebraic expressions** by solving problems involving algebraic expressions, by simplifying expressions (e.g., simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions.	

Functions and Algebra		
Grade 8	**High School**	**Advanced Mathematics**
M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.	M:F&A:HS:4 **Demonstrates conceptual understanding of equality.** • Factors, completes the square, uses the quadratic formula, and graphs quadratic functions to solve quadratic equations. • Solves equations involving polynomial, rational, and radical expressions. Graphs and interprets the solutions. • Understands extraneous solutions. • Finds approximate solutions to equations by graphing each side as a function using technology. Understands that any equation in x can be interpreted as the equation $f(x) = g(x)$ and interpret the solutions of the equation as the x-value(s) of the intersection point(s) of the graphs of $y = f(x)$ and $y = g(x)$. • Solves 2×2 and 3×3 systems of linear equations and graphically interprets the solutions. • Solves systems of linear and quadratic inequalities. • Solves systems of equations involving nonlinear expressions and graphically interprets the solutions. • Translates problem situations into inequalities; and solves linear and non-linear inequalities (symbolically and graphically). M:F&A:10:4 **Demonstrates conceptual understanding of equality** by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.	M:F&A:AM:4 **Demonstrates conceptual understanding of equality.** • Solves equations and verifies/proves identities involving trigonometric expressions. • Solves equations involving exponential and logarithmic expressions; graphs and interprets the solutions. • Uses matrices or determinants to solve systems of equations with or without technology. • Knows and applies the Intermediate Value Theorem to find exact or approximate solutions of equations or zeros of continuous functions.

Data, Statistics, and Probability		
Purpose: Collecting, organizing, and displaying data, as well as interpreting and analyzing the information to make decisions and predictions, have become very important in our society. Statistical instruction should be carried out in a spirit of investigation and exploration so students can answer and formulate questions about data. Probability should be studied in familiar contexts. Students need to investigate fairness, chances of winning, and uncertainty. Technology should be used as a tool throughout the investigation process.		
Grade 8	**High School**	**Advanced Mathematics**
M:DSP:8:1 **Interprets a given representation** (line graphs, scatter plots, histograms, or box-and-whisker plots) to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:8:2.*)	M:DSP:HS:1 **Interprets a given representation(s)** (e.g., regression function including linear, quadratic, and exponential) to analyze the data to make inferences and to formulate, justify, and critique conclusions. (IMPORTANT: *Analyze data consistent with concepts and skills in M:DSP:HS:2*). M:DSP:10:1 **Interprets a given representation(s)** (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts) to make observations, to answer questions, to analyze the data to formulate or justify conclusions, critique conclusions, make predictions, or to solve problems within mathematics or across disciplines or contexts (e.g., media, workplace, social and environmental situations). (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:10:2.*)	M:DSP:AM:1 No standard at this level

Data, Statistics, and Probability		
Grade 8	**High School**	**Advanced Mathematics**
M:DSP:8:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, or estimated line of best fit to analyze situations, or to solve problems; and evaluates the sample from which the statistics were developed (bias, random, or non-random).	M:DSP:HS:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of dispersion (standard deviation, variance, and percentiles). M:DSP:10:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts** by determining, using, or analyzing measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, estimated line of best fit, regression line, or correlation (strong positive, strong negative, or no correlation) to solve problems; and solve problems involving conceptual understanding of the sample from which the statistics were developed.	M:DSP:AM:2 **Analyzes and interprets measures of dispersion** (standard deviation, variance, and percentiles) and **central tendency** for the normal distribution; and **interprets** the correlation coefficient and the coefficient of determination in the context of data.
M:DSP:8:3 **Organizes and displays data using** scatter plots to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems; or identifies representations or elements of representations that best display a given set of data or situation, consistent with the representations required in M:DSP:8:1. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:8:2.*)	M:DSP:HS:3 **Organizes and displays one- and two-variable data using a variety of representations** (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts, linear, quadratic, and exponential regression functions) to analyze the data to formulate or justify conclusions, make predictions, or to solve problems with or without using technology. M:DSP:10:3 **Identifies or describes representations or elements of representations that best display a given set of data or situation**, consistent with the representations required in M:DSP:10:1.	M:DSP:AM:3 **Uses technology to explore** the method of least squares and median-median for linear regression.

Data, Statistics, and Probability		
Grade 8	**High School**	**Advanced Mathematics**
M:DSP:8:4 **Uses counting techniques to solve problems** in context involving combinations or permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or[sc] others).	M:DSP:HS:4 **Uses counting techniques to solve problems** in context involving combination or permutations using a variety of strategies (e.g., nCr, nPr, or n!); and finds unions, intersections, and complements of sets. M:DSP:10:4 **Uses counting techniques to solve problems** in context involving combinations or permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or[sc] others).	M:DSP:AM:4 No standard at this level
M:DSP:8:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the experimental or theoretical probability of an event in a problem-solving situation; and **predicts** the theoretical probability of an event and tests the prediction through experiments and simulations; compares and contrasts theoretical and experimental probabilities; finds the odds of an event and understands the relationship between probability and odds.	M:DSP:HS:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, predicts** the theoretical probability of an event and tests the prediction through experiments and simulations; compares and contrasts theoretical and experimental probabilities; finds the odds of an event and understands the relationship between probability and odds. M:DSP:10:5 **Solves problems involving experimental or theoretical probability.**	M:DSP:AM:5 **Solves probability problems** (e.g., by applying concepts of counting, random variables, independence/dependence of events, and conditional probability).

Data, Statistics, and Probability		
Grade 8	**High School**	**Advanced Mathematics**
M:DSP:8:6 **In response to a teacher or student generated question or hypothesis** decides the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested while considering the limitations that could affect interpretations; and when appropriate makes predictions; and asks new questions and makes connections to real-world situations. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:8:2.*)	M:DSP:HS:6 **In response to a teacher or student generated question or hypothesis** decides the most effective method (e.g., survey, observation, research, experimentation) and sampling techniques (e.g., random sample, stratified random sample) to collect the data necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the questions or hypotheses being tested while considering the limitations of the data that could effect interpretations; and when appropriate makes predications, asks new questions, or makes connections to real-world situations. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:10:2.*)	M:DSP:AM:6 No standard at this level

New Hampshire Curriculum Framework Mathematics

Since it is crucial that process standards (problem-solving, reasoning, proof, communication, connections, and representations) are not seen as completely separate from content standards, the process standards have been imbedded throughout the content strands (e.g., M:F&A:10:1 **Identifies, extends, and generalizes a variety of patterns** (linear and nonlinear) represented by models, tables, sequences, or graphs in problem solving situations). This mirrors classroom instruction in most classes. As students are learning content knowledge, instruction is focusing on improving their abilities in problem solving, reasoning, and communication. Students should be looking for and making appropriate connections, and should be able to understand and use multiple representations of mathematical ideas. Since it is crucial that students are strong in both content and process knowledge, we have included two local process strands following the content strands. These process strands are in addition to the process standards that are embedded in the content standards and are included to help guide local curriculum, assessment, and instruction. The process standards have been separated by grade-spans (K–2, 3–5, 6–8, and 9–12). The 6–8 and 9–12 spans have been included in this section. Each grade span should be thought of as building upon the skills and concepts in the previous grade span.

Problem Solving, Reasoning, and Proof

Purpose: Problem solving should serve as the organizing feature of the mathematics curriculum (as well as other areas of study) and be applied to everyday activities. Thus, problem solving approaches should be used to investigate and understand new mathematical content, with students working sometimes independently and sometimes in groups. Students should have many experiences in posing and solving problems from their world using data that are meaningful to them and performing mathematical investigations. Students should build a positive disposition toward problem solving, including the confidence needed to explore unique problems and increasingly complex tasks.

6 – 8	High School
M:PRP:8:1 **Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content** and be able to: • Use problem-solving strategies appropriately and effectively for a given situation. • Determine, collect and organize the relevant information needed to solve real-world problems. • Apply integrated problem-solving strategies to solve problems in the physical, natural and social sciences, and in pure mathematics. • Use technology when appropriate to solve problems. • Reflect on solutions and the problem-solving process for a given situation and refine strategies as needed.	M:PRP:HS:1 **Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content** and be able to: • Expand the repertoire of problem-solving strategies and use those strategies in more sophisticated ways. • Use technology whenever appropriate to solve real-world problems (e.g., personal finance, wages, banking and credit, home improvement problems, measurement, taxes, business situations, purchasing, and transportation). • Formulate and redefine problem situations as needed to arrive at appropriate conclusions.
M:PRP:8:2 **Students will use mathematical reasoning and proof** and be able to: • Draw logical conclusions and make generalizations using deductive and inductive reasoning. • Formulate, test, and justify mathematical conjectures and arguments. • Construct and determine the validity of a mathematical argument or a solution. • Apply mathematical reasoning skills in other disciplines.	M:PRP:HS:2 **Students will use mathematical reasoning and proof** and be able to: • Expand the repertoire of proof techniques and use those techniques in more sophisticated ways. • Use informal and formal reasoning and proof to explain and justify conclusions. • Formalize mathematical arguments through the use of deductive reasoning. • Use the principle of mathematical induction. • Use reasoning and proof throughout classroom discussions independent of the mathematical topic being studied. • Recognize how reasoning and proof influence the structure of mathematics.

Communication, Connections, and Representations	
Purpose: Reading, writing, talking, listening, and modeling provide students with the opportunity to develop deeper mathematical understanding and to integrate the language of mathematics into their world. Actively exploring, investigating, describing, and explaining mathematical ideas promote communication which leads to a greater comprehension of mathematical concepts. Representing ideas and connecting the representations to mathematics lies at the heart of understanding mathematics. Representations make mathematical ideas more concrete and available for reflection, and they help students recognize the common mathematical nature of different situations. Students can develop and deepen their understanding of mathematical concepts and relationships as they create, compare, and use various representations. Mathematical topics, ideas, and procedures must be connected to each other and to the students' everyday experiences, both in and out of school. In particular, mathematics must be connected to all other curriculum areas. Mathematical connections will help students become aware of the usefulness of mathematics, serve to bridge the concrete and the abstract, and enable deeper understanding of important ideas.	
6 – 8	**High School**
M:CCR:8:1 **Students will communicate their understanding of mathematics** and be able to: • Articulate ideas clearly and logically in both written and oral form. • Present, share, explain, and justify thinking with others and build upon the ideas of others to solve problems. • Use mathematical symbols and notation. • Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.	M:CCR:HS:1 **Students will communicate their understanding of mathematics** and be able to: • Explain and justify their thinking and develop increasingly sophisticated questions for given problem-situations. • Critique and follow the logic of arguments presented within mathematics and across disciplines.
M:CCR:8:2 **Students will create and use representations to communicate mathematical ideas and to solve problems** and be able to: • Use models and technology to develop equivalent representations of the same mathematical concept. • Use and create representations to solve problems and organize their thoughts and ideas. • Convert between representations (e.g., a table of values, an equation, and a graph may all be representations of the same function).	M:CCR:HS:2 **Students will create and use representations to communicate mathematical ideas and to solve problems** and be able to: • Choose appropriate representations and mathematical language (e.g., spreadsheets, geometric models, algebraic symbols, tables, graphs, matrices) to present ideas clearly and logically for a given situation. • See a common structure in mathematical phenomena that come from very different contexts (e.g., the sum of the first n odd natural numbers, the areas of square gardens, and the distance traveled by a vehicle that starts at rest and accelerates at a constant rate can be represented by functions of the form $f(x) = ax^2$). • Find representations that model essential features of a mathematical situation (e.g., cost of postage can be modeled by a step-function). • Use representations as a primary means for expressing and understanding more abstract mathematical concepts.

Communication, Connections, and Representations	
6 – 8	**High School**
M:CCR:8:3 **Students will recognize, explore, and develop mathematical connections** and be able to: • Connect new mathematical ideas to those already studied and build upon them. • Understand that many real-world applications require an understanding of mathematical concepts (e.g., personal finance, running a business, building a house, following a recipe, or sending a rocket to the moon). • Explain in oral and written form the relationships between a real-world problem and an appropriate mathematical model. • Explain in oral and written form the relationships among various mathematical concepts (e.g., the relationship between exponentiation and multiplication).	M:CCR:HS:3 **Students will recognize, explore, and develop mathematical connections** and be able to: • Explain in oral or written form how mathematics connects to other disciplines, to daily life, careers, and society (e.g., geometry in art and literature, data analysis in social studies, and exponential growth in finance). • Explain multiple approaches that lead to equivalent results when solving problems.

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New Hampshire Curriculum Framework

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The *1995 K-12 Mathematics Curriculum Framework* was revised in 2000. The publishing of the document was put on hold as the *No Child Left Behind Act* was being prepared for release. *No Child Left Behind* requires states to develop grade-level expectations in mathematics and the revised version of the *1995 K-12 Mathematics Curriculum Framework* was organized by grades spans. This revised document was the foundation for the development of the GLEs and GSEs. The following people contributed to the developed of the revised version of the *1995 K-12 Mathematics Curriculum Framework* in 2000. Affiliations listed are those that the individuals held at the time of serving on the committees.

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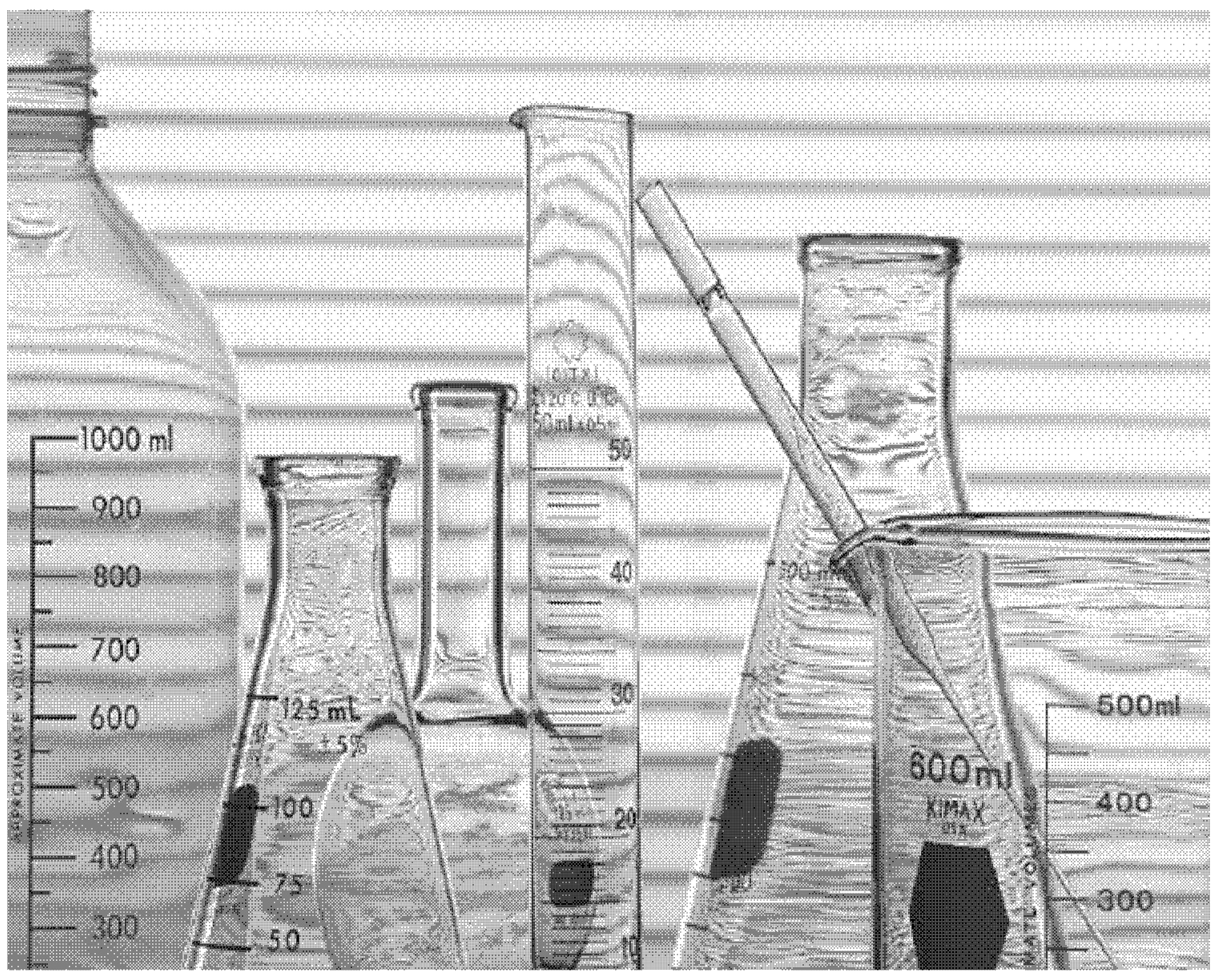
K-12 Science Literacy New Hampshire Curriculum Framework



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Philosophy of the Frameworks

How do the new frameworks differ from the old ones?

Science should not be approached as a collection of isolated abilities and bits of information, but as a rich fabric of mutually supported ideas and skills that must develop overtime. From primary school to high school what students learn should build on what they learned before, makes sense in terms of what else they are learning, and prepare them for what they will learn next[1].This framework looks at how kids perceive and interact with the world.

One of the major changes from the earlier framework can be seen the structure of the new frameworks reflecting the developmental stages of children. To help districts develop curricula for all grade levels, the new Frameworks for Science Literacy includes Grade Span Expectations (GSEs) that break down the content into specific grade spans (K-2, 3-4, 5-6, 7-8, 9-12). Each span lists proficiencies which indicate what all students should know and be able to do by the end of that grade span.

The old framework had six strands: 1) Inquiry; 2) Science, Technology and Society; 3) Life Science; 4) Earth Space Science; 5) Physical Science; and 6) Unifying Themes. Many district curricula had little to no emphasis on strands 1, 2, and 6. In the new edition, Science is divided into three content domains (Earth Space Science, Life Science, and Physical Science) and one Science Process Skills domain. Ideas and objectives which correspond to the 1995 Science Framework strands 1, 2, and 6 have been rolled into each of the new strands.

Science Process Skills (SPS) is a new addition to the Frameworks. It reflects the need to make sure that in the early years students develop specific skill sets that will help them be successful in future science experiences. The last section of the skills strand, SPS4, looks at goals for Information and Computer Technology standards in Science. This was included to help districts meet the needs of all students and to meet the new ICT requirements for K-8 and 9-12 digital portfolios.

Everything in the old framework could be the subject of the state assessment in science. In the new framework, only specific proficiencies will be part of the upcoming NECAP Science Assessment. These "NECAP Science Targets" are clearly marked in bold boxes throughout the GSEs for each grade span. They are also referenced in the Science Process Skills documents as they connect to Inquiry and the Unifying themes of science. The other proficiencies should become part of each districts local science assessment system.

[1] *Atlas of Science Literacy*, American Association for the Advancement of Science, 2001, page 3

New Hampshire Curriculum Framework Science

Why include Design Technology in Science?

Science comprises our knowledge about the natural world and the processes by which that knowledge is acquired, synthesized, evaluated, and applied. Therefore, science education must emphasize hands-on exploration and direct experience with the natural world. Students should be engaged in the observation of these phenomena whenever possible. Science is, above all, an inquiry activity that seeks answers to questions by collecting and analyzing data in an attempt to offer a rational explanation of naturally-occurring events. The knowledge that results from scientific problem solving is most useful when it is organized into concepts, generalizations, and unifying principles, which lead to further investigation of objects and events in the environment.

Science and technology are practiced in the context of human culture, and therefore, dynamic interactions occur among science, technology, and society. Each component-- inquiry and problem solving, and how these relate to each other and to society-- is critically important to instruction at every grade level.

Technology concerns the human-made world. Technology is much older than science, and has its roots in the very early use of tools by our human-like ancestors. Enabling our children to understand how humans modify the natural world to solve problems and to meet human needs and desires is equally as important as teaching them how to inquire about the natural world. And of course, these two endeavors are related. The reason for including technology along with science in the curriculum is stated in the National Science Education Standards: "Although these are science education standards, the relationship between science and technology is so close that any presentation of science without developing an understanding of technology would portray an inaccurate picture of science." [2] The National Standards goes on to define technology and its relationship to science as follows:

> "As used in the Standards, the central distinguishing characteristic between science and technology is a difference in goal: The goal of science is to understand the natural world, and the goal of technology is to make modifications in the world to meet human needs. Technology as design is included in the Standards as parallel to science as inquiry." [3]

In order to broaden our students' career opportunities and awareness it is also important that they learn distinction between the occupations of scientist and engineer: Scientists propose explanations for questions about the natural world, and engineers propose solutions relating to human problems, needs, and aspirations. Scientists and engineers frequently work together in teams, along with people from other fields, to tackle the essential issues facing our society.

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[2] *National Science Education Standards*, National Research Council, Washington, D.C.: National Academy Press, 1996, page 190.
[3] *Ibid*. page 24.

K-12 Broad Goals of Science Education

1. Students will use inquiry strategies to investigate and understand the natural world.

2. Students will demonstrate an understanding of key concepts and principles central to the biological, physical, and earth sciences, and engineering, while recognizing the interrelationship of all the sciences.

3. Students will demonstrate an understanding of the basic laws which govern and explain phenomena observed in the natural world

4. Students will demonstrate an understanding of, and be able to practice, the basic processes which scientists use to obtain and continually revise knowledge about the natural world.

5. Students will perceive that scientific and technological knowledge is the result of the cumulative efforts of people, past and present, who have attempted to explain the world through an objective, peer-tested, rational approach to understanding natural phenomena and occurrences.

6. Students will display a sense of curiosity and wonder about the natural world, and demonstrate an increasing awareness of the interdependence between all living things and the environment.

7. Students will demonstrate their abilities to identify human needs and concerns and to engage in problem-solving processes to define the problem, research and generate solutions, and develop simulations and prototypes to test their ideas before implementation.

8. Students will be able to apply rational, creative-thinking, and investigative skills and use scientific and technical knowledge in their roles as citizens, workers, family members, and consumers in an increasingly technological society.

9. Students will use oral and written communication, mathematical representation, and physical and conceptual models to describe and explain scientific concepts and ideas, and will be able to apply scientific and technical knowledge.

10. Students will know and employ safe practices and techniques in the laboratory, in field work or any other scientific investigation, and when using scientific or technological materials at home or work.

The History of the New Hampshire Science Frameworks

The state of New Hampshire adopted the NH Science Frameworks in February 1995. These frameworks, based on the draft *National Science Education Standards*[4] and *Benchmarks for Science Literacy*[5], provided guidance for what we would assess in our state science assessment. We tested all students in NH in science at the ends of grades 6 and 10 to determine how well districts were developing science curricula which would improve what all students should know and be able to do in science. Due to budgetary constraints, NH suspended the Science Assessment in school year 2003-2004.

Realizing that NCLB required a science assessment by 2008, in March 2004 we began a thorough review of the NH Science Frameworks and relative research and literature. The goal of this process was to revise our science frameworks to reflect changes in our understanding of how children learn science in the classroom and to guide the development of a rigorous science assessment that will drive change in instructional practice.

As we began our internal review, we joined with Rhode Island and Vermont to develop guidance for a common assessment that would look at specific content covered in all three states frameworks (standards). We spent a great deal of time analyzing the research about how students learn and looked at how to focus our assessment on those things that would improve classroom practice and expose more students, across all three states, to challenging science curricula. The NECAP Science Assessment will be given at the end of Grades 4, 8, and 11 and will consist of three test sessions (one session will be performance).

More than one hundred and fifty NH educators and community members were involved with the revision process. The revised frameworks, now referred to as the *New Hampshire Frameworks for Science Literacy K-12,* were approved by the New Hampshire State Board of Education in June 2006.

The New Hampshire Frameworks for Science Literacy K-12 includes Grade Span Expectations (GSEs) which clearly delineate expected content for 2 or 3 year grade spans. NECAP Science Assessment Targets are highlighted but they are not the only things included in the framework. In order to provide guidance but allow for some local flexibility, grade spans include: K to 4 (K-2, 3-4); 5 to 8 (5-6, 7-8); and 9 to 12 (9-11 basic, 11 -12 advanced level).

[4] *National Science Education Standards*, © 1995, National Academy of Science
[5] *Benchmarks for Science Literacy*, © 1993, American Association for the Advancement of Science

Science in the Grade Spans

ELEMENTARY – GRADES K to 4
USING SCIENCE TO EXPLORE THE WORLD

Children in grades K-4 observe, describe, and interact with the world around them. At this level effective learning environments provide opportunities for developing awareness of and involvement with the world around them through:

- Playing with, exploring, collecting, handling, sorting, and classifying objects.
- Using graphic organizers and other strategies to motivate, organize, and identify the questions children ask about the world. [*Test Guess*]
- Using tools (for example: non standard measures, rulers, and magnifiers) to enhance observations, collect, represent and interpret data.
- Organizing and manipulating data in multiple ways, which may include tools of technology, e.g., calculators, and computers.
- Communicating (through reading, writing, speaking, listening, movement and viewing) to describe their observations of the world.

In summary, the K-4 classroom should provide students opportunities to engage with concrete manipulative activities that will lead children to construct the desired concepts through investigation and analysis of experience. At this level in particular, science should be integrated with other curricular areas (e.g., reading, writing, math, social studies, technology, art, music, or physical education).

MIDDLE LEVEL SCIENCE – GRADES 5 to 8
STUDENTS IDENTIFY AND SHAPE THEIR UNDERSTANDING OF THE WORLD

Children in grades 5-8 will build on their K-4 measurement and observation skills to construct new understandings and validate scientific theories and explanations. At this level, effective learning environments provide opportunities for collaborative inquiry in the field, classroom, and laboratory. These students need content knowledge as well as frequent and varied practice in experimentation and inquiry. Since students in the middle years tend to center on evidence which supports their current beliefs, they need to be able to examine their beliefs and concepts in a safe environment and be provided with scientific theories as alternatives. At this level effective learning environments provide opportunities for students to construct new understandings and validate scientific theories and explanations through:

- Providing frequent opportunities for students to engage in full and partial Inquiries
- Providing students with background content and theories to guide their design of observations and investigations.
- Helping students shape and modify their background knowledge through experiments and observations. Students should develop their abilities in systematic observation, making accurate measurements, and identifying and controlling variables.
- Since students in the middle years tend to center on evidence which supports their current beliefs, teachers need to challenge current beliefs and concepts that students hold and provide scientific theories as alternatives.

- Giving ample opportunity for students to establish and refine methods of experimentation, data collection and reporting.
- Encouraging students to develop skills to present their understandings using the language of science to communicate scientific explanations and ideas. Students should receive constructive criticism and questions and should be able to provide the same for fellow student groups and individuals.
- The use of writing, labeling drawings, completing concept maps, developing spreadsheets, and designing computer images and representations should be part of the middle school science experience.
- Use literature and technology, and graphic organizers to support different explanations and predictions

Science is a way of knowing and understanding the world around us. Because science plays a key role in developing an informed citizen, it is important that all middle school children have experience in the enterprise and content of science.

HIGH SCHOOL – GRADES 9 to 12
REFINING, ENRICHING, AND APPLYING KEY SCIENCE CONCEPTS

It is important that students develop a solid understanding of how specific domains of science operate. Students in high school should learn science in courses with clear content goals and expectations. Understanding the connections of one science domain to another is important but research indicates students need concentrated knowledge and skills in specific science domains.

Courses become more content-intensive without losing the field, experiential, and laboratory components. Although content may take on a more prominent role, instruction should proceed as much as possible on an inquiry basis. Alternative paths may exist to serve increasingly divergent student needs.

- Use formal controlled experimentation to gather data about the natural world. Limit scope, isolate variables, prove or disprove a limited hypothesis.
- Generate their own questions, develop hypotheses, and design or modify experiments to test those hypotheses.
- Manipulate scientific apparatus and use advanced technology to gather data (e.g., air tracks, electrophoresis, lasers, titration glassware.)
- Analyze collected data to validate or refute a hypothesis.
- Articulate clearly and defend a scientific viewpoint.

The importance of linking science content to student lives can not be overemphasized. The ability of students to link new content to their personal science knowledge is critical for students to understand and remember concepts. Collaboration in science as a critical process will be fostered in the classroom. In addition, an increased use of quantitative reasoning should occur throughout high school.

What is Science?

The following information should be of help to teachers, parents, and students. One of the greatest problems in science education centers on this lack of understanding by the general public.

Science teachers teach about science concepts in their classrooms, but rarely do they take time to help students understand what science is and what it is not. The New Hampshire Framework for Science Literacy contains information about what science is and it is intended that teachers will take time to repeatedly help students understand the nature of science. The business of science is to develop theories based on natural explanations about how the natural world works.

Students need to realize how the scientific processes are used to acquire new knowledge. The best way for them to do this is to spend time using scientific inquiry, experimentation, discussing data, drawing inferences based on data, and writing conclusions based on evidence. These processes should be practiced in every science course at every science level. It is also desirable that students be aware of past scientific works that formed the basis for the development of present theories, and the fact that scientific theories are built on the sequential work of many scientists over time.

The Nature of Science

(Adapted from Arkansas Science Framework 1999)

People have many ways of knowing about their world including scientific knowledge, societal knowledge, religious knowledge and cultural knowledge. Science differs from these other ways of knowing in important ways (see: Comparison of Ways of Knowing).

Science is a system of exploring the natural universe through data collected by observation, experimentation and peer verification. This data must be reviewed by many scientists before it is accepted as valid evidence. Based on evidence from collected data, theories are advanced to explain and account for observations. Science must limit itself to explanation about the natural world.

The success and credibility of science are anchored in the willingness of scientists to:

1. Expose their ideas and results to independent testing and replication by other scientists. This requires the complete and open exchange of data, procedures and materials.
2. Abandon or modify accepted conclusions when confronted with more complete or reliable experimental evidence.

Science definitions for the following terms are specific:

Fact: In science, an observation that has been repeatedly confirmed
Hypothesis: A testable statement or prediction about the natural world which can be supported by experiment or observation
Law: A descriptive generalization or pattern about how some aspect of the natural world behaves under stated circumstances; often stated in a form of a mathematical equation
Theory: In science, a well-substantiated explanation of how the natural world works that explains facts, laws, inferences, and tested hypotheses

Before a theory can be included in the system of science, it must meet all of the following criteria:

1. Be able to explain what has been observed;
2. Be able to predict what has not yet been observed; and
3. Be able to be tested by further experimentation and to be modified as required by the acquisition of new data.

People often use the word *theory* to mean a hunch or a guess; but as these criteria show, that is not correct. A scientific theory is held with a high degree of confidence and is supported by

enough evidence to make its abandonment unlikely. As new evidence is found, a theory may be modified but only with compelling evidence, verification and peer review. The business of science is to build theories that explain how the natural world works and predict how it might work in the future.

Science is not a matter of belief; rather, it is a matter of conclusive evidence that can be subjected to the test of observation, reasoning and peer review. The open competition of ideas in published papers is a major part of scientific work.

The goal of science is an understanding of the general principles underlying the functioning of the universe. Such understanding is achieved by means of four components:

1. Observation of specific facts or phenomena
2. Formulation of generalizations about such phenomena
3. Production of causal hypotheses relating the phenomena
4. Test of the causal hypotheses by means of further observation and experimentation

The science is based on two fundamental assumptions:

1. A naturalistic explanation is sufficient to account for the functioning of the universe.
2. The universe can be understood using logic and rational thinking.

Two types of evidence are accepted by practicing scientists:

1. Confirmation of hypothesis by data strengthens their validity.
2. Repeated inconsistency of data with a hypothesis eventually leads to the rejection of the hypothesis.

Science can only deal with events or things that can be measured, observed or detected. It cannot be used to investigate all questions. There are beliefs that cannot be proved or disproved by their very nature (e.g., the meaning of life or the existence of supernatural powers and beings). In other cases, a scientific approach that may be valid is likely to be rejected as irrelevant by people who hold certain beliefs (e.g., astrology, fortune-telling, and superstition). Scientists do not have the means to settle issues concerning good and evil. Answers to these questions must be found in religion, philosophy, cultural ideals and other systems of beliefs.

Scientific Theories

Science theories are not hunches or guesses, but all have been subjected repeated testing and verification. All scientific theories are subject to change as new evidence comes to be accepted by all scientists. Students should develop an understanding of the basic theories that are foundational in science and which guide scientific understanding. A few current scientific theories are listed below:

Atomic Theory: This theory states that the atom is the smallest unit of matter. The atom is composted of the nucleus in the middle of the atom that is composed of neutrons and protons (both of these may break down into smaller particles). The neutrons have no charge. The protons have a positive charge. Surround the nucleus are electrons that swirl around the nucleus in a large region, rather than orbiting in a fixed pattern (electron cloud). The electrons have a negative charge. Many modern scientists have contributed to our current view of the atom in which the electrons swirl around the nucleus in a large region (electron cloud), rather than orbiting in a fixed pattern. Plus modern quantum theory shows how atomic particles such as electrons may also be seen as having wavelike properties (see below).

Big Bang Theory: Big bang theory assumes that the universe began from a singular state of infinite density and expanding from an explosive moment of creation. The theory was further developed in the 1940s by George Gamow and R. A. Alpher. Fred Hoyle coined the term Big Bang. The Big Bang Theory is the dominant scientific theory about the origin of the universe. According to the big bang, the universe was created sometime between 10 billion and 20 billion years ago from a cosmic explosion that hurled matter and in all directions.

Gravity Theory: Gravitation, or gravity, is a force that attracts all objects in the universe. The most familiar of the four fundamental interactions of matter, gravitation has several characteristics that distinguish it from the other interactions: (1) It is universal; (2) It is always attractive; (3) It is a long-range interaction; and (4) It is a long-range attractive force affecting all matter.

Evolution Theory: Evolution theory says that all living things are related to one another through common ancestry from earlier forms that differed from the present forms. Exactly how evolution occurs is still a matter of debate, but that it occurs is a scientific fact. Biologists agree that all living things arose through a long history of changes shaped by physical and chemical processes that are still taking place. According to the theory, variability among individuals in a population of sexually reproducing organisms is produced by mutation and genetic recombination. The resulting genetic variability is subject to natural selection in the environment.

Cell Theory: The cell theory of life states: (1) All living material is made up of cells; (2) All cells are derived from previously existing cells; most cells arise by cell division, but in sexual organisms they may be formed by the fusion of sperm and egg; (3) A cell is the most elementary unit of life; (4) Every cell is bounded by a plasma membrane, an extremely thin skin separating it from the environment and from other cells; (5) All cells have strong biochemical similarities; and (6) Most cells are small, about 0.001 cm (0.0004 in) in length; for example, the smallest cells of

the microorganism mycoplasma are 0.3 micrometers in size, whereas some giant algae cells may be several centimeters long.

The Germ Theory of Disease: French bacteriologist Louis Pasteur is considered the founder of microbiology. Pasteur argued that infectious diseases were caused by germs. The germ theory has affected our views on infectious disease, surgery, hospital management, agriculture, and industry.

Relativity Theories: Albert Einstein's theory of special relativity, published in 1905, revealed that energy and matter are different manifestations of the same phenomenon and can be transformed into each other in terms of the relationship $E = mc^2$. Einstein's theory of general relativity, published in 1917, provided a powerful new way to view gravity as a warping of the four-dimensional space-time continuum by the presence of matter. If space-time is imagined as a rubber sheet, then massive objects such as stars and galaxies create deformations in space-time, just as a bowling ball sitting on a mattress creates a dent into which nearby smaller objects fall. Thus the shape of space-time determines the behavior of matter/energy. At the same time, the presence of matter/energy determines the shape of space-time.

Plate Tectonics Theory: Plate tectonics is an all-embracing theory that the Earth is divided into a number of rigid plates floating on a viscous underlayer in the mantle. Alfred L. Wegener was the first to propose in 1912 that the continents were at one time connected and had drifted apart. In 1960 when H. H. Hess suggested that new ocean floor was created at the mid-oceanic ridges and that the ocean evolved by seafloor spreading.

Quantum Theory: This theory that says that energy exists in tiny discrete units called quanta. Just as earlier theory showed how light, generally seen as a wave motion, could also in some ways be seen as composed of discrete particles (photons), quantum theory shows how atomic particles such as electrons may also be seen as having wavelike properties. Quantum theory is the basis of particle physics, modern theoretical chemistry, and the solid-state physics that describes the behavior of the silicon chips used in computers. Quantum theory and the theory of relativity together form the theoretical basis of modern physics. Later work by scientists elaborated the theory into what is called quantum mechanics (or wave mechanics).

Unified Field Theory: This theory proposes to unify the four known interactions, or forces– the strong, electromagnetic, weak, and gravitational forces– by a simple set of general laws. These four distinct forces control all the observed interactions in matter: gravitation, electromagnetism, the strong force (force that holds atomic nuclei together), and the weak force (force present in some nuclear processes).

Comparison of Ways of Knowing

People have several ways that they know about their world. The chart below lists some of the ways of knowing. One way of knowing is no more valid that another. However, as you read the chart please note that science is a way of knowing that requires the use of certain rules and methods that differs from the other means of knowing. Scientific knowledge is limited to the natural world. The other ways of knowing do not have these limitations. (Adapted from the Arkansas Science Teachers Association website, http://users.aristotle.net/~asta/science.htm)

Religious Knowledge	Philosophic Knowledge	Cultural Knowledge	Scientific Knowledge
Seeks answers to any question that can be posed including answers to the ultimate questions (e.g., What is my purpose? What is the meaning of life? Is there a supreme being?).	Seeks answers to any question that can be posed including answers to the ultimate (e.g., What is my purpose? What is the meaning of life? Is there a supreme being?).	Seeks answers to any question that can be posed including answers to the ultimate questions (e.g., What is my purpose? What is the meaning of life?), but generally relates to how people treat one another.	Can only seek answers about the natural world but cannot answer ultimate questions (e.g., Is there a god? What is the meaning of life? What is my purpose?).
Seeks predictions on any event based on faith and belief.	Seeks predictions on any event based on point of view.	Seeks predictions on any event based on belief and cultural history.	Seeks predictions about future natural events based on observational evidence and testing.
The rules may vary among the different religions.	The rules may vary among the different philosophic views.	The rules may vary among the different cultures.	Has a set of rules that must be followed in order to be called science.
Explanations are based on beliefs and faith and seek to understand and follow an ultimate purpose.	Explanations are based on logic or viewpoint and seek to understand and follow an ultimate purpose and may undergo some type of testing.	Explanations are based on beliefs and seek to understand and follow an ultimate purpose.	Explanations are based on observation, evidence, and testing.
Explanations can include supernatural forces.	Explanations can include supernatural forces and viewpoints.	Explanations can include supernatural forces and other historical viewpoints.	Explanations cannot include supernatural forces.
Hypotheses need not be part of the religion, nor do hypotheses have to be tested nor proved or disproved.	Hypotheses may be a part of the philosophic view and hypotheses may or may not have to be tested and proved or disproved.	Hypotheses need not be part of the cultural view, nor do hypotheses have to be tested nor proven.	The hypothesis used in tests must be able to be disproved.
Is a belief system and seeks truths.	Is a point of view and seeks truths.	May be a belief system rooted in historical views and seeks truths.	Is not a belief system nor seeks truths.
Knowledge may not change greatly over time, but may be swayed by culture.	Knowledge may not change greatly over time and may be influenced by culture.	Knowledge may or may not change slowly over time.	Knowledge may change as new data (evidence) arises.
Accepted knowledge does not need peer review or verification.	Accepted knowledge may seek peer review or verification, but conclusions may differ among individuals.	Accepted knowledge may seek review or verification, but conclusions may differ among individuals.	All knowledge must have peer review and verification.

New Hampshire Curriculum Framework Science

How to Read the Science GSEs

The numbering system for the NH Science GSEs is made up of the following information.
Example: **S:ESS2:11:1.1**

Content Area ➔ *(Science)*
Domain ➔ *(Earth Space)*
Strand ➔ *(ESS2)*
Grade level ➔ *(by end of 11)*
Stem ➔ *(Earth, Sun, and Moon)*
Expectation➔ *(Explain how ...)*

Strand– This is the Enduring Knowledge Statement for this section of the GSE. Strands will be two or three letters and one number. The same strands are used across grade levels.
Example: ESS2

Stem– This is an organizing topic for content and skills. The same stems are used across all grade levels.
Example: 2. Energy

Expectations– These are listed in the columns by grade level. All expectations should be the foundation of your local assessment system. Each expectation has a unique number. The order is not specific.
Example:
S:ESS2:11:2.1 Identify the Earth's major external source of energy as solar energy.

New Hampshire State Curriculum Framework

	Earth Space Science	
ESS2– The Earth is part of a solar system, made up of distinct parts, which have		
	9-11	
1. EARTH, SUN, AND MOON	S:ESS2:11:1.1 Explain how the Earth, Moon and Sun were formed.	S:ES fusic struc
2. ENERGY	S:ESS2:11:2.1 Identify the Earth's major external source of energy as solar energy. S:ESS2:11:2.2 Explain how the inclination of incoming solar radiation can impact the amount of energy Earth receives on any given surface area. **S:ESS2:11:2.3 Explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading). [ESS1(9-11)SAE+POC-3]**	*Non*
3. SOLAR SYSTEM	S:ESS2:11:3.1 Explain how gravitational force influenced the formations of the planets and their moons; and describe how these objects move in patterns under its continued influence. S:ESS2:11:3.2 Explain how the Solar System formed from a giant cloud of gas and debris about 5 billion years ago.	*Non*
4. VIEW FROM EARTH	*None at this grade span.*	*Non*

Domain (Science Skills, Earth Space, Life, or Physical)
Example: Earth Space Science

Grade Level– the highest grade in the column.
Example: 11

NECAP Science Assessment Targets– These are indicated by a bold box around the expectation. Each Assessment target will be assessed each year.
Example:
S:ESS2:11:2.3 will be assessed on the NECAP Science Assessment.

Reading the NECAP ASSESSMENT TARGET CODE– Found below the text of the Assessment Target is a unique code that identifies the enduring knowledge statement, the grade levels, and the Big Ideas (Unifying Themes) that the content will be approached from. The last number just is the number in a sequence.
Example: [ESS1(9-**11**)SAE+POC-**3**]
ESS1 – grade 11 – SAE (Systems and Energy) POC (Patterns of Change) – 3 (third item on the NECAP list)

New Hampshire Curriculum Framework Science

Science Process Skills Overview

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs	Page K-4	Page 5-8	Page 9-12
SPS1– Scientific Inquiry and Critical Thinking Skills	1. Making observations and asking questions	**18**	**26**	**36**
	2. Designing scientific investigations	**18**	**27**	**36**
	3. Conducting scientific investigations	**18**	**27**	**37**
	4. Representing and Understanding results of Investigations	**19**	**27**	**37**
	5. Evaluating Scientific Investigations	**19**	**28**	**37**
	NECAP Science Assessment Targets for Inquiry (INQ) *May subject of performance component*	**19**	**28**	**37**
SPS2– Unifying Concepts of Science (including NECAP Science Assessment Targets by Big Idea)	1. Nature of Science (NOS)	**20**	**29**	**38**
	2. Systems and Energy (SAE)	**20**	**30**	**39**
	3. Models and Scale (MAS)	**21**	**31**	**39**
	4. Patterns of Change (POC)	**21**	**32**	**40**
	5. Form and Function (FAF)	**21**	**32**	**41**
SPS3– Personal, Social, and Technological Perspectives	1. Collaboration in Scientific Endeavors	**22**	**33**	**42**
	2. Environment, Natural Resources, and Conservation	**22**	**33**	**42**
	3. Science, Technology, and Design	**23**	**34**	**43**
SPS4– Science Skills for Information, Communication and Media Literacy	1. Information and Media Literacy	**24**	**35**	**44**
	2. Communication Skills	**24**	**35**	**44**
	3. Critical Thinking and Systems Thinking	**24**	**35**	**44**
	4. Problem Identification, Formulation, and Solution	**24**	**35**	**44**
	5. Creativity and Intellectual Curiosity	**24**	**35**	**45**
	6. Interpersonal and Collaborative Skills	**25**	**35**	**45**
	7. Self Direction	**25**	**35**	**45**
	8. Accountability and Adaptability	**25**	**35**	**45**
	9. Social Responsibility	**25**	**35**	**45**

Science Process Skills		
SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
1. MAKING OBSERVATIONS AND ASKING QUESTIONS	S:SPS1:2:1.1 Make observations and explore materials using all of their senses (one sense at a time). S:SPS1:2:1.2 Record observations using language, concrete objects, and symbolic representations. S:SPS1:2:1.3 Ask questions about objects, organisms and events in their immediate environment. S:SPS1:2:1.4 Ask questions that lead to exploration and investigation as a result of working with materials and objects. S:SPS1:2:1.5 Sort and classify object materials and events based on one or more attributes; and explain the methods used for sorting.	S:SPS1:4:1.1 Extend the senses using simple tools. S:SPS1:4:1.2 Make and record observations for a given purpose. S:SPS1:4:1.3 Differentiate between observations and inferences. S:SPS1:4:1.4 Record observations using standard units of measurement. S:SPS1:4:1.5 Classify according to several attributes and describe or show the method for classification. S:SPS1:4:1.6 Compare methods of classifying based on the goal. S:SPS1:4:1.7 Ask questions about objects, organisms and events in their local environment. S:SPS1:4:1.8 Pose questions to investigate and practical problems to solve.
2. DESIGNING SCIENTIFIC INVESTIGATIONS	S:SPS1:2:2.1 Select tools and procedures, in a purposeful way, to explore objects and materials. S:SPS1:2:2.2 Suggest a plan and describe a sequence of events for conducting an exploration. S:SPS1:2:2.3 Predict how changing one part of an exploration will affect the outcome.	S:SPS1:4:2.1 Plan a step-by-step process to solve a practical problem or to carry out a "fair test" of a simple scientific question. S:SPS1:4:2.2 Select an activity and justify it as an effective means of collecting appropriate data.
3. CONDUCTING SCIENTIFIC INVESTIGATIONS	S:SPS1:2:3.1 Follow their own plan for conducting an investigation. S:SPS1:2:3.2 Follow a simple step-by-step procedure.	S:SPS1:4:3.1 Follow a set of procedures. S:SPS1:4:3.2 Plan and test ideas through guided experiments. S:SPS1:4:3.3 Identify and use appropriate tools.

Science Process Skills		
SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
4. REPRESENTING AND UNDERSTANDING RESULTS OF INVESTIGATIONS	S:SPS1:2:4.1 Represent and interpret information and observations in many ways (such as in tally, pictographs, bar graphs, tables). S:SPS1:2:4.2 Identify and describe patterns and relationships in observed objects and events.	S:SPS1:4:4.1 Compile and display data in a variety of formats. S:SPS1:4:4.2 Select an appropriate format to represent data or observations. S:SPS1:4:4.3 Identify and suggest possible explanations for patterns. S:SPS1:4:4.4 Analyze data and identify discrepancies.
5. EVALUATING SCIENTIFIC EXPLANATIONS	*None at this level.*	S:SPS1:4:5.1 Cite evidence or data to support conclusions. S:SPS1:4:5.2 Determine if an observation or measurement supports a given scientific explanation. S:SPS1:4:5.3 Draw a conclusion to answer an initial question, based on the evidence collected.
NECAP ASSESSMENT TARGETS FOR INQUIRY *MAY BE SUBJECT OF PERFORMANCE COMPONENT*		NECAP ASSESSMENT TARGETS S:ESS1:4:2.4 S:ESS1:4:5.2 S:ESS1:4:6.4 S:LS1:4:1.2 S:PS1:4:2.5 S:PS2:4:3.8 S:PS3:4:2.1 S:PS3:4:1.5 (For actual text: please see GSE's for Earth Space, Life, and Physical Science.)

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
1. NATURE OF SCIENCE (NOS)	S:SPS2:2:1.1 Recognize that information can be obtained merely by careful observation, but sometimes even more data can be collected by conducting scientific investigations. S:SPS2:2:1.2 Discover that when a scientific investigation is done the way it was done before, we expect to get a very similar result. S:SPS2:2:1.3 Explain that sometimes people aren't sure what will happen because they don't know all the factors that may have an effect on the outcome.	S:SPS2:4:1.1 Recognize that sometimes scientists have different explanations for the same set of observations which usually lead them to make more observations to resolve the differences. S:SPS2:4:1.2 Realize that results of similar scientific investigations seldom turn out exactly the same, but if the differences are large it's important to try to figure out why. S:SPS2:4:1.3 Know when comparisons might not be fair because some conditions are not kept the same. S:SPS2:4:1.4 Explain that scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments; and that investigations can focus on physical, biological, and social questions. S:SPS2:4:1.5 Realize that scientists' explanations about what happens in the world come partly from what they observe, and partly from what they think.
2. SYSTEMS AND ENERGY (SAE)	S:SPS2:2:2.1 Show how most things are made of parts. S:SPS2:2:2.2 Observe that when parts are put together, they can do things that they couldn't do by themselves. S:SPS2:2:2.3 Explain that something may not work if some of its parts are missing.	S:SPS2:4:2.1 Demonstrate that if something consists of many parts, the parts usually influence one another. S:SPS2:4:2.2 Provide examples that demonstrate that something may not work well (or at all) if a part of it is missing, broken, worn out, mismatched, or misconnected.

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
3. MODELS AND SCALE (MAS)	S:SPS2:2:3.1 Describe how a model of something is different from the real thing but can be used to learn something about the real thing. S:SPS2:2:3.2 Explain how one way to describe something is to say how it is like something else. S:SPS2:2:3.3 Provide examples to explain that things in nature and things people make have very different sizes, weights, ages and speeds.	S:SPS2:4:3.1 Know that seeing how a model works after changes are made to it may suggest how the real thing would work if the same changes were done to it. S:SPS2:4:3.2 Use geometric figures, number sequences, graphs, diagrams, and pictures as scientific models. S:SPS2:4:3.3 Recognize that most everything has limits on how big or small it can be.
4. PATTERNS OF CHANGE (POC)	S:SPS2:2:4.1 Discover that things change in some ways and stay the same in some ways. S:SPS2:2:4.2 Understand that people can keep track of some things by seeing where they come from and where they go. S:SPS2:2:4.3 Observe that things can change in different ways, such as in size, weight, color and movement.	S:SPS2:4:4.1 Observe that some small changes can be detected by taking measurements. S:SPS2:4:4.2 Understand that some changes are so slow or so fast that they are hard to see. S:SPS2:4:4.3 Demonstrate that some features of things may stay the same even when other features change (e.g., some patterns look the same when they are shifted over, turned, reflected, or seen from different directions).
5. FORM AND FUNCTION (FAF)	S:SPS2:2:5.1 Identify shape and use of objects. S:SPS2:2:5.2 Draw an object and the object in use.	S:SPS2:4:5.1 Discover the relationship between shape and use. S:SPS2:4:5.2 Explore methods, designs and problems of transporting liquids.

Science Process Skills		
SPS3– Personal, Social, and Technological Perspectives		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
1. COLLABORATION IN SCIENTIFIC ENDEAVORS	S:SPS3:2:1.1 Work with a partner to accomplish a specific task. S:SPS3:2:1.2 Take turns. S:SPS3:2:1.3 Ask questions of others about their work.	S:SPS3:4:1.1 Be able to complete an assigned task when given a specific role in a group. S:SPS3:4:1.2 Communicate ideas to others. S:SPS3:4:1.3 Give specific feedback about work of others.
2. COMMON ENVIRONMENTAL ISSUES, NATURAL RESOURCES MANAGEMENT AND CONSERVATION	S:SPS3:2:2.1 Use observation skills to describe the area around their homes and school.	S:SPS3:4:2.1 Demonstrate a basic conservation action such as recycling or a schoolyard habitat project. S:SPS3:4:2.2 Develop questions based upon their observations about the natural world and design a simple investigation. S:SPS3:4:2.3 Develop questions that help them learn about the environment; and design and conduct simple investigations. S:SPS3:4:2.4 Locate and collect information about the environment and environmental and natural resources topics. S:SPS3:4:2.5 Use reliable information to answer questions. S:SPS3:4:2.6 Organize information to search for relationships and patterns concerning the environment and environmental topics. S:SPS3:4:2.7 Identify and investigate issues in their local environments and communities.

Science Process Skills		
SPS3– Personal, Social, and Technological Perspectives		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
3. SCIENCE AND TECHNOLOGY, TECHNOLOGICAL DESIGN AND APPLICATION	S:SPS3:2:3.1 Demonstrate that all tools have a special purpose (e.g., to measure, to help in observations, to make things or to make things better). S:SPS3:2:3.2 Provide examples that highlight the importance of the planning phase of any project. S:SPS3:2:3.3 Identify multiple ways to solve a design problem. S:SPS3:2:3.4 Describe how most things are made up of multiple parts and explain that things may not work if some parts are missing. S:SPS3:2:3.5 Provide examples of how people throughout history have used legends and stories to explain how the world works.	S:SPS3:4:3.1 Describe the design process as a logical progression for transforming ideas into reality. S:SPS3:4:3.2 Describe how people have designed and used tools throughout history; and provide examples of how many of these tools, while improved, are still in use today. S:SPS3:4:3.3 Provide examples illustrating that throughout history, people of all ages and from all walks of life have made significant contributions to the fields of science and technology.

Science Process Skills		
SPS4– Science Skills for Information, Communication and Media Literacy (from *ICT Literacy Map for Science,* www.21stcenturyskills.org)		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
1. INFORMATION AND MEDIA LITERACY	S:SPS4:2:1.1 Have experience with a variety of media sources. S:SPS4:2:1.2 Use tools. S:SPS4:2:1.3 Use age-appropriate sources such as newspapers, books and websites.	S:SPS4:4:1.1 Access information from a variety of media sources (e.g., Internet, CD-ROM programs, print resources). S:SPS4:4:1.2 Use appropriate tools to measure and graph data. S:SPS4:4:1.3 Analyze and compare data from a variety of age-appropriate sources such as newspapers and websites.
2. COMMUNICATION SKILLS	S:SPS4:2:2.1 Communicate ideas and observations through a variety of tools and formats (e.g., oral, journal, drawing, projects, multimedia).	S:SPS4:4:2.1 Use a variety of tools and formats (oral presentations, journals, and multimedia presentations) to summarize and communicate the results of observations.
3. CRITICAL THINKING AND SYSTEMS THINKING	S:SPS4:2:3.1 Make observations and tell ideas about real-life issues. S:SPS4:2:3.2 Use pictures or other means to organize ideas. S:SPS4:2:3.3 Make a graph to represent data.	S:SPS4:4:3.1 Apply a variety of age-appropriate strategies to address real-life issues (e.g., identify factors that affect plants in a particular habitat). S:SPS4:4:3.2 Build a concept map (or other graphic organizer) to understand a complex problem. S:SPS4:4:3.3 Organize observations and data into tables, charts and graphs.
4. PROBLEM IDENTIFICATION, FORMULATION, AND SOLUTION	S:SPS4:2:4.1 Ask questions and take part in investigations. S:SPS4:2:4.2 Compile observations (one to one relationship) by making or using simple pictographs, tally charts or simple graphs. S:SPS4:2:4.3 Look for evidence to support ideas.	S:SPS4:4:4.1 Ask questions and plan investigations to find answers. S:SPS4:4:4.2 Compile data gathered through observations to record and present results using tally charts, tables and graphs. S:SPS4:4:4.3 Use evidence to construct explanations.
5. CREATIVITY AND INTELLECTUAL CURIOSITY	S:SPS4:2:5.1 Use computer software and various technologies as appropriate to display and communicate information and ideas.	S:SPS4:4:5.1 Use a variety of equipment and software packages to enter, process, display, and/or communicate information in different forms using text, tables, pictures, and sound (e.g., brainstorming software, collaboration software, telecommunications, presentation software, digital cameras, projectors).

Science Process Skills		
SPS4– Science Skills for Information, Communication and Media Literacy (from *ICT Literacy Map for Science,* www.21stcenturyskills.org)		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
6. INTERPERSONAL AND COLLABORATIVE SKILLS	S:SPS4:2:6.1 Plan and carry out simple activities with a group.	S:SPS4:4:6.1 Plan and conduct a scientific investigation in group settings. S:SPS4:4:6.2 Engage in group decision making activities. S:SPS4:4:6.3 Role-play different points of view on an issue.
7. SELF DIRECTION	S:SPS4:2:7.1 Keep a visual or written journal.	S:SPS4:4:7.1 Keep a journal record of observations, recognizing patterns, summarizing findings, and reflecting on the observations.
8. ACCOUNTABILITY AND ADAPTABILITY	S:SPS4:2:8.1 Take part in sharing information with another classroom or school as a group.	S:SPS4:4:8.1 Establish ongoing communication with students from other communities or countries to share and compare data.
9. SOCIAL RESPONSIBILITY	S:SPS4:2:9.1 Collaborate, as a group, with another classroom or school.	S:SPS4:4:9.1 Collaborate with other learners by letter, phone, or online.

Science Process Skills		
SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
1. MAKING OBSERVATIONS AND ASKING QUESTIONS	S:SPS1:6:1.1 Make observations and record measurements using a variety of tools and instruments. S:SPS1:6:1.2 Plan observations based on a given purpose. S:SPS1:6:1.3 Identify and investigate similarities and differences among observations and sets of observations. S:SPS1:6:1.4 Use appropriate units and precision of metric measurement when recording data. S:SPS1:6:1.5 Use a classification key, such as a dichotomous key, to identify and distinguish among members of a group or set. S:SPS1:6:1.6 Construct a simple classification key. S:SPS1:6:1.7 Compare methods of classification for a specific purpose. S:SPS1:6:1.8 Ask questions about relationships between and among observations. S:SPS1:6:1.9 Determine which observations will be helpful to a given investigation. S:SPS1:6:1.10 Distinguish between those questions that can be answered by science and those that cannot.	S:SPS1:8:1.1 Use appropriate tools to accurately collect and record both qualitative and quantitative data gathered through observations (e.g., temperature probes, electronic balances, spring scales, microscopes, stop watches). S:SPS1:8:1.2 Determine the degree of accuracy that can be obtained using a given instrument. S:SPS1:8:1.3 Investigate similarities and differences noted when making observations. S:SPS1:8:1.4 Construct and use a dichotomous key to classify a given set of objects or organisms. S:SPS1:8:1.5 Evaluate methods of classification for a specific purpose. S:SPS1:8:1.6 Rephrase questions so that they can be tested or investigated using scientific methodologies. S:SPS1:8:1.7 Ask questions about relationships between and among observable variables.

Science Process Skills		
SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
2. DESIGNING SCIENTIFIC INVESTIGATIONS	S:SPS1:6:2.1 Design and record a simple step-by-step procedure to follow in order to carry out a fair test of a scientific question. S:SPS1:6:2.2 Identify and utilize appropriate tools/technology for collecting data in designing investigations. S:SPS1:6:2.3 Incorporate components of good experimental design, such as controls and multiple trials, into investigations.	S:SPS1:8:2.1 Identify the manipulated, responding and controlled variables in an experiment. S:SPS1:8:2.2 Design a controlled experiment, identifying and controlling the major variables. S:SPS1:8:2.3 Identify flaws or omissions in the design of simple experiments.
3. CONDUCTING SCIENTIFIC INVESTIGATIONS	S:SPS1:6:3.1 Carry out simple student or teacher-developed procedures or experiments. S:SPS1:6:3.2 Use appropriate tools to collect and record data. S:SPS1:6:3.3 Follow the teacher's instructions in performing experiments, following all appropriate safety rules and procedures.	S:SPS1:8:3.1 Use appropriate laboratory techniques to carry out student- or teacher-developed procedures or experiments. S:SPS1:8:3.2 Use appropriate tools to gather data as part of an investigation (e.g., ruler, meter stick, thermometer, spring scale, graduated cylinder, calipers, balance, probes, microscopes). S:SPS1:8:3.3 Follow the teacher's instructions in performing experiments, following all appropriate safety rules and procedures.
4. REPRESENTING AND UNDERSTANDING RESULTS OF INVESTIGATIONS	S:SPS1:6:4.1 Use appropriate tools to organize, represent, analyze and explain data. S:SPS1:6:4.2 Make and record observations using a pre-determined format. S:SPS1:6:4.3 Compare and display data in a variety of student or computer generated formats (such as diagrams, flow charts, tables, bar graphs, line graphs, scatter plots, and histograms). S:SPS1:6:4.4 Identify patterns and relationships in data and formulate basic explanations. S:SPS1:6:4.5 Draw appropriate conclusions based on data collected.	S:SPS1:8:4.1 Use appropriate tools (including computer hardware and software) to collect, organize, represent, analyze and explain data. S:SPS1:8:4.2 Identify sources of error in experiments. S:SPS1:8:4.3 Draw appropriate conclusions regarding the scientific question under investigation, based on the data collected.

Science Process Skills		
SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
5. EVALUATING SCIENTIFIC EXPLANATIONS	S:SPS1:6:5.1 Determine if the results of an experiment support or fail to support the scientific idea tested. S:SPS1:6:5.2 Explain how a hypothesis is a direct extension of a scientific idea and therefore makes that idea "testable."	S:SPS1:8:5.1 Determine if the results of an experiment support or refute the scientific idea tested. S:SPS1:8:5.2 Evaluate whether the information and data collected allows an evaluation of the scientific idea under investigation. S:SPS1:8:5.3 Determine what additional information would be helpful in answering the scientific question.
NECAP ASSESSMENT TARGETS FOR INQUIRY *MAY BE SUBJECT OF PERFORMANCE COMPONENT*		NECAP ASSESSMENT TARGETS S:ESS1:8:2.2 S:ESS1:8:6.4 S:LS1:8:2.5 S:LS2:8:1.3 S:LS4:8:2.4 S:LS1:8:3.7 S:LS4:8:3.4 S:PS1:8:2.4 S:PS1:8:2.5 S:PS1:8:1.6 S:PS2:8:3.6 S:PS3:8:1.3 (For actual text: please see GSE's for Earth Space, Life, and Physical Science.)

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
1. NATURE OF SCIENCE (NOS)	S:SPS2:6:1.1 Explain that scientists do not pay much attention to claims about how something works unless they are backed up with evidence that can be confirmed with a logical argument. S:SPS2:6:1.2 Describe how results of similar and repeated investigations may vary and suggest possible explanations for variations. S:SPS2:6:1.3 Explain that sometimes similar investigations get different results because of unexpected differences in the things being investigated, the methods used, or the circumstances in which the investigation is carried out, and sometimes just because of uncertainties of observations. S:SPS2:6:1.4 Realize that if more than one variable changes at the same time in an experiment, the outcome of the experiment may not be clearly attributable to any one of the variables.	S:SPS2:8:1.1 Describe how scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence. S:SPS2:8:1.2 Realize that when similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, and this often requires more investigations. S:SPS2:8:1.3 Realize that knowledge, based on science, is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way. S:SPS2:8:1.4 Provide examples that show how some scientific knowledge is very old and yet is still applicable today. S:SPS2:8:1.5 Recognize that some matters cannot be examined usefully in a scientific way, such as those matters that by their nature cannot be tested objectively and those that are essentially matters of morality. S:SPS2:8:1.6 Give examples of how science can sometimes be used to inform ethical decisions by identifying the likely consequences of particular actions but cannot be used to establish that some action is either moral or immoral.

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
2. SYSTEMS AND ENERGY (SAE)	S:SPS2:6:2.1 Recognize that thinking about things as systems means looking for how every part relates to others. S:SPS2:6:2.2 Discover that collections of pieces (e.g., powders, marbles, sugar cubes or wooden blocks) may have properties that the individual pieces do not. S:SPS2:6:2.3 Estimate or predict the effect that making a change in one part of the system will have on other parts, and on the system as a whole. S:SPS2:6:2.4 Compare a variety of forms of energy, including heat, light, sound, mechanical, electrical, and chemical energy. S:SPS2:6:2.5 Demonstrate how energy can be transformed from one form to another (e.g., from electrical energy to heat, light or mechanical energy).	S:SPS2:8:2.1 Understand that any system is usually connected to other systems, both internally and externally; thus a system may be thought of as containing subsystems and as being a subsystem of a larger system. S:SPS2:8:2.2 Analyze how the output of one part of a system, which can include materials, energy or information, can become the input to other parts. S:SPS2:8:2.3 Realize that as the complexity of any system increases, gaining an understanding of it depends increasingly on summaries (such as averages and ranges) and on descriptions of typical examples of that system. S:SPS2:8:2.4 Explain that when energy is transformed or converted from one type to another, there is no net loss of energy. S:SPS2:8:2.5 Describe how objects and substances can store energy (e.g., a battery, food, gasoline).

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
3. MODELS AND SCALE (MAS)	S:SPS2:6:3.1 Understand that models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly; or that are too vast to be changed deliberately; or that are potentially dangerous. S:SPS2:6:3.2 Analyze how finding out the biggest and smallest values of something are often as revealing as knowing what the usual value is.	S:SPS2:8:3.1 Demonstrate how mathematical models can be displayed on a computer and then modified to see what happens. S:SPS2:8:3.2 Know that different models can be used to represent the same thing; what kind of model is used and how complex it should be depends on its purpose; and the usefulness of a model is one of the instances in which intuition and creativity come into play in science, mathematics and engineering. S:SPS2:8:3.3 Discover how properties of systems that depend on volume, such as capacity and weight change, change out of proportion to properties that depend on area, such as strength or surface processes. S:SPS2:8:3.4 Recognize that as the complexity of any system increases, gaining an understanding increasingly depends on summaries (such as averages and ranges) and on descriptions of typical examples of that system.

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
4. PATTERNS OF CHANGE (POC)	S:SPS2:6:4.1 Understand that things change in steady, repetitive, or irregular ways, or sometimes in more than one way at the same time; often the best way to tell which kinds of change are happening is to make a table or graph of measurements. S:SPS2:6:4.2 Discover how a system may stay the same because nothing is happening or because things are happening that exactly balance each other out.	S:SPS2:8:4.1 Analyze how physical and biological systems tend to change until they become stable and then stay that way unless their surroundings change. S:SPS2:8:4.2 Recognize how many systems contain feedback mechanisms that serve to keep changes within specified limits. S:SPS2:8:4.3 Realize that symbolic equations can be used to summarize how the quantity of something changes over time or in response to other changes. S:SPS2:8:4.4 Explain how symmetry (or the lack of it) may determine properties of many objects, from molecules and crystals to organisms and designed structures. S:SPS2:8:4.5 Realize that cycles, such as the seasons or body temperature, can be described by their cycle length or frequency, what their highest and lowest values are, and when those values occur; different cycles range from many thousand years down to less than a billionth of a second.
5. FORM AND FUNCTION (FAF)	S:SPS2:6:5.1 Describe the structure and function of organs. S:SPS2:6:5.2 Diagram and label the structure of the primary components of representative organs in plants and animals. S:SPS2:6:5.3 Investigate the relationship between various landforms and wind currents.	S:SPS2:8:5.1 Describe the relationship between structure and function of organ systems in plants and animals. S:SPS2:8:5.2 Describe the structure and function of various organ systems (i.e., digestion, respiration, circulation, nervous, protection and support) and how these systems contribute to homeostasis of the organism. S:SPS2:8:5.3 Compare the structure and function of organ systems in one organism to the structure and function in another organism.

Science Process Skills		
SPS3– Personal, Social, and Technological Perspectives		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
1. COLLABORATION IN SCIENTIFIC ENDEAVORS	S:SPS3:6:1.1 Work effectively within a cooperative group setting, accepting and executing assigned roles and responsibilities. S:SPS3:6:1.2 Work collectively within a group toward a common goal. S:SPS3:6:1.3 Demonstrate respect of one another's abilities and contributions to the group.	S:SPS3:8:1.1 Work effectively within a cooperative group setting, accepting and executing assigned roles and responsibilities. S:SPS3:8:1.2 Work collectively within a group toward a common goal. S:SPS3:8:1.3 Demonstrate respect of one another's abilities and contributions to the group. S:SPS3:8:1.4 Demonstrate an understanding of the ethics involved in scientific inquiry.
2. COMMON ENVIRONMENTAL ISSUES, NATURAL RESOURCES MANAGEMENT AND CONSERVATION	S:SPS3:6:2.1 Develop, focus and explain questions about the environment and do environmental investigations. S:SPS3:6:2.2 Design environmental investigations to answer particular questions. S:SPS3:6:2.3 Explore evidence that human-caused changes have consequences for the immediate environment as well as for other places and future times. S:SPS3:6:2.4 Explore how humans shape and control the environment while creating knowledge and developing new technologies. S:SPS3:6:2.5 Investigate environmental and resource management issues at scales that range from local to national to global.	S:SPS3:8:2.1 Locate and collect reliable information about the environment and environmental topics using a variety of methods and sources. S:SPS3:8:2.2 Judge the weaknesses and strengths of the information they are using. S:SPS3:8:2.3 Explore the uses and limitations of models. S:SPS3:8:2.4 Synthesize observations and findings into coherent explanations about natural resources and the environment.

Science Process Skills		
SPS3– Personal, Social, and Technological Perspectives		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
3. SCIENCE AND TECHNOLOGY, TECHNOLOGICAL DESIGN AND APPLICATION	S:SPS3:6:3.1 Identify problems/issues that can be addressed by design technology. S:SPS3:6:3.2 Identify and describe the procedure for designing a product, including identifying a need, researching, brainstorming, selecting, developing a prototype, testing and evaluating. S:SPS3:6:3.3 Evaluate technological designs using established criteria.	S:SPS3:8:3.1 Design a product or solution to a problem. S:SPS3:8:3.2 Build a product that has been designed in class. S:SPS3:8:3.3 Evaluate student-designed products according to established criteria and recommend improvements or modifications.

Science Process Skills	
SPS4– Science Skills for Information, Communication and Media Literacy (from *ICT Literacy Map for Science,* www.21stcenturyskills.org)	
	By the end of Grade 8, all students will apply skills from previous grades and…
1. INFORMATION AND MEDIA LITERACY	S:SPS4:8:1.1 Use a variety of information access tools to locate, gather, and organize potential sources of scientific information to answer questions. S:SPS4:8:1.2 Collect real-time observations and data, synthesizing and building upon existing information (e.g., online databases, NOAA, EPA, USGS) to solve problems. S:SPS4:8:1.3 Use appropriate tools to analyze and synthesize information (e.g., diagrams, flow charts, frequency tables, bar graphs, line graphs, stem-and-leaf plots) to draw conclusions and implications based on investigations of an issue or question.
2. COMMUNICATION SKILLS	S:SPS4:8:2.1 Use a wide range of tools and a variety of oral, written, and graphic formats to share information and results from observations and investigations.
3. CRITICAL THINKING AND SYSTEMS THINKING	S:SPS4:8:3.1 Execute steps of scientific inquiry to engage in the problem-solving and decision making processes. S:SPS4:8:3.2 Apply new and unusual applications of existing knowledge to new and different situations. S:SPS4:8:3.3 Make sketches, graphs, and diagrams to explain ideas and to demonstrate the interconnections between systems.
4. PROBLEM IDENTIFICATION, FORMULATION, AND SOLUTION	S:SPS4:8:4.1 Formulate a scientific question about phenomena, a problem, or an issue and using a broad range of tools and techniques; and plan and conduct an inquiry to address the question. S:SPS4:8:4.2 Use evidence collected from observations or other sources and use them to create models and explanations.
5. CREATIVITY AND INTELLECTUAL CURIOSITY	S:SPS4:8:5.1 Use a variety of media tools to make oral and written presentations, which include written notes and descriptions, drawings, photos, and charts to communicate the procedures and results of an investigation.
6. INTERPERSONAL AND COLLABORATIVE SKILLS	S:SPS4:8:6.1 Work in diverse pairs/teams to answer questions, solve problems and make decisions. S:SPS4:8:6.2 Plan and develop team science projects. S:SPS4:8:6.3 Articulate understanding of content through personal interaction and sharing with peers.
7. SELF DIRECTION	S:SPS4:8:7.1 Keep a journal of observations and investigations, and periodically evaluate entries to assess progress toward achieving the understanding of key ideas.
8. ACCOUNTABILITY AND ADAPTABILITY	S:SPS4:8:8.1 Develop and execute a plan to collect and record accurate and complete data from various sources to solve a problem or answer a question; and gather and critically analyze data from a variety of sources. S:SPS4:8:8.2 Participate in science competitions, where students are responsible for creating a product or participating in an event.
9. SOCIAL RESPONSIBILITY	S:SPS4:8:9.1 Collaborate with a network of learners by phone, video, virtual classroom platform. S:SPS4:8:9.2 Participate in simulation or role-playing activities in which students grapple with the ethics of complex issues.

Science Process Skills		
SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
1. MAKING OBSERVATIONS AND ASKING QUESTIONS	S:SPS1:11:1.1 Ask questions about relationships among variables that can be observed directly as well as those that cannot. S:SPS1:11:1.2 Use complex classification criteria and keys to identify items/organisms. S:SPS1:11:1.3 Evaluate complex methods of classification for a specific purpose. S:SPS1:11:1.4 Identify limitations of a given classification system and identify alternative ways of classifying to accommodate anomalies.	S:SPS1:12:1.1 Define and delimit problems to facilitate investigation. S:SPS1:12:1.2 Make and record measurements to the correct number of significant figures based on the precision of the instrument used. S:SPS1:12:1.3 Make measurements and observations about a variety of events and phenomena, including those that occur during very small and very large time frames. S:SPS1:12:1.4 Ask questions about relationships between and among observable variables as well as theoretical entities. S:SPS1:12:1.5 Use, evaluate and apply complex classification schemes based on an understanding of scientific concepts, laws and principles. S:SPS1:12:1.6 Describe and apply classification systems and nomenclatures used in the sciences.
2. DESIGNING SCIENTIFIC INVESTIGATIONS	S:SPS1:11:2.1 Apply scientific theories and laws to new situations to generate hypotheses. S:SPS1:11:2.2 State a hypothesis and prediction based on available evidence and background information.	S:SPS1:12:2.1 Identify the theoretical basis of an investigation and develop a prediction and a hypothesis that are consistent with the theoretical basis. S:SPS1:12:2.2 Evaluate and select appropriate instruments for collecting data and evidence in an investigation. S:SPS1:12:2.3 Develop appropriate sampling procedures for a given investigation.

Science Process Skills		
SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
3. CONDUCTING SCIENTIFIC INVESTIGATIONS	S:SPS1:11:3.1 Select and use apparatus and material safely. S:SPS1:11:3.2 Use instruments effectively and accurately for collecting data. S:SPS1:11:3.3 Compile and organize data, using appropriate units.	S:SPS1:12:3.1 Carry out procedures controlling major variables and adapting or extending procedures where required. S:SPS1:12:3.2 Implement appropriate sampling procedures. S:SPS1:12:3.3 Identify and explain sources of error and uncertainty in measurement and express results in a form that acknowledges the degree of uncertainty.
4. REPRESENTING AND UNDERSTANDING RESULTS OF INVESTIGATIONS	S:SPS1:11:4.1 Compile and display data, evidence and information by hand and computer, in a variety of formats, including diagrams, flow charts, tables, graphs and scatter plots.	S:SPS1:12:4.1 Interpret patterns and trends in data, and infer or calculate linear and non-linear relationships among variables. S:SPS1:12:4.2 Compare theoretical and empirical values and account for discrepancies. S:SPS1:12:4.3 Evaluate the relevance, reliability and adequacy of data and data collection methods.
5. EVALUATING SCIENTIFIC EXPLANATIONS	S:SPS1:11:5.1 Explain how data support or refute the hypothesis or prediction. S:SPS1:11:5.2 Provide a statement that addresses and answers the question investigated in light of the evidence generated in the investigation.	S:SPS1:12:5.1 Explain how two different scientific explanations for the same phenomenon can be evaluated using the predictive value of the explanations. S:SPS1:12:5.2 Apply and assess alternative theoretical models.
NECAP ASSESSMENT TARGETS FOR INQUIRY *MAY BE SUBJECT OF PERFORMANCE COMPONENT*	NECAP ASSESSMENT TARGETS S:ESS1:11:4.1 S:ESS1:11:3.2 S:LS1:11:2.8 S:LS2:11:1.5 S:LS3:11:3.9 S:LS3:11:2.6 S:LS4:11:2.6 S:PS1:11:2.6 S:PS2:11:3.10 S:PS3:11:1.8 (For actual text: please see GSE's for Earth Space, Life, and Physical Science.)	

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
1. NATURE OF SCIENCE (NOS)	S:SPS2:11:1.1 Explore new phenomena through investigations conducted for different reasons, or to check on previous results. S:SPS2:11:1.2 Test how well a theory predicts a phenomena. S:SPS2:11:1.3 Recognize that sometimes scientists can control conditions in order to focus on the effect of a single variable; when that is not possible for practical or ethical reasons, they try to observe as wide a range of natural occurrences as possible to be able to discern patterns. S:SPS2:11:1.4 Show how hypotheses are widely used in science for choosing what data to pay attention to and what additional data to seek, and for guiding the interpretation of the data (both new and previously available). S:SPS2:11:1.5 Understand that in the long run, theories are judged by how they fit with other theories, the range of observations they explain, how well they explain observations, and how effective they are in predicting new findings. S:SPS2:11:1.6 Show how the usefulness of a model can be tested by comparing its predictions to actual observations in the real world; but a close match does not mean that the model is the only "true" model or the one that would work. S:SPS2:11:1.7 Realize that in science, the testing, revising, and occasional discarding of theories, new and old, never ends; this ongoing process leads to an increasingly better understanding of how things work in the world but not to absolute truth.	S:SPS2:12:1.1 Recognize that there are different traditions in science about what is investigated and how; but they all have in common certain beliefs about the value of evidence, logic and good arguments. S:SPS2:12:1.2 Understand that no matter how well one theory fits observations, a new theory might fit them better, or might fit a wider range of observations. S:SPS2:12:1.3 Explain how in the short run, new ideas that do not mesh well with mainstream ideas in science often encounter vigorous criticism. S:SPS2:12:1.4 Know that from time to time, major shifts occur in the scientific view of how the world works; more often, however, the changes that take place in the body of scientific knowledge are small modifications of prior knowledge (change and continuity are persistent features of science). S:SPS2:12:1.5 Recognize that evidence for the value of testing, revising and discarding theories is given by the improving ability of scientists to offer reliable explanations and make accurate predictions.

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
2. SYSTEMS AND ENERGY (SAE)	S:SPS2:11:2.1 Realize that systems may be so closely related that there is no way to draw boundaries that separate all parts of one from all parts of the others. S:SPS2:11:2.2 Give examples to show that a system usually has some properties that are different from those of its parts, but appear because of the interaction of those parts. S:SPS2:11:2.3 Demonstrate that even in some very simple systems, it may not always be possible to predict accurately the result of changing some part or connection.	S:SPS2:12:2.1 Use evidence and logic to explain that as the number of parts in a system grows in size, the number of possible interactions increases much more rapidly, roughly with the square of the number of parts. S:SPS2:12:2.2 Know that understanding how things work and designing solutions to problems of almost any kind can be facilitated by systems analysis; in defining a system, it is important to specify its boundaries and subsystems, indicate its relation to other systems, and identify what its input and output are expected to be.
3. MODELS AND SCALE (MAS)	S:SPS2:11:3.1 Understand that the basic idea of mathematical modeling is to find a mathematical relationship that behaves in the same way as the objects or processes under investigation; a mathematical model may give insight about how something really works or may fit observations very well without any intuitive meaning.	S:SPS2:12:3.1 Recognize that computers have greatly improved the power and use of mathematical models by performing computations that are very long, very complicated, or repetitive; therefore, computers can show the consequences of applying complex rules or of changing the rules. The graphic capabilities of computers make them useful in the design and testing of devices and structures and in the simulation of complicated processes.

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
4. PATTERNS OF CHANGE (POC)	S:SPS2:11:4.1 Recognize that things can change in detail, but remain the same in general (e.g., the players change but the team remains, the cells are replaced but the organism remains); sometimes counterbalancing changes are necessary for a thing to retain its essential constancy in the presence of changing conditions. S:SPS2:11:4.2 Describe how graphs and equations are useful (and often equivalent) ways for depicting and analyzing patterns of change. S:SPS2:11:4.3 Give examples of how a system in equilibrium may return to the same state of equilibrium if the disturbances it experiences are small; but large disturbances may cause it to escape that equilibrium and eventually settle into some other state of equilibrium. S:SPS2:11:4.4 Describe how in evolutionary change, the present arises from the materials and forms of the past, more or less gradually, and in ways that can be explained.	S:SPS2:12:4.1 Give examples of how in many physical, biological and social systems, changes in one direction tend to produce opposing (but somewhat delayed) influences, leading to repetitive cycles of behavior. S:SPS2:12:4.2 Realize that most systems above the molecular level involve so many parts and forces and are so sensitive to tiny differences in conditions that their precise behavior is unpredictable, even if all the rules for change are known. Predictable or not, the precise future of a system is not completely determined by its present state and circumstances but also on the fundamentally uncertain outcomes of events on the atomic scale.

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
5. FORM AND FUNCTION (FAF)	S:SPS2:11:5.1 Explore how the movement of ocean floor plates under continental plates or two continental plates moving against each other can deform the earth's surface. S:SPS2:11:5.2 Provide data and evidence on how folding in crustal plates can cause mountain ranges. S:SPS2:11:5.3 Understand that an atom's electron configuration determines how the atom can interact with other atoms. S:SPS2:11:5.4 Provide examples of how configuration of atoms in a molecule determines a molecule's properties. S:SPS2:11:5.5 Discover how the shape of large molecules affects the interaction with other molecules. S:SPS2:11:5.6 Demonstrate that a variety of biological, chemical and physical phenomena can be explained by changes in the arrangement and motion of atoms and molecules.	*Same as Grade 11*

Science Process Skills		
SPS3– Personal, Social, and Technological Perspectives		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
1. COLLABORATION IN SCIENTIFIC ENDEAVORS	S:SPS3:11:1.1 Collaborate with existing research efforts. S:SPS3:11:1.2 Identify global researchers in a field of interest.	*Same as grade 11*
2. COMMON ENVIRONMENTAL ISSUES, NATURAL RESOURCES MANAGEMENT AND CONSERVATION	S:SPS3:11:2.1 Develop, modify, clarify and explain questions that guide environmental investigations of various types. S:SPS3:11:2.2 Design investigations to answer particular questions about the environment. S:SPS3:11:2.3 Locate and collect reliable information for environmental investigations of many types. S:SPS3:11:2.4 Apply basic logic and reasoning skills to evaluate completeness and reliability in a variety of information sources. S:SPS3:11:2.5 Organize and display information in ways appropriate to different types of environmental investigations and purposes. S:SPS3:11:2.6 Create, use and evaluate models to understand environmental phenomena. S:SPS3:11:2.7 Use to evidence and logic in developing proposed explanations that address their initial questions and hypotheses. S:SPS3:11:2.8 Analyze global, social, cultural, political, economic and environmental linkages. S:SPS3:11:2.9 Evaluate presentations of environmental issues for accuracy.	*Same as grade 11*

Science Process Skills		
SPS3– Personal, Social, and Technological Perspectives		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
3. SCIENCE AND TECHNOLOGY, TECHNOLOGICAL DESIGN AND APPLICATION	S:SPS3:11:3.1 Analyze environmental issues such as water quality, air quality, hazardous waste, and depletion of natural resources. S:SPS3:11:3.2 Evaluate status of a local community system (transportation, water, communication, food resources or electrical) in partnership with local officials. S:SPS3:11:3.3 Analyze technical writing, graphs, charts, and diagrams.	*Same as grade 11*

Science Process Skills	
SPS4– Science Skills for Information, Communication and Media Literacy (from *ICT Literacy Map for Science,* www.21stcenturyskills.org)	
	By the end of Grade 11, all students will apply skills from previous grades and…
1. INFORMATION AND MEDIA LITERACY	S:SPS4:12:1.1 Select and analyze information from various sources (including electronic resources, print resources, community resources) and personally collected data to answer questions being investigated. S:SPS4:12:1.2 Collect and use qualitative and quantitative data and information, seek evidence and sources of information to identify flaws such as errors and bias, and explain how the evidence supports or refutes an initial hypothesis. S:SPS4:12:1.3 Analyze data and information gathered to clarify problems or issues identifying costs and benefits from a social, cultural, and/or environmental perspective; predict the consequences of action or inaction; and propose possible solutions.
2. COMMUNICATION SKILLS	S:SPS4:12:2.1 Select and use appropriate scientific vocabulary to orally share and communicate scientific ideas, plans, results, and conclusions resulting from investigations. S:SPS4:12:2.2 Create written reports and journals to share and communicate scientific ideas, plans, results, and conclusions resulting from observations and investigations. S:SPS4:12:2.3 Create a multimedia presentation incorporating numeric symbolic and/or graphic modes of representation to share scientific ideas, plans, results, and conclusions.
3. CRITICAL THINKING AND SYSTEMS THINKING	S:SPS4:12:3.1 Pursue scientific inquiry such as observation, measurement, hypothesis formation and analysis, and value "habits of mind" such as persistence, accuracy, and collaboration. S:SPS4:12:3.2 Generate solutions to scientific questions and challenges through developing, modeling and revising investigations. S:SPS4:12:3.3 Apply scientific knowledge and skills to make reasoned decisions about the use of science and scientific innovations.
4. PROBLEM IDENTIFICATION, FORMULATION, AND SOLUTION	S:SPS4:12:4.1 Formulate scientific questions about an issue and define experimental procedures for finding answers. S:SPS4:12:4.2 Plan and conduct practical tests to solve problems or answer a question, collect and analyze data using appropriate instruments and techniques safely and accurately. S:SPS4:12:4.3 Develop models and explanations to fit evidence obtained through investigations.

Science Process Skills	
SPS4– Science Skills for Information, Communication and Media Literacy (from *ICT Literacy Map for Science,* www.21stcenturyskills.org)	
	By the end of Grade 11, all students will apply skills from previous grades and…
5. CREATIVITY AND INTELLECTUAL CURIOSITY	S:SPS4:12:5.1 Prepare multimedia presentations to share results of investigations, demonstrating a clear sense of audience and purpose. S:SPS4:12:5.2 Use electronic networks to share information. S:SPS4:12:5.3 Model solutions to a range of problems in science and technology using computer simulation software.
6. INTERPERSONAL AND COLLABORATIVE SKILLS	S:SPS4:12:6.1 Create a culminating team project that demonstrates content knowledge and conceptual understanding and shows connections between science content and real-world settings. S:SPS4:12:6.2 Collect, synthesize, and report information from a variety of points of view.
7. SELF DIRECTION	S:SPS4:12:7.1 Use key ideas of science to document and explain through an investigation the relationship between science and concepts. S:SPS4:12:7.2 Self-assess progress toward a predetermined outcome and decide what needs to be done to meet the goal.
8. ACCOUNTABILITY AND ADAPTABILITY	S:SPS4:12:8.1 Identify the reputable and appropriate communities of learners to whom research findings should be reported, compare data, and adapt as needed. S:SPS4:12:8.2 Use science learned to create a personal action plan on a community issue.
9. SOCIAL RESPONSIBILITY	S:SPS4:12:9.1 Collaborate with interested learners using appropriate web resources and publication media such as journals (print and electronic).

Earth Space Science Overview

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs	Page K-4	Page 5-8	Page 9-12
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.	1. Atmosphere, Climate, and Weather	**47**	**52**	**59**
	2. Composition and Features	**47**	**52**	**59**
	3. Fossils	**48**	**52**	**60**
	4. Observation Of The Earth From Space	**48**	**53**	**60**
	5. Processes and Rates Of Change	**48**	**53**	**61**
	6. Rock Cycle	**48**	**53**	**61**
	7. Water	**48**	**54**	**61**
ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.	1. Earth, Sun And Moon	**49**	**55**	**62**
	2. Energy	**49**	**55**	**62**
	3. Solar System	**49**	**56**	**62**
	4. View From Earth	**49**	**56**	**62**
ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.	1. Size And Scale	**50**	**57**	**63**
	2. Stars And Galaxies	**50**	**57**	**63**
	3. Universe	**50**	**57**	**64**
ESS4– The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	1. Design Technology	**51**	**58**	**65**
	2. Tools	**51**	**58**	**65**
	3. Local And Global Environmental Issues	**51**	**58**	**65**
	4. Career and Technical Education	**51**	**58**	**65**

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	K-2	**3-4**
1. ATMOSPHERE, CLIMATE, AND WEATHER	S:ESS1:2:1.1 Recognize that weather conditions change frequently, and that weather patterns change over the seasons. S:ESS1:2:1.2 Describe and compare weather using observations and measurements of local weather conditions.	S:ESS1:4:1.1 Explain how water exists in the atmosphere in different forms and describe how it changes from one form to another through various processes such as freezing, condensation, precipitation and evaporation. S:ESS1:4:1.2 Explain that air surrounds the Earth, it takes up space, and it moves around as wind. S:ESS1:4:1.3 Based on data collected from daily weather observations, describe weather changes or weather patterns. [ESS1(K-**4**)POC-**5**] S:ESS1:4:1.4 Explain how the use of scientific tools helps to extend senses and gather data about weather (i.e., weather/wind vane– direction; wind sock– wind intensity; anemometer– speed; thermometer– temperature; meter sticks/rulers– snow depth; rain gauges– rain amount in inches). [ESS1(K-**4**)NOS-**3**]
2. COMPOSITION AND FEATURES	S:ESS1:2:2.1 Recognize that solid rocks, soils, and water in its liquid and solid states can be found on the Earth's surface. S:ESS1:2:2.2 Use observable properties, such as color and texture, to classify and organize rocks and minerals. S:ESS1:2:2.3 Recognize that Earth materials have a variety of properties, including size, shape, color and texture.	S:ESS1:4:2.1 Describe Earth materials such as gases found in the atmosphere, rocks, soils, and water in its liquid and solid states. S:ESS1:4:2.2 Describe rock as being composed of different combinations of minerals. S:ESS1:4:2.3 Given information about Earth materials, explain how their characteristics lend themselves to specific uses. [ESS1(K-**4**)FAF-**6**] S:ESS1:4:2.4 Given certain Earth materials (soils, rocks, or minerals) use physical properties to sort, classify, and/or describe them. [ESS1(K-**4**)INQ-**1**]

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	K-2	**3-4**
3. FOSSILS	*None at this grade span.*	S:ESS1:4:3.1 Recognize and explain that fossils offer evidence of plants, animals and the nature of environments that existed long ago.
4. OBSERVATION OF THE EARTH FROM SPACE	*None at this grade span.*	S:ESS1:4:4.1 Recognize features of the Earth as viewed by astronauts in orbit and as transmitted by scientific instruments on satellites and spacecraft.
5. PROCESSES AND RATES OF CHANGE	S:ESS1:2:5.1 Recognize that some changes are too slow or too fast to be easily observed.	S:ESS1:4:5.1 Identify and describe processes that affect the features of the Earth's surface, including weathering, erosion, deposition of sediment. S:ESS1:4:5.2 Explain how wind, water, or ice shape and reshape the Earth's surface. [ESS1(K-**4**)INQ+SAE-**4**]
6. ROCK CYCLE	S:ESS1:2:6.1 Explain that large rocks can be broken down into smaller rocks. S:ESS1:2:6.2 Describe rocks and soils in terms of their physical properties.	S:ESS1:4:6.1 Explain that smaller rocks come from the breaking and weathering of larger rocks and bedrock. S:ESS1:4:6.2 Distinguish between the three categories of rocks (metamorphic, igneous and sedimentary) and describe the processes that create them. S:ESS1:4:6.3 Identify minerals by their physical properties, such as color, texture and cleavage, and describe simple tests used in the identification process. S:ESS1:4:6.4 Use results from an experiment to draw conclusions about how water interacts with earth materials (e.g., percolation, erosion, frost heaves). [ESS1(K-**4**)INQ-**2**]
7. WATER	S:ESS1:2:7.1 Recognize that water can be a liquid or a solid; and explain that it can be made to change from one state to the other, but the amount (mass) of water always remains the same in either state.	S:ESS1:4:7.1 Recognize and describe the Earth's surface as mostly covered by water. S:ESS1:4:7.2 Explain that most of Earth's water is salt water, which is found in the oceans, and that fresh water is found in rivers, lakes, underground sources, and glaciers.

Earth Space Science		
ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.		
	K-2	**3-4**
1. EARTH, SUN, AND MOON	S:ESS2:2:1.1 Recognize the basic patterns of the Sun, including its appearance during the daytime, and how its position in the sky changes through the seasons. S:ESS2:2:1.2 Recognize the basic patterns of the Moon, including its appearance sometimes at night and sometimes during the day; and how it appears to change shape through the month.	S:ESS2:4:1.1 Explain that night and day are caused by the Earth's rotation on its axis; and that the Earth rotates approximately once, every 24 hours. S:ESS2:4:1.2 Describe the Sun as a star.
2. ENERGY	S:ESS2:2:2.1 Recognize that the light and heat the Sun provides to the Earth is necessary for life.	S:ESS2:4:2.1 Recognize that the Sun provides the light and heat necessary to maintain the temperature of the Earth.
3. SOLAR SYSTEM	*None at this grade span.*	S:ESS2:4:3.1 Recognize that the Moon orbits the Earth. S:ESS2:4:3.2 Recognize that the Earth is one of a number of planets that orbit the Sun.
4. VIEW FROM EARTH	S:ESS2:2:4.1 Recognize that the Sun, Moon and stars all appear to move slowly across the sky. S:ESS2:2:4.2 Recognize that as the position of the Sun changes in relation to the Earth it creates shadows of varying length and direction. S:ESS2:2:4.3 Explain that people should not look directly at the Sun because it is dangerous and may cause injury to the eyes.	S:ESS2:4:4.1 Recognize that although star patterns seen in the sky appear to move slowly each night from east to west they actually remain the same, and explain why different stars can be seen during different seasons. S:ESS2:4:4.2 Explain why the planets look like stars, and why, over a period of time, they appear to wander among the constellations.

Earth Space Science		
ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.		
	K-2	**3-4**
1. SIZE AND SCALE	*None at this grade span.*	S:ESS3:4:1.1 Recognize that astronomical objects in space are massive in size and are separated from one another by vast distances. S:ESS3:4:1.2 Explain that telescopes magnify the size of distant objects and significantly increase the number of these objects that can be viewed from Earth.
2. STARS AND GALAXIES	S:ESS3:2:2.1 Recognize there are too many stars to count, and that they are unequal in their brightness.	S:ESS3:4:2.1 Recognize and describe the stars, like the Sun, as spherical in nature. S:ESS3:4:2.2 Recognize that stars come in different colors, and that the Sun is a yellow star.
3. UNIVERSE	*None at this grade span.*	*None at this grade span.*

Earth Space Science		
ESS4– The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	K-2	**3-4**
1. DESIGN TECHNOLOGY	*None at this grade span.*	S:ESS4:4:1.1 Recognize that man uses various mechanical devices to record changes in the weather and the Earth.
2. TOOLS	S:ESS4:2:2.1 Recognize, and with assistance, safely demonstrate the use of tools to gather data and extend the senses, such as thermometers, hand lenses and balances.	S:ESS4:4:2.1 Demonstrate the use of simple instruments to collect weather data, including thermometers, windsocks, meter sticks, and rain gauges.
3. LOCAL AND GLOBAL ENVIRONMENTAL ISSUES	S:ESS4:2:3.1 Differentiate between natural and man-made materials. S:ESS4:2:3.2 Identify environments that are natural, such as a forest, meadow, or mountains and those that have been built or modified by people, including cities, roads, farms, and houses. S:ESS4:2:3.3 Describe actions that can help the environment, such as recycling and proper disposal of waste materials.	S:ESS4:4:3.1 Distinguish between and provide examples of materials that can be recycled/reused and those that cannot. S:ESS4:4:3.2 Provide examples of technology that have changed the environment and explain whether the effect had a positive or negative impact. S:ESS4:4:3.3 Explain how to dispose of waste so that it does not harm the environment. S:ESS4:4:3.4 Recognize there are pros and cons to using different types of energy, such as solar energy and fossil fuels, and compare the differences.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:ESS4:2:4.1 Recognize that some jobs/careers require knowledge and use of Earth science content and/or skills.	S:ESS4:4:4.1 Identify some jobs/careers that require knowledge and use of Earth science content and/or skills.

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	5-6	**7-8**
1. ATMOSPHERE, CLIMATE, AND WEATHER	S:ESS1:6:1.1 Describe and make predictions about local and regional weather conditions using observation and data collection methods. S:ESS1:6:1.2 Identify weather patterns by tracking weather related events, such as hurricanes. S:ESS1:6:1.3 Explain the composition and structure of the Earth's atmosphere. S:ESS1:6:1.4 Describe weather in terms of temperature, wind speed and direction, precipitation, and cloud cover. S:ESS1:6:1.5 Describe how clouds affect weather and climate, including precipitation, reflecting light from the sun, and retaining heat energy emitted from the Earth's surface.	S:ESS1:8:1.1 Identify and describe the processes of the water cycle and explain their effects on climatic patterns. S:ESS1:8:1.2 Identify and describe the impact certain factors have on the Earth's climate, including changes in the oceans' temperature, changes in the composition of the atmosphere, and geological shifts due to events such as volcanic eruptions and glacial movements.
2. COMPOSITION AND FEATURES	S:ESS1:6:2.1 Differentiate between renewable and non-renewable resources. S:ESS1:6:2.2 Describe and define the different landforms on the Earth's surface, such as coastlines, rivers, mountains, deltas, canyons, etc. S:ESS1:6:2.3 Identify and distinguish between various landforms using a map and/or digital images.	S:ESS1:8:2.1 Describe the layers of the Earth, including the core, mantle, lithosphere, hydrosphere, and atmosphere. S:ESS1:8:2.2 Use geological evidence provided to support the idea that Earth's crust/lithosphere is composed of plates that move. [ESS1(5-**8**)INQ+POC-**1**]
3. FOSSILS	S:ESS1:6:3.1 Recognize that fossils offer important evidence relating to changes in life forms and environmental conditions over geologic time. S:ESS1:6:3.2 Identify connections between fossil evidence and geological events, such as changes in atmospheric composition, movement of tectonic plates, and asteroid/comet impact; and develop a means of sequencing this evidence.	S:ESS1:8:3.1 Explain how fossils found in sedimentary rock can be used to support the theories of Earth's evolution over geologic time; and describe how the folding, breaking, and uplifting of the layers affects the evidence.

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	5-6	**7-8**
4. OBSERVATION OF THE EARTH FROM SPACE	S:ESS1:6:4.1 Recognize that images taken of the Earth from space can show its features and any changes in those features that appear over time. S:ESS1:6:4.2 Explain that satellites can be used to view and track storms and Earth events, such as hurricanes and wild fires.	S:ESS1:8:4.1 Describe how catastrophic changes that have taken place on the Earth's surface can be revealed by satellite images.
5. PROCESSES AND RATES OF CHANGE	S:ESS1:6:5.1 Recognize that things change in steady, repetitive, or irregular ways, or sometimes in more than one way at the same time. S:ESS1:6:5.2 Explain how some changes to the Earth's surface happen abruptly, as a result of landslides, earthquakes and volcanic eruptions; while other changes happen very slowly as a result of weathering, erosions and deposition of sediment caused by waves, wind, water and ice. S:ESS1:6:5.3 Recognize that vibrations in materials set up wavelike disturbances that spread away from the source, as with earthquakes.	S:ESS1:8:5.1 Explain that the Earth's crust is divided into plates which move at extremely slow rates in response to movements in the mantle. S:ESS1:8:5.2 Explain how Earth events, abruptly and over time, can bring about changes on Earth's surface (e.g., landforms, ocean floor, rock features, climate). [ESS1(5-**8**)POC-**3**] S:ESS1:8:5.3 Explain the role of differential heating or convection in ocean currents, winds, weather and weather patterns, atmosphere, or climate. [ESS1(5-**8**)SAE+POC-**4**]
6. ROCK CYCLE	S:ESS1:6:6.1 Explain how soil is formed from combinations of weathered rock and decomposed plant and animal remains, and that it contains living organisms. S:ESS1:6:6.2 Identify the components of soil and other factors, such as bacteria, fungi and worms, which influence its texture, fertility, and resistance to erosion. S:ESS1:6.6.3 Describe the properties of soil, such as color, texture, capacity to retain water, and its ability to support plant life.	S:ESS1:8:6.1 Describe the processes of the rock cycle. S:ESS1:8:6.2 Explain that sedimentary, igneous, and metamorphic rocks contain evidence of the minerals, temperatures, and forces that created them. S:ESS1:8:6.3 Explain how sediments of sand and smaller particles, which may contain the remains of organisms, are gradually buried and cemented together by dissolved minerals to form solid rock. S:ESS1:8:6.4 Using data about a rock's physical characteristics, make and support an inference about the rock's history and connection to the rock cycle. [ESS1(5-**8**)SAE+POC-**5**]

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	5-6	**7-8**
7. WATER	S:ESS1:6:7.1 Explain the properties that make water an essential component of the Earth's system, including solvency and its ability to maintain a liquid state at most temperatures. S:ESS1:6:7.2 Explain that water quality has a direct effect on Earth's life forms.	S:ESS1:8:7.1 Describe how water flows into and through a watershed, falling on the land, collecting in rivers and lakes, soil, and porous layers of rock, until much of it flows back into the ocean. S:ESS1:8:7.2 Identify the physical and chemical properties that make water an essential component of the Earth's system. S:ESS1:8:7.3 Explain the processes that cause cycling of water into and out of the atmosphere and their connections to our planet's weather patterns. [ESS1(5-**8**)SAE-**2**]

Earth Space Science		
ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.		
	5-6	**7-8**
1. EARTH, SUN, AND MOON	S:ESS2:6:1.1 Recognize and describe how the regular and predictable motions of the Earth and Moon explain certain Earth phenomena, such as day and night, the seasons, the year, shadows and the tides. S:ESS2:6:1.2 Recognize that of all the known planets, Earth appears to be somewhat unique; and describe the conditions that exist on Earth that allow it to support life.	S:ESS2:8:1.1 Identify the characteristics of the Sun and its position in the universe. S:ESS2:8:1.2 Recognize and describe how the regular and predictable motions of the Earth and Moon account for phenomena, such as the phases of the Moon and eclipses. S:ESS2:8:1.3 Recognize the relationships between the tides and the phases of the moon; and use tide charts and NOAA information to describe them. S:ESS2:8:1.4 Explain the temporal or positional relationships between or among the Earth, Sun and Moon (e.g., night/day, seasons, year, tide). [ESS2(5-**8**)SAE+POC-**8**]
2. ENERGY	S:ESS2:6:2.1 Recognize how the tilt of the Earth's axis and the Earth's revolution around the Sun affect seasons and weather patterns. S:ESS2:6:2.2 Identify and describe seasonal, daylight and weather patterns as they relate to energy.	S:ESS2:8:2.1 Describe the Sun as the principle energy source for phenomena on the Earth's surface.

Earth Space Science		
ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.		
	5-6	**7-8**
3. SOLAR SYSTEM	*Districts may choose to work on End of Grade 8 standards in grades 5-8.*	S:ESS2:8:3.1 Identify the characteristics and movement patterns of the planets in our Solar System and differentiate between them. S:ESS2:8:3.2 Explain the effects of gravitational force on the planets and their moons. S:ESS2:8:3.3 Explain why Earth and our Solar System appear to be somewhat unique, while acknowledging recent evidence that suggests similar systems exist in the universe. S:ESS2:8:3.4 Compare and contrast planets based on data provided about size, composition, location, orbital movement, atmosphere, or surface features (includes moons). [ESS2(5-**8**)MAS-**6**] S:ESS2:8:3.5 Explain how gravitational force affects objects in the Solar System (e.g., moons, tides, orbits, satellites). [ESS2(5-**8**)SAE+POC-**8**]
4. VIEW FROM EARTH	S:ESS2:6:4.1 Explain the historical perspective of planetary exploration and man's achievements in space, beginning with Russia's Sputnik mission in 1957. S:ESS2:6:4.2 Describe man's perception of the constellations throughout history; and explain how he has used them to his advantage, including navigational purposes and to explain historical events.	S:ESS2:8:4.1 Explain how technological advances have allowed scientists to re-evaluate or extend existing ideas about the Solar System. [ESS2(5-**8**)NOS-7]

Earth Space Science		
ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.		
	5-6	**7-8**
1. SIZE AND SCALE	*Districts may choose to work on End of Grade 8 standards in grades 5-8.*	S:ESS3:8:1.1 Define an astronomical unit as the distance from the Earth to the Sun. S:ESS3:8:1.2 Explain that special units of measure, such as light years and astronomical units, are used to calculate distances in space.
2. STARS AND GALAXIES	*Districts may choose to work on End of Grade 8 standards in grades 5-8.*	S:ESS3:8:2.1 Describe objects such as asteroids, comets and meteors in terms of their characteristics and movement patterns.
3. UNIVERSE	*Districts may choose to work on End of Grade 8 standards in grades 5-8.*	S:ESS3:8:3.1 Describe the universe as being comprised of billions of galaxies, each containing many billions of stars; and explain that there are vast distances separating these galaxies and stars from one another and from the Earth.

Earth Space Science		
ESS4–The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	5-6	**7-8**
1. DESIGN TECHNOLOGY	S:ESS4:6:1.1 Understand that technology is used to design tools that improve our ability to measure and observe the world.	S:ESS4:8:1.1 Describe ways in which technology has increased our understanding of the world in which we live. S:ESS4:8:1.2 Recognize the importance of technology as it relates to science, for purposes such as: access to space and other remote locations, sample collection and treatment, measurement, data collection, and storage, computation, and communication of information.
2. TOOLS	S:ESS4:6:2.1 Recognize that satellites and Doppler radar can be used to observe or predict the weather. S:ESS4:6:2.2 Employ knowledge of basic weather symbols to read and interpret weather and topographic maps. S:ESS4:6:2.3 Read and interpret data from barometers, sling psychrometers and anemometers.	S:ESS4:8:2.1 Calculate temperature in degrees Celsius. S:ESS4:8:2.2 Perform calculations using metric measurements. S:ESS4:8:2.3 Describe how man uses land-based light telescopes, radio telescopes, satellites, manned exploration, probes and robots to collect data.
3. LOCAL AND GLOBAL ENVIRONMENTAL ISSUES	S:ESS4:6:3.1 Provide examples of products that man has developed which allow humans to do things that they could not do otherwise; and identify the natural materials used to produce these products. S:ESS4:6:3.2 Identify the most appropriate materials for a given design task with requirements for specific properties, such as weight, strength, hardness, and flexibility. S:ESS4:6:3.3 Provide examples of how to reduce waste through conservation, recycling, and reuse.	S:ESS4:8:3.1 Provide examples of how creative thinking and economic need has shaped the way people use natural materials, such as the use of metal ores, petroleum, and fresh water. S:ESS4:8:3.2 Explain how to test natural materials to measure and compare their properties. S:ESS4:8:3.3 Explain how technologies can reduce the environmental impact of natural disasters. S:ESS4:8:3.4 Identify the potential impact of converting forested land to uses such as farms, homes, factories, or tourist attractions.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:ESS4:6:4.1 Understand that some form of science is used in most jobs/careers and that some jobs/careers specifically require knowledge of Earth science.	S:ESS4:8:4.1 Understand that some scientific jobs/careers involve the application of Earth Space science content knowledge and experience in specific ways that meet the goals of the job.

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	9-11	**11-12 (Advanced)**
1. ATMOSPHERE, CLIMATE, AND WEATHER	S:ESS1:11:1.1 Explain how winds and ocean currents are created on the Earth's surface. S:ESS1:11:1.2 Explain how heat and energy transfer in and out of the atmosphere; and provide examples of how it is related to weather and climate. S:ESS1:11:1.3 Describe how Earth's atmospheric composition has changed from the formation of the Earth through current time. S:ESS1:11:1.4 Explain how Earth's features can affect wind and weather patterns by causing air to rise and increasing precipitation.	S:ESS1:12:1.1 Identify and describe the layers of the atmosphere. S:ESS1:12:1.2 Understand the effects of solar influences, such as flares and sunspots, on atmospheric conditions.
2. COMPOSITION AND FEATURES	S:ESS1:11:2.1 Recognize that elements exist in fixed amounts and describe how they move through the solid Earth, oceans, atmosphere, and living things as part of geochemical cycles, such as the water, carbon and nitrogen cycles. S:ESS1:11:2.2 Describe the conditions that enable the Earth to support life, such as the availability of water, the gravitational force, the electromagnetic field and the intensity of radiation from the Sun. S:ESS1:11:2.3 Explain the theory of plate tectonics. S:ESS1:11:2.4 Describe the movement of crustal plates and explain how the effects have altered the Earth's features.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	9-11	**11-12 (Advanced)**
3. FOSSILS AND GEOLOGIC TIME	S:ESS1:11:3.1 Identify and describe the methods used to measure geologic time, such as fossil identification, radioactive dating, and rock sequences. S:ESS1:11:3.2 Relate how geologic time is determined using various dating methods (e.g., radioactive decay, rock sequences, fossil records). [ESS1(9-**11**)INQ+POC+MAS-**4**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*
4. OBSERVATION OF THE EARTH FROM SPACE	S:ESS1:11:4.1 Provided with geologic data (including movement of plates) on a given locale, predict the likelihood for an earth event (e.g. volcanoes mountain ranges, islands, earthquakes, tides, tsunamis). [ESS1(9-**11**)INQ+POC-**1**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	9-11	**11-12 (Advanced)**
5. PROCESSES AND RATES OF CHANGE	S:ESS1:11:5.1 Explain that the Earth is composed of interactive layers, which have distinct compositions, physical properties and processes. S:ESS1:11:5.2 Relate plate movement to earthquakes and volcanic activity, and explain how it results in tectonic uplift and mountain building. S:ESS1:11:5.3 Identify and describe the major external and internal sources of energy on Earth. S:ESS1:11:5.4 Provide supporting geologic/geographic evidence that supports the validity of the theory of plate tectonics. [ESS1(9-**11**)NOS-**2**] S:ESS1:11:5.5 Trace the development of the theory of plate tectonics. [ESS1(9-**11**)NOS-**2**] S:ESS1:11:5.6 Explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading). [ESS1(9-**11**)SAE+POC-**3**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*
6. ROCK CYCLE	S:ESS1:11:6.1 Explain that throughout the rock cycle, the total amount of the material remains the same.	S:ESS1:12:6.1 Describe the processes that transform one type of rock into another, such as lithification, metamorphosis, and weathering on a chemical level. S:ESS1:12:6.2 Describe the various types of igneous, sedimentary, and metamorphic rocks found on Earth.
7. WATER	S:ESS1:11:7.1 Explain that water quality can be affected positively or negatively by outside sources	*Same as Grade 11*

Earth Space Science		
ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.		
	9-11	**11-12 (Advanced)**
1. EARTH, SUN, AND MOON	S:ESS2:11:1.1 Explain how the Earth, Moon and Sun were formed.	S:ESS2:12:1.1 Understand how the Nebular Hypothesis, fusion, and the process of differentiation contributes to the structure and organization of the universe.
2. ENERGY	S:ESS2:11:2.1 Identify the Earth's major external source of energy as solar energy. S:ESS2:11:2.2 Explain how the inclination of incoming solar radiation can impact the amount of energy Earth receives on any given surface area. S:ESS2:11:2.3 Explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading). [ESS1(9-**11**)SAE+POC-**3**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*
3. SOLAR SYSTEM	S:ESS2:11:3.1 Explain how gravitational force influenced the formations of the planets and their moons; and describe how these objects move in patterns under its continued influence. S:ESS2:11.3.2 Explain how the Solar System formed from a giant cloud of gas and debris about 5 billion years ago.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*
4. VIEW FROM EARTH	*Students should have regular access and use of data gathered by space based instruments.*	*Students should have regular access and use of data gathered by space based instruments.*

Earth Space Science		
ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.		
	9-11	**11-12 (Advanced)**
1. SIZE AND SCALE	S:ESS3:11:1.1 Recognize electromagnetic waves can be used to locate objects in the universe, and track their movement. S:ESS3:11:1.2 Define a light year.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*
2. STARS AND GALAXIES	S:ESS3:11:2.1 Identify and describe the characteristics common to most stars in the universe. S:ESS3:11:2.2 Describe the ongoing processes involved in star formation, their life cycles and their destruction. S:ESS3:11:2.3 Explain the relationships between or among the energy produced from nuclear reactions, the origin of elements, and the life cycles of stars. [ESS3(9-**11**)POC+SAE-**8**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*

Earth Space Science		
ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.		
	9-11	**11-12 (Advanced)**
3. UNIVERSE	S:ESS3:11:3.1 Explain that current scientific evidence supports the Big Bang Theory as a probable explanation of the origin of the universe, and describe the theory. S:ESS3:11:3.2 Explain the evidence that suggests the universe is expanding. S:ESS3:11:3.3 Provide scientific evidence that supports or refutes the "Big Bang" theory of how the universe was formed. [ESS3(9-**11**)NOS-**6**] S:ESS3:11:3.4 Based on the nature of electromagnetic waves, explain the movement and location of objects in the universe or their composition (e.g., red shift, blue shift, line spectra). [ESS3(9-**11**)SAE-**7**] S:ESS3:11:3.5 Explain how scientific theories about the structure of the universe have been advanced through the use of sophisticated technology (e.g., space probes and visual, radio and x-ray telescopes). [ESS3(9-**11**)NOS-**5**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*

Earth Space Science		
ESS4– The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	9-11	**11-12 (Advanced)**
1. DESIGN TECHNOLOGY	S:ESS4:11:1.1 Describe ways in which technology has increased our understanding of the universe. S:ESS4:11:1.2 Understand that technology is designed with a particular function in mind; and principles of Earth Space science are useful in creating technology for the Earth space sciences.	S:ESS4:12:1.1 Recognize the importance of technology as it relates to science, for purposes such as: access to space and other remote locations, sample collection and treatment, measurement, data collection, and storage, computation, and communication of information.
2. TOOLS	S:ESS4:11:2.1 Describe the use and benefits of land-based light telescopes, radio telescopes, spectrophotometers, satellites, manned exploration, probes, and robots to the study of Earth Space Science. S:ESS4:11:2.2 Explain how scientists study the Earth using computer-generated models and observations from both land-based sites and satellites; and describe the value of using these tools in unison.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*
3. LOCAL AND GLOBAL ENVIRONMENTAL ISSUES	S:ESS4:11:3.1 Differentiate between and provide examples of renewable and nonrenewable sources of energy; and explain the advantages and limitations of each. S:ESS4:11:3.2 Describe the means for transforming a natural material, such as iron ore, into useful products during different historical periods, such as the Stone Age, Iron Age, Renaissance, the Industrial Period and the current Age of Information. S:ESS4:11.3.3 Explain how the use of technologies at a local level, such as burning of fossil fuels for transportation or power generation, may contribute to global environmental problems.	S:ESS4:12:3.1 Explain the environmental effects of using both renewable and nonrenewable resources; and provide examples of how man is addressing these effects on the environment. S:ESS4:12:3.2 Provide examples of how man's use of Earth materials has changed over time; and use those examples to explain how the relationship between science and technology has gradually grown closer in the past century. S:ESS4:12:3.3 Research and evaluate a current environmental issue within the State of New Hampshire, such as a dispute regarding the conversion of a natural environment to human use; and construct a defense that supports environmental protection.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:ESS4:11:4.1 Explain the kinds of applications of knowledge and skills necessary for jobs/careers specific to Earth or space sciences.	S:ESS4:12:4.1 Understand the various scientific fields that use scientific content and skills; and distinguish between professional and skilled science jobs/careers in Earth or space sciences.

Life Science Overview

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs	Page K-4	Page 5-8	Page 9-12
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, and species).	1. Classification	**67**	**74**	**83**
	2. Living Things And Organization	**67**	**74**	**84**
	3. Reproduction	**68**	**75**	**85**
LS2– Energy flows and matter recycles through an ecosystem.	1. Environment	**69**	**76**	**86**
	2. Flow Of Energy	**69**	**76**	**87**
	3. Recycling Of Materials	**69**	**77**	**87**
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).	1. Change	**70**	**78**	**88**
	2. Evolution	**70**	**78**	**89**
	3. Natural Selection	**70**	**79**	**90**
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.	1. Behavior	**71**	**80**	**91**
	2. Disease	**71**	**80**	**92**
	3. Human Identity	**72**	**81**	**93**
LS5– The growth of scientific knowledge in Life Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	1. Design Technology	**73**	**82**	**94**
	2. Tools	**73**	**82**	**94**
	3. Social Issues (Local And Global) Medical Technology and Biotechnology	**73**	**82**	**94**
	4. Career Technical Education Connections	**73**	**82**	**94**

Life Science		
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).		
	K-2	**3-4**
1. CLASSIFICATION	S:LS1:2:1.1 Differentiate between living and nonliving things; and categorize objects in each group using the significant observable characteristics they share, such as color, shape and size. S:LS1:2:1.2 Recognize plants and animals as living things and describe how they are alike and different.	S:LS1:4:1.1 Recognize and identify the various ways in which living things can be grouped. S:LS1:4:1.2 Sort/classify different living things using similar and different characteristics; and describe why organisms belong to each group or cite evidence about how they are alike or not alike. [LS1(K-**4**)INQ+POC-**1**]
2. LIVING THINGS AND ORGANIZATION	S:LS1:2:2.1 Recognize that plants and animals have features that help them survive in different environments.	S:LS1:4:2.1 Recognize that living organisms have certain structures and systems that perform specific functions, facilitating survival, growth and reproduction. S:LS1:4.2.2 Identify and describe the function of the plant structures responsible for food production, water transport, support, reproduction, growth and protection. S:LS1:4:2.3 Identify and explain how the physical structures of an organism (plants or animals) allow it to survive in its habitat/environment (e.g., roots for water; nose to smell fire). [LS1(K-**4**)FAF-**4**] S:LS1:4:2.4 Identify the basic needs of plants and animals in order to stay alive (i.e., water, air, food, space). [LS1(K-**4**)SAE-**2**]

Life Science		
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).		
	K-2	**3-4**
3. REPRODUCTION	S:LS1:2:3.1 Recognize that parents and offspring of many species closely resemble one another; and describe the similarities in appearance of given plant and animal families. S:LS1:2:3.2 Recognize that living things have a life cycle, during which they are born, grow, and die.	S:LS1:4:3.1 Distinguish between plant and animal characteristics that are inherited, such as eye color in humans and the shape of leaves in plants, and those that are affected by their environment, such as grass turning brown due to lack of water. S:LS1:4:3.2 Recognize that living organisms have life cycles, which include birth, growth and development, reproduction, and death; and explain how these life cycles vary for different organisms. S:LS1:4:3.3 Describe the reproductive process of plants, explaining some plants grow from seed, while others grow from the parts of other plants. S:LS1:4-3.4 Predict, sequence, or compare the life stages of organisms (plants and animals): e.g., put images of life stages of an organism in order, predict the next stage in sequence, and compare two organisms. [LS1(K-**4**)POC–**3**]

Life Science		
LS2– Energy flows and matter recycles through an ecosystem.		
	K-2	**3-4**
1. ENVIRONMENT	S:LS2:2:1.1 Recognize that living things can be found almost anyplace in the world; and that specific types of environments are required to support the many different species of plant and animal life. S:LS2:2:1.2 Recognize that animals, including humans, interact with their surroundings using their senses; and that different senses provide different kinds of information. S:LS2:2:1.3 Recognize that some plants and animals go through changes in appearance when the seasons change.	S:LS2:4:1.1 Describe how the nature of an organism's environment, such as the availability of a food source, the quantity and variety of other species present, and the physical characteristics of the environment affect the organism's patterns of behavior. S:LS2:4:1.2 Describe the interaction of living organisms with nonliving things.
2. FLOW OF ENERGY	S:LS2:2:2.1 Identify the resources plants and animals need for growth and energy, and describe how their habitat provides these basic needs.	S:LS2:4:2.1 Recognize that the transfer of energy through food is necessary for all living organisms and describe the organization of food webs. S:LS2:4:2.2 Recognize that energy is needed for all organisms to stay alive and grow or identify where a plant or animal gets its energy. [LS2(K-**4**)SAE-**5**]
3. RECYCLING OF MATERIALS	*Districts may choose to work on End of Grade 8 expectations in the 5-8 grade span.*	S:LS2:4:3.1 Recognize that plants and animals interact with one another in various ways besides providing food, such as seed dispersal or pollination. S:LS2:4:3.2 Describe ways plants and animals depend on each other (e.g., shelter, nesting, food). [LS2(K-**4**)SAE-**6**]

Life Science		
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).		
	K-2	**3-4**
1. CHANGE	S:LS3:2:1.1 Recognize that some living things, which lived on Earth long ago, are now extinct, such as dinosaurs, mammoths, giant tree ferns, and horsetail trees.	S:LS3:4:1.1 Provide examples of how environmental changes can cause different effects on different organisms. S:LS3:4:1.2 Provide examples of how an organism's inherited characteristics can adapt and change over time in response to changes in the environment. S:LS3:4:1.3 Using information (data or scenario), explain how changes in the environment can cause organisms to respond (e.g., survive there and reproduce, move away, die). [LS3(K-4)SAE-7]
2. EVIDENCE OF EVOLUTION	S:LS3:2:2.1 Recognize that some plants and animals, which are alive today, are similar to living things which have become extinct, such as elephants and mammoths.	S:LS3:4:2.1 Compare information about fossils to living organisms and other fossils to determine any similarities and differences.
3. NATURAL SELECTION	S:LS3:2:3.1 Recognize and describe the similarities and differences in both behavior and appearance of plants and animals. S:LS3:2:3.2 Recognize that there are different species of living things in various places around the world.	S:LS3:4:3.1 Recognize that individuals of the same species differ in their characteristics; and explain that sometimes these differences give individuals an advantage in survival and reproduction. S:LS3:4:3.2 Recognize that for any particular environment, some kinds of animals and plants survive well, some less well, and some cannot survive at all.

Life Science		
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.		
	K-2	**3-4**
1. BEHAVIOR	S:LS4:2:1.1 Recognize and describe how living things respond when exposed to helpful and harmful situations. S:LS4:2:1.2 Recognize that humans learn from each other in many different ways, such as listening and speaking, watching and imitating. S:LS4:2:1.3 Recognize that humans can gather different kinds of information about an object by adjusting their proximity to it. S:LS4:2:1.4 Recognize that some of the things humans can do, such as playing games, reading, and writing, must be learned.	S:LS4:4:1.1 Recognize that an individual organism's behavior is affected by internal cues, such as hunger and thirst; and describe how an organism uses its senses to understand and respond to these cues. S:LS4:4:1.2 Recognize that an individual organism's behavior is influenced by external cues, such as seasonal change; and describe how an organism might react, such as migrating or hibernating. S:LS4:4:1.3 Recognize behaviors that may be unsafe or unhealthy for themselves and others.
2. DISEASE	S:LS4:2:2.1 Recognize that proper nutrition, exercise and rest are all important factors in maintaining good health. S:LS4:2:2.2 Recognize that humans can spread germs that cause disease. S:LS4:2.2.3 Identify and describe the basic personal hygiene habits for maintaining good health, such as washing one's hands with soap and water and brushing one's teeth. S:LS4:2:2.4 Recognize symptoms, such as fever, rashes, coughing and congestion for common illnesses.	S:LS4:4:2.1 Explain how the amount of rest and the types of food, exercise and recreation humans choose can influence and affect their well-being. S:LS4:4:2.2 Recognize that vitamins and minerals are needed in small amounts and are essential to maintain proper health. S:LS4:4:2.3 Explain how proper food preparation and appropriate food handling practices can maintain the safety and quality of food.

Life Science		
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.		
	K-2	**3-4**
3. HUMAN IDENTITY	S:LS4:2:3.1 Recognize similarities and individual differences among people, and that children closely resemble their parents. S:LS4:2:3.2 Identify the sense organs, including eyes, ears, nose mouth, and skin; and describe how each can warn an individual about danger. S:LS4:2:3.3 Recognize that two parents, both a father and mother, are required for human reproduction. S:LS4:2:3.4 Recognize and describe the human life cycle from birth to old age. S:LS4:2:3.5 Recognize that humans need food, water, air, waste removal and a particular range of temperatures in their environment, just as other animals do.	S:LS4:4:3.1 Identify what the physical structures of humans do (e.g., sense organs– eyes, ears, skin, etc.) or compare physical structures of humans to similar structures of animals. [LS4(K-**4**)FAF-**8**] S:LS4:4:3.2 Distinguish between characteristics of humans that are inherited from parents (i.e., hair color, height, skin color, eye color) and others that are learned (e.g., riding a bike, singing a song, playing a game, reading). [LS4(K-**4**)POC-**9**] S:LS4:4:3.3 Recognize the nutritional value of different foods and distinguish between healthy and unhealthy food choices using data gathered from food labels and dietary guidelines, such as the food pyramid.

Life Science		
LS5– The growth of scientific knowledge in Life Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	K-2	**3-4**
1. DESIGN TECHNOLOGY	S:LS5:2:1.1 Recognize that new products can be made out of natural materials, such as paper from trees and cloth from various plants and animals.	S:LS5:4:1.1 Recognize that man uses various mechanical devices to record and describe living organisms.
2. TOOLS	S:LS5:2:2.1 Recognize that some tools, such as magnifiers, balances and thermometers, have special uses and can help gather information and extend the senses.	S:LS5:4:2.1 Demonstrate the use of appropriate tools and simple equipment, such as thermometers, magnifiers and microscopes to gather data and extend the senses. S:LS5:4:2.2 Identify and describe the purpose of tools used by health care professionals, such as X-rays and stethoscopes.
3. SOCIAL ISSUES (LOCAL AND GLOBAL) MEDICAL TECHNOLOGY BIOTECHNOLOGY	S:LS5:2:3.1 Recognize that technology is used in medicine to prevent and cure diseases through vaccinations and medications. S:LS5:2:3.2 Provide examples from personal experience that illustrate how medicine helps humans recover from illness.	S:LS5:4:3.1 Recognize that medical technology provides information about a body's condition, such as determining blood pressure, and recognizing the need to repair, replace and support the affected body parts. S:LS5:4:3.2 Recognize that biotechnology refers to the different ways humans modify the living environment to meet their needs, including growing food, genetic engineering and using living organisms such as yeast to prepare foods.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:LS5:2:4.1 Recognize that some jobs/careers require knowledge and use of life science content and/or skills.	S:LS5:4:4.1 Identify some jobs/careers that require knowledge and use of life science content and/or skills.

Life Science		
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).		
	5-6	**7-8**
1. CLASSIFICATION	S:LS1:6:1.1 Identify ways in which living things can be grouped and organized, such as taxonomic groups of plants, animals and fungi. S:LS1:6:1.2 Categorize organisms into kingdoms that are currently recognized, according to shared characteristics.	S:LS1:8:1.1 Recognize that similarities among organisms are found in anatomical features and patterns of development; and explain how these can be used to infer the degree of relatedness among organisms. S:LS1:8:1.2 Describe or compare how different organisms have mechanisms that work in a coordinated way to obtain energy, grow, move, respond, provide defense, enable reproduction, or maintain internal balance (e.g., cells, tissues, organs and systems). [LS1(5-**8**)SAE+FAF-**2**]
2. LIVING THINGS AND ORGANIZATION	S:LS1:6:2.1 Recognize that all living things are composed of cells, and explain that while many organisms are single celled, such as yeast, others, including humans, are multicellular. S:LS1:6:2.2 Explain that the way in which cells function is similar in all organisms. S:LS1:6:2.3 Recognize that cells use energy obtain from food, to conduct the functions necessary to sustain life, such as cell growth. S:LS1:6:2.4 Recognize and describe the hierarchical organization of living systems, including cells, tissues, organs, organ systems, whole organisms, and ecosystems. S:LS1:6:2.5 Explain that multicellular organisms have specialized cells, tissues, organs and organ systems that perform certain necessary functions, including digestion, respiration, reproduction, circulation, excretion, movement, control and coordination and protection from disease. S:LS1:6:2.6 Recognize that the human cells found in tissues and organs are similar to those of other animals, but somewhat different from cells found in plants.	S:LS1:8:2.1 Identify the functions of the human body's systems, including digestion, respiration, reproduction, circulation, excretion, movement, control and coordination and protection from disease; and describe how they interact with one another. S:LS1:8:2.2 Define a population and describe the factors that can affect it. S:LS1:8:2.3 Explain why it is beneficial for an organism to be able to regulate its internal environment while living in a constantly changing external environment. S:LS1:8:2.4 Explain relationships between or among the structure and function of the cells, tissues, organs, and organ systems in an organism. [LS1(5-**8**)FAF-**4**] S:LS1:8:2.5 Using data and observations about the biodiversity of an ecosystem, make predictions or draw conclusions about how the diversity contributes to the stability of the ecosystem. [LS1(5-**8**)INQ+SAE-**1**]

Life Science		
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).		
	5-6	**7-8**
3. REPRODUCTION	S:LS1:6:3.1 Explain that cells repeatedly divide to make more cells for growth and repair. S:LS1:6:3.2 Explain that the same genetic information is copied in each cell of a new organism. S:LS1:6:3.3 Explain that all living things reproduce in order to continue their species.	S:LS1:8:3.1 Differentiate between asexual and sexual reproduction, and explain that in some kinds of organisms, all the genes come from one parent, while in organisms requiring two sexes to reproduce, typically half the genes come from each parent. S:LS1:8:3.2 Explain that a species of sexually reproducing organisms is comprised of all the organisms that can mate to produce fertile offspring. S:LS1:8:3.3 Explain that in sexual reproduction, a single specialized cell from a female merges with a specialized cell from a male in a process called fertilization. S:LS1:8:3.4 Explain that the fertilized egg cell, carrying genetic information from each parent, multiplies to form the complete organism. S:LS1:8:3.5 Explain how the basic tissues of an embryo form. S:LS1:8:3.6 Compare and contrast sexual reproduction with asexual reproduction. [LS1(5-**8**)POC-**3**] S:LS1:8:3.7 Using data provided, select evidence that supports the concept that genetic information is passed on from both parents to offspring. [LS4(5-**8**)INQ+POC-**11**]

Life Science		
LS2– Energy flows and matter recycles through an ecosystem.		
	5-6	**7-8**
1. ENVIRONMENT	S:LS2:6:1.1 Identify and describe the factors that influence the number and kinds of organisms an ecosystem can support, including the resources that are available, the differences in temperature, the composition of the soil, any disease, the threat of predators, and competition from other organisms. S:LS2:6:1.2 Explain that most microorganisms do not cause disease and that many are beneficial to the environment.	S:LS2:8:1.1 Explain how changes in environmental conditions can affect the survival of individual organisms and an entire species. S:LS2:8:1.2 Explain that in all environments, organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter, and that in any particular environment the growth and survival of organisms depend on the physical conditions. S:LS2:8:1.3 Using data and observations, predict outcomes when abiotic/biotic factors are changed in an ecosystem. [LS2(5-**8**)INQ+SAE-**5**]
2. FLOW OF ENERGY	S:LS2:6:2.1 Describe how energy is transferred in an ecosystem through food webs; and explain the roles and relationships between producers, consumers and decomposers. S:LS2:6:2.2 Recognize that one of the most general distinctions among organisms is between plants, which use sunlight to make their own food, and animals, which consume energy-rich foods. S:LS2:6:2.3 Describe the process of photosynthesis and explain that plants can use the food they make immediately or store it for later use. S:LS2:6:2.4 Recognize that energy, in the form of heat, is usually a byproduct when one form of energy is converted to another, such as when living organisms transform stored energy to motion.	S:LS2:8:2.1 Explain how food provides energy and materials for growth and repair of body parts. S:LS2:8:2.2 Given a scenario, trace the flow of energy through an ecosystem, beginning with the sun, through organisms in the food web, and into the environment (includes photosynthesis and respiration). [LS2(5-**8**)SAE-**6**]

Life Science		
LS2– Energy flows and matter recycles through an ecosystem.		
	5-6	**7-8**
3. RECYCLING OF MATERIALS	S:LS2:6:3.1 Define a population as all individuals of a species that exist together at a given place and time; and explain that all populations living together in a community, along with the physical factors with which they interact, compose an ecosystem. S:LS2:6:3.2 Using food webs, identify and describe the ways in which organisms interact and depend on one another in an ecosystem. S:LS2:6:3.3 Explain how insects and various other organisms depend on dead plant and animal matter for food; and describe how this process contributes to the system.	S:LS2:8:3.1 Identify autotrophs as producers who may use photosynthesis, and describe this as the basis of the food web. S:LS2:8:3.2 Explain the process of respiration and differentiate between it and photosynthesis. S:LS2:8:3.3 Know that all organisms, including humans, are part of, and depend on, two main interconnected global food webs: one which includes microscopic ocean plants, and the other which includes land plants. S:LS2:8:3.4 Describe how matter is recycled within ecosystems and explain that the total amount of matter remains the same, though its form and location change. S:LS2:8:3.5 Identify carbon, hydrogen, oxygen, nitrogen and phosphorus as common elements of living matter. S:LS2:8:3.6 Given an ecosystem, trace how matter cycles among and between organisms and the physical environment (includes water, oxygen, food web, decomposition and recycling, but not carbon cycle nor nitrogen cycle). [LS2(5-**8**)SAE-**7**]

Life Science		
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).		
	5-6	**7-8**
1. CHANGE	S:LS3:6:1.1 Provide examples of how all organisms, including humans, impact their environment; and explain how some changes can be detrimental to other organisms. S:LS3:6:1.2 Explain how changes in environmental conditions can affect the survival of individual organisms and the entire species.	S:LS3:8:1.1 Describe the type of impact certain environmental changes, including deforestation, invasive species, increased erosion, and pollution containing toxic substances, could have on local environments.
2. EVIDENCE OF EVOLUTION	S:LS3:6:2.1 Describe the fundamental concepts related to biological evolution, such as biological adaptations and the diversity of species.	S:LS3:8:2.1 Describe how the fossil record provides geologic evidence verifying the existence of now extinct life forms, and explains how this evidence provides documented proof of their appearance, diversification and extinction. S:LS3:8:2.2 Explain the concept of extinction and describes its importance in biological evolution. S:LS3:8:2.3 Use a model, classification system, or dichotomous key to illustrate, compare, or interpret possible relationships among groups of organisms (e.g., internal and external structures, anatomical features). [LS3(5-**8**)MAS+FAF-**8**]

Life Science		
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).		
	5-6	**7-8**
3. NATURAL SELECTION	S:LS3:6:3.1 Recognize that there are genetic variations among individuals in groups of organisms and provide examples of how these variations affect the survival of an organism. S:LS3:6:3.2 Recognize that only organisms that are able to reproduce can pass on their genetic information to the next generation.	S:LS3:8:3.1 Recognize that hereditary information is contained in genes, which are located in the chromosomes of each cell; and explain that inherited traits can be determined by either one or many genes, and that a single gene can influence more than one trait, such as eye and hair color. S:LS3:8:3.2 Recognize that in any given environment the growth and survival of organisms depend on the physical conditions that exist; and explain that in all environments, organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter. S:LS3:8:3.3 Explain how individual organisms with certain traits are more likely than others to survive and have offspring. S:LS3:8:3.4 Recognize that humans are able to control some characteristics of plants and animals through selective breeding; and explain how this results in small differences between the parents and offspring, which can accumulate in successive generations so that decedents are very different from their ancestors. S:LS3:8:3.5 Cite examples supporting the concept that certain traits of organisms may provide a survival advantage in a specific environment and therefore, an increased likelihood to produce offspring. [LS3(5-**8**)POC-**9**]

Life Science		
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.		
	5-6	**7-8**
1. BEHAVIOR	S:LS4:6:1.1 Recognize that learning requires more than just storage and retrieval of information and that prior knowledge needs to be tapped in order to make sense out of new experiences or information. S:LS4:6:1.2 Explain that people can learn about others from direct experience, from the media, and from listening to others talk about their life and work. S:LS4:6:1.3 Provide examples of how humans make judgments about new situations based on memories of past experiences.	S:LS4:8:1.1 Recognize that unlike human beings, behavior in insects and many other species is determined almost entirely by biological inheritance. S:LS4:8:1.2 Explain that organism's behavioral response is a reaction to internal or and environmental stimuli, and that these responses may be determined by heredity or from past experience. S:LS4:8:1.3 Explain how all behavior is affected by both inheritance and experience.
2. DISEASE	S:LS4:6:2.1 Explain that the human body has ways to defend itself against disease-causing organisms and describe how defenders, including tears, saliva, the skin, some blood cells and stomach secretions support the defense process. S:LS4:6:2.2 Recognize that there are some diseases that human beings can only get once; and explain how many diseases can be prevented by vaccination. S:LS4:6:2.3 Explain how vaccines induce the body to build immunity to a disease without actually causing the disease itself. S:LS4:6:2.4 Recognize a healthy body cannot fight all germs that invade it; and explain how some germs interfere with the body's defenses.	S:LS4:8:2.1 Recognize that disease in organisms can be caused by intrinsic failures of the system or infection from other organisms. S:LS4:8:2.2 Describe how viruses, bacteria, fungi, and parasites may affect the human body and provide examples of how they can interfere with normal body function. S:LS4:8:2.3 Describe the function of white blood cells and explain how they support the body's defense system. S:LS4:8:2.4 Use data and observations to support the concept that environmental or biological factors affect human body systems (biotic and abiotic). [LS4(5-**8**)INQ-**10**]

Life Science		
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.		
	5-6	**7-8**
3. HUMAN IDENTITY	S:LS4:6:3.1 Recognize that the length and quality of human life are influenced by many factors, including sanitation, diet, medical care, gender, genes, environmental conditions, and personal health behaviors.	S:LS4:8:3.1 Compare patterns of human development with those of other vertebrates. S:LS4:8:3.2 Recognize that an organism can be described in terms of a combination of traits; and differentiate between inherited traits and those that result from interactions with the environment. S:LS4:8:3.3 Describe the major changes that occur over time in human development from single cell through embryonic development to new born (i.e., group of cells during the first trimester, organs form during the second, organs mature during the third). [LS4(5-**8**)POC-**12**] S:LS4:8:3.4 Using data provided, select evidence that supports the concept that genetic information is passed on from both parents to offspring. [LS4(5-**8**)INQ+POC-**11**]

Life Science		
LS5– The growth of scientific knowledge in Life Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	5-6	**7-8**
1. DESIGN TECHNOLOGY	S:LS5:6:1.1 Recognize that an agricultural system is designed to maximize the use of all the elements in the system, including using plants for food, oxygen, for the filtration of air and water, and for making compost.	S:LS5:8:1.1 Explain how technology has influenced the course of history, and provide examples such as those that relate to agriculture, sanitation and medicine. S:LS5:8:1.2 Provide examples of ways technology is used to protect the environment, such as using bacteria to clean water.
2. TOOLS	S:LS5:6:2.1 Demonstrate the appropriate use of tools, such as thermometers, probes, microscopes and computers to gather, analyze and interpret data in the life sciences.	S:LS5:8:2.1 Recognize and provide examples of how technology has enhanced the study of life sciences, as in the development of advanced diagnosing equipment improving medicine.
3. SOCIAL ISSUES (LOCAL AND GLOBAL) MEDICAL TECHNOLOGY BIOTECHNOLOGY	S:LS5:6:3.1 Provide examples of early health care technology that helped to extend the life expectancy of humans, such as the discovery of penicillin and sterilization of surgical instruments. S:LS5:6:3.2 Differentiate between vaccines, which help prevent diseases from developing and spreading, and medicines, which relieve symptoms or cure diseases. S:LS5:6:3.3 Recognize that the quality of personal health can be influenced by society and technology. S:LS5:6:3.4 Identify and describe some of the processes and systems used to grow food in New Hampshire, including irrigation, pest control and harvesting.	S:LS5:8:3.1 Explain the necessity of and purpose for the proper disposal of medical products. S:LS5:8:3.2 Give examples of how increased understanding of biology has led to improvements in biotechnology, such as scientific methods for increasing the yield or the pest-resistance of important food crops. S:LS5:8:3.3 Describes ways biotechnology helps humans, including improved health and medicine.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:LS5:6:4.1 Understand that some form of science is used in most jobs/careers and that some jobs/careers specifically require knowledge of life science.	S:LS5:8:4.1 Understand that some scientific jobs/careers involve the application of life science content knowledge and experience in specific ways that meet the goals of the job.

Life Science		
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).		
	9-11	**11-12 (Advanced)**
1. CLASSIFICATION	S:LS1:11:1.1 Describe how organisms are classified into a hierarchy of groups and subgroups, which are based on similarities that reflect their evolutionary relationships. S:LS1:11:1.2 Explain that organisms that possess similar DNA code are more closely related than those in which DNA varies greatly. S:LS1:11:1.3 Identify plants and animals according to binomial nomenclature. S:LS1:11:1.4 Differentiate between prokaryotic and eukaryotic cells according to general structure and degrees of complexity.	S:LS1:12:1.1 Differentiate between prokaryotic and eukaryotic cells at the biochemical level, using cell wall composition, DNA structure, and other biochemical pathways.

Life Science		
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).		
	9-11	**11-12 (Advanced)**
2. LIVING THINGS AND ORGANIZATION	S:LS1:11:2.1 Identify the structures of different types of cell parts/organelles and explain the functions they perform. S:LS1:11:2.2 Recognize how cell functions are regulated through changes in the activity of the functions performed by proteins, and through the selective expression of individual genes; and explain how this regulation allows cells to respond to their environment and to control and coordinate cell growth and division. S:LS1:11:2.3 Recognize how an organism's organization and complexity accommodate its need for obtaining, transforming, transporting, releasing, and eliminating the matter and energy used to sustain it. S:LS1:11:2.4 Explain how the processes of photosynthesis and cellular respiration are interrelated and contribute to biogeochemical cycles. S:LS1:11:2.5 Describe the structures of proteins and their role in cell function. S:LS1:11:2.6 Describe the chemical reactions involved in cell functions using examples from the nervous, immune and endocrine systems in multicellular animals. S:LS1:11:2.7 Recognize that because all matter tends toward more disorganized states, living systems need a continuous input of energy to maintain their chemical and physical organizations. S:LS1:11:2.8 Use data and observation to make connections between, to explain, or to justify how specific cell organelles produce/regulate what the cell needs or what a unicellular or multi-cellular organism needs for survival (e.g., protein synthesis, DNA transport, nerve cells). [LS1(9-**11**)INQ+SAE+FAF-**1**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses* S:LS1:12:2.1 Compare the processes of mitosis and meiosis, including disruptions to the cycles, such as disease or cancer. S:LS1:12:2.2 Explain the process of cell differentiation, using stem cells as an example.

Life Science		
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).		
	9-11	**11-12 (Advanced)**
3. REPRODUCTION	S:LS1:11:3.1 Describe the chemical and structural properties of DNA and explain its role in identifying the characteristics of an organism. S:LS1:11:3.2 Recognize that new heritable characteristics can only result from new combinations of existing genes or from mutations of genes in an organism's sex cells; and explain why other changes in an organism cannot be passed on. S:LS1:11:3.3 Describe the alternation of generations, life cycles with haploid and diploid phases in living organisms, such as bacteria, plants and animals. S:LS1:11:3.4 Explain or justify with evidence how the alteration of the DNA sequence may produce new gene combinations that make little difference, enhance capabilities, or can be harmful to the organism (e.g., selective breeding, genetic engineering, mutations). [LS1(9-**11**)FAF+POC-**2**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses* S:LS1:12:3.1 Compare and contrast the alternation of generations' life cycles; and understand the variations of the haploid and diploid phases that produce diplontic, haplontic, and isomorphic alternation of generations in living organisms.

Life Science		
LS2– Energy flows and matter recycles through an ecosystem.		
	9-11	**11-12 (Advanced)**
1. ENVIRONMENT	S:LS2:11:1.1 Explain how the amount of life an environment can sustain is restricted by the availability of matter and energy, and the ability of the ecosystem to recycle materials. S:LS2:11:1.2 Describe how the interrelationships and interdependencies among organisms generate stable ecosystems that fluctuate around a state of rough equilibrium for hundreds or thousands of years. S:LS2:11:1.3 Identify the factors in an ecosystem that can affect its carrying capacity. S:LS2:11:1.4 Analyze and describe how environmental disturbances, such as climate changes, natural events, human activity and the introduction of invasive species, can affect the flow of energy or matter in an ecosystem. S:LS2:11:1.5 Using data from a specific ecosystem, explain relationships or make predictions about how environmental disturbance (human impact or natural events) affects the flow of energy or cycling of matter in an ecosystem. [LS2(9-**11**)INQ+SAE-**3**] S:LS2:11:1.6 Explain or evaluate potential bias in how evidence is interpreted in reports concerning a particular environmental factor that impacts the biology of humans. [LS2(9-**11**)NOS-**5**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*

Life Science		
LS2– Energy flows and matter recycles through an ecosystem.		
	9-11	**11-12 (Advanced)**
2. FLOW OF ENERGY AND RECYCLING OF MATERIALS	S:LS2:11:2.1 Use examples from local ecosystems to describe the relationships among organisms at the different trophic levels.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*
3. RECYCLING OF MATERIALS	S:LS2:11:3.1 Explain that as matter and energy flow through different levels of organization in living systems and between living systems and the environment, elements, such as carbon and nitrogen, are recombined in different ways. S:LS2:11:3.2 Trace the cycling of matter (e.g., carbon cycle) and the flow of energy in a living system from its source through its transformation in cellular, biochemical processes (e.g., photosynthesis, cellular respiration, fermentation). [LS2(9-**11**)POC+SAE-**4**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*

Life Science		
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).		
	9-11	**11-12 (Advanced)**
1. CHANGE	S:LS3:11:1.1 Identify ways humans can impact and alter the stability of ecosystems, such as habitat destruction, pollution, and consumption of resources; and describe the potentially irreversible effects these changes can cause. S:LS3:11:1.2 Identify ways of detecting, and limiting or reversing environmental damage. S:LS3:11:1.3 Analyze the aspects of environmental protection, such as ecosystem protection, habitat management, species conservation and environmental agencies and regulations; and evaluate and justify the need for public policy in guiding the use and management of the environment.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Life Science		
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).		
	9-11	**11-12 (Advanced)**
2. EVIDENCE OF EVOLUTION	S:LS3:11:2.1 Explain the currently accepted theory for the development of life on Earth, including the history of its origin and the evolutionary process. S:LS3:11:2.2 Recognize that the abilities and behaviors an organism has, and likelihood of its survival strongly depend on its heritable characteristics, which can be biochemical and anatomical. S:LS3:11:2.3 Explain the contributions of Darwin, Malthus, Wallace and Russell to the advancement of life science. S:LS3:11:2.4 Explain evolution in terms of how the Earth's present-day life forms evolved from earlier, distinctly different species as a consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuing selection. S:LS3:11:2.5 Explain how evidence from technological advances supports or refutes the genetic relationships among groups of organisms (e.g., DNA analysis, protein analysis). [LS3(9-**11**)NOS-**6**] S:LS3:11:2.6 Given information about living or extinct organisms, cite evidence to explain the frequency of inherited characteristics of organisms in a population; or explain the evolution of varied structures (with defined functions) that affected the organisms' survival in a specific environment (e.g., giraffe, wind pollination of flowers). [LS3(9-**11**)INQ+FAF+POC-**8**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Life Science		
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).		
	9-11	**11-12 (Advanced)**
3. NATURAL SELECTION	S:LS3:11:3.1 Explain the concept of natural selection. S:LS3:11:3.2 Explain the diversity and unity of past and present life forms on Earth using currently accepted theories. S:LS3:11:3.3 Recognize how a species' chance of survival increases with each variation of an organism within the species; and explain how, in the event of a major global change, the greater the diversity of species on Earth, the greater the chance for survival of life. S:LS3:11:3.4 Analyze present day data and research in areas, including antibiotic resistance in bacteria, changes in viral genomes, such as bird flu, and DNA sequencing; and relate it to the concepts of natural selection. S:LS3:11:3.5 Identify and describe ways genes may be changed and combined to create genetic variation within a species. S:LS3:11:3.6 Explain that gene mutations and new combinations may have a variety of effects on the organism, including positive and negative ones, or none at all. S:LS3:11:3.7 Explain the concepts of Mendelian genetics. S:LS3:11:3.8 Use pedigree charts and Punnet Squares to determine patterns of inheritance. S:LS3:11:3.9 Given a scenario, provide evidence that demonstrates how sexual reproduction results in a great variety of possible gene combinations and contributes to natural selection (e.g., Darwin's finches, isolation of a species, Tay Sach's disease). [LS3(9-**11**)INQ+POC-7]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.* S:LS3:12:3.1 Understand the types of mutations that cause changes in DNA and cause the appearance of new alleles, such as frameshift and point mutations, and the chromosomal mutations of insertion, deletion, translocation, and duplication.

Life Science		
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.		
	9-11	**11-12 (Advanced)**
1. BEHAVIOR	S:LS4:11:1.1 Recognize that the immune system, endocrine system, and nervous system can affect the homeostasis of an organism. S:LS4:11:1.2 Describe how the functions of all the human body systems are interrelated at a chemical level and how they maintain homeostasis.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Life Science		
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.		
	9-11	**11-12 (Advanced)**
2. DISEASE	S:LS4:11:2.1 Explain that disease in organisms can be caused by intrinsic failures of the system or infection by other organisms, and describe as well as provide examples of how some diseases are caused by: the breakdown in cellular function, congenital conditions, genetic disorders, malnutrition, and emotional health, including stress. S:LS4:11:2.2 Explain that vaccines were developed to reduce or eliminate diseases; and provide examples of how these medical advances have proven to be successful. S:LS4:11:2.3 Describe and provide examples of how new medical techniques, efficient health care delivery systems, improved sanitation, and a more complete understanding of the nature of disease provides today's humans a better chance of staying healthier than their forebears. S:LS4:11:2.4 Describe how some drugs mimic or block the molecules involved in transmitting nerve or hormone signals and explain how this disturbs the normal operations of the brain and body. S:LS4:11:2.5 Explain that gene mutation in a cell can result in uncontrolled division, which is called cancer; and describe how exposure of cells to certain chemicals and radiation increase mutation, and thus the chance for cancer. S:LS4:11:2.6 Use evidence to make and support conclusions about the ways that humans or other organisms are affected by environmental factors or heredity (e.g., pathogens, diseases, medical advances, pollution, mutations). [LS4(9-**11**)INQ+NOS-**9**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Life Science		
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.		
	9-11	**11-12 (Advanced)**
3. HUMAN IDENTITY	S:LS4:11:3.1 Describe how the length and quality of human life are influenced by many factors, including sanitation, diet, medical care, gender, genes, and environmental conditions and personal health behaviors. S:LS4:11:3.2 Explain how the immune system functions to prevent and fight disease. S:LS4:11:3.3 Explain how the immune system, endocrine system, or nervous system works and draw conclusions about how systems interact to maintain homeostasis in the human body. [LS4(9-**11**)SAE+FAF-**10**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Life Science		
LS5– The growth of scientific knowledge in Life Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	9-11	**11-12 (Advanced)**
1. DESIGN TECHNOLOGY	S:LS5:11:1.1 Describe ways in which technology has increased our understanding of the life sciences. S:LS5:11:1.2 Understand that technology is designed with a particular function in mind, and principles of life science are useful in creating technology for the life sciences.	S:LS5:12:1.1 Recognize the importance of technology as it relates to science, for purposes such as: access to information about living systems, medical diagnosis, sample collection and treatment, measurement, data collection, and storage, computation, and communication of information.
2. TOOLS	S:LS5:11:2.1 Describe the use and benefits of equipment such as light microscopes, transmission electron microscopes, scanning electron microscopes, spectrophotometers, probes, and robotics to the study of the life sciences.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*
3. SOCIAL ISSUES (LOCAL AND GLOBAL) MEDICAL TECHNOLOGY BIOTECHNOLOGY	S:LS5:11:3.1 Describe ways technology can support and improve our understanding of environmental issues. S:LS5:11:3.2 Describe aspects of the medical system available to help people in New Hampshire, including: prevention programs, vaccines and pharmaceuticals, hospitals and rehabilitation facilities. S:LS5:11:3.3 Recognize that biotechnology is used in many areas, such as agriculture, pharmaceuticals, the environment, and genetic engineering; and understand that it requires extensive knowledge of the systems being changed. S:LS5:11:3.4 Explain how advances in agriculture made using biotechnology have directly affected the food production over the past 100 years; and that this change has profoundly affected societies all over the globe, making larger populations and urban centers a possibility.	S:LS5:12:3.1 Explain how genetic engineering is used to modify the DNA structure of an organism; and describe how this process is used to research and develop medically useful products, such as insulin. S:LS5:12:3.2 Summarize arguments on both sides of a medical research controversy, such as stem cell research, cloning, or zootransplanation. S:LS5:12:3.3 Analyze and evaluate a biotechnology system in New Hampshire that focuses on a specific goal, such as pharmaceutical development; and describe all elements of the system, identifying the costs and the benefits.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:LS5:11:4.1 Explain the kinds of applications of knowledge and skills necessary for jobs/careers specific to the life sciences.	S:LS5:12:4.1 Understand the various scientific fields that use scientific content and skills; and distinguish between professional and skilled science jobs/careers in the life sciences.

Physical Science Overview

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs	Page K-4	Page 5-8	Page 9-12
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).	1. Composition	**96**	**101**	**107**
	2. Properties	**96**	**102**	**108**
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.	1. Change	**97**	**103**	**109**
	2. Conservation	**97**	**103**	**110**
	3. Energy	**98**	**104**	**111-112**
PS3– The motion of an object is affected by force.	1. Forces	**99**	**105**	**113**
	2. Motion	**99**	**105**	**114**
PS4– The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	1. Design Technology	**100**	**106**	**115**
	2. Tools	**100**	**106**	**115**
	3. Social Issues (Local and Global) Energy, Power, and Transportation Manufacturing	**100**	**106**	**115**
	4. Career Technical Education Connections	**100**	**106**	**115**

Physical Science		
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).		
	K-2	**3-4**
1. COMPOSITION	S:PS1:2:1.1 Recognize that objects can be composed of different types of materials, such as wood, metal, and paper. S:PS1:2:1.2 Recognize that objects can be made of one or more materials.	S:PS1:4:1.1 Explain that materials may be composed of parts that are too small to be seen without magnification. S:PS1:4:1.2 Use measures of weight (data) to demonstrate that the whole equals the sum of its parts. [PS1(K-**4**)SAE-**3**]
2. PROPERTIES	S:PS1:2:2.1 Identify the observable properties of different objects, such as color, size, shape, weight and texture.	S:PS1:4:2.1 Recognize that substances can be classified by observable properties. S:PS1:4:2.2 Explain that some materials can exist in different states; and describe the distinct physical properties of each state of matter. S:PS1:4:2.3 Explain how some materials, such as water, can change from one state to another by heating or cooling. S:PS1:4:2.4 Make a prediction about what might happen to the state of common materials when heated or cooled; or categorize materials as solid, liquid, or gas. [PS1(K-**4**)POC-**2**] S:PS1:4:2.5 Collect and organize data about physical properties in order to classify objects or draw conclusions about objects and their characteristic properties (e.g., temperature, color, size, shape, weight, texture, flexibility). [PS1(K-**4**)INQ-**1**]

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	K-2	**3-4**
1. CHANGE	S:PS2:2:1.1 Describe how the properties of certain materials can change when specific actions are applied to them, such as freezing, mixing, heating, cutting, dissolving and bending. S:PS2:2:1.2 Recognize that not all materials react the same way when an action is applied to them.	S:PS2:4:1.1 Recognize that energy has the ability to create change.
2. CONSERVATION	*None at this grade span.*	*None at this grade span.*

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	K-2	**3-4**
3. ENERGY	S:PS2:2:3.1 Recognize that sound is produced by vibrating objects and that the pitch of the sound can be varied by changing the rate of vibration. S:PS2:2:3.2 Explain that the Sun provides the Earth with heat and light. S:PS2:2:3.3 Describe that heat can be produced in a variety of ways, such as burning, rubbing, and mixing substances together. S:PS2:2:3.4 Recognize that energy comes from different sources, such as electricity and water, and is utilized in many common objects.	S:PS2:4:3.1 Identify the various forms of energy, such as electrical, light, heat, sound. S:PS2:4:3.2 Recognize that electricity in circuits can produce light, heat, sound, and magnetic effects. S:PS2:4:3.3 Identify and describe the organization of a simple circuit. S:PS2:4:3.4 Differentiate between objects and materials that conduct electricity and those that are insulators of electricity. S:PS2:4:3.5 Explain that light travels in a straight line until it strikes an object; and describe how it can be reflected by a mirror, bent by a lens, or absorbed by the object. S:PS2:4:3.6 Given a specific example or illustration (e.g., simple closed circuit, rubbing hands together) predict the observable effects of energy (i.e., the bulb lights, a bell rings, hands warm up). A test item may ask, "What will happen when…?" [PS2(K-**4**)SAE-**4**] S:PS2:4:3.7 Use observations of light in relation to other objects/substances to describe the properties of light (i.e., can be reflected, refracted, or absorbed). [PS2(K-**4**)SAE-**5**] S:PS2:4:3.8 Experiment, observe, or predict how heat might move from one object to another. [PS2(K-**4**) INQ+SAE-**6**]

Physical Science		
PS3– The motion of an object is affected by force.		
	K-2	**3-4**
1. FORCES	S:PS3:2:1.1 Describe the properties of magnetism and demonstrate how magnets can be used to move some things without touching them. S:PS3:2:1.2 Describe and demonstrate that things close to the Earth drop to the ground unless something supports them.	S:PS3:4:1.1 Recognize that magnets attract certain kinds of other materials; and classify objects by those magnets will attract and those they will not. S:PS3:4:1.2 Recognize that magnets attract and repel each other. S:PS3:4:1.3 Explain that electrically charged material pulls on all other materials and can attract or repel other charged materials. S:PS3:4:1.4 Recognize that the Earth's gravitational force pulls any object toward it. S:PS3:4:1.5 Use observations of magnets in relation to other objects to describe the properties of magnetism (i.e., attract or repel certain objects or has no effect). [PS3(K-**4**)INQ+SAE-**8**]
2. MOTION	S:PS3:2:2.1 Describe the many different ways things can move, such as in a straight line, zigzag or circular motion, back and forth, and fast and slow. S:PS3:2:2.2 Describe and demonstrate how the position and motion of an object can be changed by applying force, such as pushing and pulling; and explain that the greater the force, the greater the change. S:PS3:2:2.3 Describe the position of an object by referencing its location in relation to another object or background.	S:PS3:4:2.1 Use data to predict how a change in force (greater/less) might affect the position, direction of motion, or speed of an object (e.g., ramps and balls). [PS3(K-**4**)INQ+SAE-**7**]

Physical Science		
PS4– The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	K-2	**3-4**
1. DESIGN TECHNOLOGY	S:PS4:2:1.1 Recognize that new objects can be made out of physical materials, such as cloth and paper.	S:PS4:4:1.1 Understand that materials are used in certain products based on their properties, such as strength and flexibility. S:PS4:4:1.2 Recognize that products are made using a combination of technologies, such as how an escalator uses both a pulley system and an electrical motor.
2. TOOLS	S:PS4:2:2.1 Identify tools and simple machines, such as a wheel, and explain how they work. S:PS4:2:2.2 Demonstrate how to use tools, such as rulers, scales, balances, magnifiers and thermometers to measure properties of objects, such as size, weight, temperature.	S:PS4:4:2.1 Demonstrate how to use tools, such as magnifiers, scales, balances, rulers, and thermometers to gather data and extend the senses. S:PS4:4:2.2 Describe how some tools can be used to modify natural materials by processes such as separating, shaping, and joining, to produce new materials.
3. SOCIAL ISSUES (LOCAL AND GLOBAL) ENERGY, POWER, AND TRANSPORTATION MANUFACTURING	S:PS4:2:3.1 Provide examples of how man uses energy in everyday life, such as providing light, warmth in winter, cooling in summer, TVs, computers, telephones, transportation, factories. S:PS4:2:3.2 Provide examples of items that are manufactured or produced.	S:PS4:4:3.1 Give examples of transportation systems used in New Hampshire, such as buses, trains, cars, and bicycles; and describe the sources of energy they use. S:PS4:4:3.2 Explain that manufactured products are designed to solve a problem or meet a need. S:PS4:4:3.3 Provide an example to illustrate that manufacturing involves changing natural materials into finished products; and explain that this results in the production of a large number of objects that look almost identical.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:PS4:2:4.1 Recognize that some jobs/careers require knowledge and use of physical science content and/or skills.	S:PS4:4:4.1 Identify some jobs/careers that require knowledge and use of physical science content and/or skills.

Physical Science		
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).		
	5-6	**7-8**
1. COMPOSITION	S:PS1:6:1.1 Recognize that all matter is composed of minute particles called atoms; and explain that all substances are composed of atoms, each arranged into different groupings. S:PS1:6:1.2 Identify elements as substances that contain only one kind of atom; and explain that elements do not break down by normal laboratory reactions, such as heating, exposure to electric current, and reaction to acid. S:PS1:6:1.3 Recognize that over one hundred elements exist, and identify the periodic table as a tool for organizing the information about them.	S:PS1:8:1.1 Explain that atoms often combine to form a molecule or formula unit (crystal). S:PS1:8:1.2 Recognize that elements can combine in a variety of ways to form compounds. S:PS1:8:1.3 Differentiate between an atom and an molecule. S:PS1:8:1.4 Differentiate between a mixture and a pure substance. S:PS1:8:1.5 Identify methods used to separate mixtures, such as boiling, filtering, chromatography and screening. S:PS1:8:1.6 Collect data or use data provided to infer or predict that the total amount of mass in a closed system stays the same, regardless of how substances interact (conservation of matter). [PS1(5-**8**)INQ+SAE-**3]** S:PS1:8:1.7 Given graphic or written information, classify matter as atom/molecule or element/compound (not the structure of an atom). [PS1(5-**8**)MAS-**5]**

Physical Science		
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).		
	5-6	**7-8**
2. PROPERTIES	S:PS1:6:2.1 Identify elements according to their common properties, such as highly reactive metals, less reactive metals, highly reactive non-metals and almost non-reactive gases. S:PS1:6:2.2 Identify substances by their physical and chemical properties, such as magnetism, conductivity, density, solubility, boiling and melting points. S:PS1:6:2.3 Differentiate between weight and mass. S:PS1:6:2.4 Identify energy as a property of many substances.	S:PS1:8:2.1 Differentiate between volume and mass and define density. S:PS1:8:2.2 Explain how different substances of equal volume usually have different weights. S:PS1:8:2.3 Identify a molecule as the smallest part of a substance that retains its properties. S:PS1:8:2.4 Investigate the relationships among mass, volume and density. [PS1(5-**8**)INQ-**1**] S:PS1:8:2.5 Given data about characteristic properties of matter (e.g., melting and boiling points, density, solubility), identify, compare, or classify different substances. [PS1(5-**8**)INQ+POC-**2**] S:PS1:8:2.6 Represent or explain the relationship between or among energy, molecular motion, temperature, and states of matter. [PS1(5-**8**)SAE+MAS-**4**]

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	5-6	**7-8**
1. CHANGE	S:PS2:6:1.1 Differentiate between a physical change, such as melting, and a chemical change, such as rusting.	S:PS2:8:1.1 Explain how substances react chemically with other substances to form new substances, known as compounds, and that in such recombinations, the properties of the new substances may be very different from those of the old. S:PS2:8:1.2 Identify factors that affect reaction rates, such as temperature, concentration and surface area; and explain that dissolving substances in liquids often accelerates reaction rates. S:PS2:8:1.3 Explain that oxidation involves combining oxygen with another substance, as in burning or rusting. S:PS2:8:1.4 Explain that states of matter depend on the arrangement of the molecules and their motion. S:PS2:8:1.5 Given a real-world example, show that within a system, energy transforms from one form to another (i.e., chemical, heat, electrical, gravitational, light, sound, mechanical). [PS2(5-**8**)SAE+POC-**6**]
2. CONSERVATION	S:PS2:6:2.1 Describe how mass remains constant in a closed system and provide examples relating to both physical and chemical change.	S:PS2:8:2.1 Explain the law of conservation of energy. S:PS2:8:2.2 Collect data or use data provided to infer or predict that the total amount of mass in a closed system stays the same, regardless of how substances interact (conservation of matter). [PS1(5-**8**)INQ+SAE-**3**]

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	5-6	**7-8**
3. ENERGY	S:PS2:6:3.1 Explain that the pitch of a sound is dependent on the frequency of the vibration producing it. S:PS2:6:3.2 Explain that sound vibrations move at different speeds, have different wavelengths; and establish wave-like disturbances that emanate from the source. S:PS2:6:3.3 Recognize that energy, in the form of heat, is usually a by-product when one form of energy is changed to another, such as when machines convert stored energy to motion. S:PS2:6:3.4 Explain that heat energy moves from warmer materials or regions to cooler ones through conduction, convection, and radiation. S:PS2:6:3.5 Explain how electrical circuits can be used to transfer energy in order to produce heat, light, sound, and chemical changes.	S:PS2:8:3.1 Differentiate between kinetic energy, which is the energy of motion and potential energy, which depends on relative position. S:PS2:8:3.2 Recognize the Sun is a major energy source for the Earth, and describes how it affects the planet's surface. S:PS2:8:3.3 Describe ways light can interact with matter, such as transmission (which includes refraction), absorption, and scattering (which includes reflection). S:PS2:8:3.4 Explain that the human eye can only detect wavelengths of electromagnetic radiation within a narrow range; and explain that the differences of wavelength within that range of visible light are perceived as differences in color. S:PS2:8:3.5 Recognize that most chemical and nuclear reactions involve a transfer of energy. S:PS2:8:3.6 Use data to draw conclusions about how heat can be transferred (convection, conduction, radiation). [PS2(5-**8**)INQ+SAE+POC-**7**]

Physical Science		
PS3– The motion of an object is affected by force.		
	5-6	**7-8**
1. FORCES	S:PS3:6:1.1 Recognize that just as electric currents can produce magnetic forces, magnets can cause electric currents. S:PS3:6:1.2 Explain that when a force is applied to an object, it reacts in one of three ways: the object either speeds up, slows down, or goes in a different direction. S:PS3:6:1.3 Describe the relationship between the strength of a force on an object and the resulting effect, such as the greater the force, the greater the change in motion.	S:PS3:8:1.1 Explain that the force of gravity gets stronger the closer one gets to an object and decreases the further away one gets from it. S:PS3:8:1.2 Recognize the general concepts related to gravitational force. S:PS3:8:1.3 Use data to determine or predict the overall (net) effect of multiple forces (e.g., friction, gravitational, magnetic) on the position, speed, and direction of motion of objects. [PS3(5-**8**)INQ+POC-**8**]
2. MOTION	S:PS3:6:2.1 Explain the how balanced and unbalanced forces are related to an object's motion. S:PS3:6:2.2 Explain that an object's motion can be tracked and measured over time and that the data can be used to describe its position.	S:PS3:8:2.1 Explain that an object in motion that is unaffected by a force will continue to move at a constant speed and in a straight line. S:PS3:8:2.2 Explain how the motion of an object can be described by its position, direction of motion, and speed; and illustrate how that motion can be measured and represented graphically.

Physical Science		
PS4– The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	5-6	**7-8**
1. DESIGN TECHNOLOGY	S:PS4:6:1.1 Understand that scientific principles are used in the design of technology.	S:PS4:8:1.1 Understand that design features, such as size shape, weight, and function, must be considered when designing new technology.
2. TOOLS	S:PS4:6:2.1 Recognize that manufacturing processes use a variety of tools and machines to separate, form, combine and condition natural and synthetic materials.	S:PS4:8:2.1 Demonstrate appropriate use of tools, such as rulers, calculators, balances, and graduated cylinders to measure and calculate volume and mass.
3. SOCIAL ISSUES (LOCAL AND GLOBAL) ENERGY, POWER, AND TRANSPORTATION MANUFACTURING	S:PS4:6:3.1 Explain how a battery changes chemical energy into electrical energy. S:PS4:6:3.2 Demonstrate how to produce a magnetic force with an electric current, such as an electromagnet, and how to produce an electric current with a magnet, such as a generator. S:PS4:6:3.3 Provide an example to show that manufacturing processes involve changing natural materials into finished products through a series of processes that involve physical and/or chemical changes.	S:PS4:8:3.1 Explain how humans use natural resources, such as flowing water and burning of coal, oil, or natural gas to generate electrical energy in power plants. S:PS4:8:3.2 Describe how natural resources, such as coal, oil and natural gas are tapped for use in power plants, and how alternative sources, such as solar, wind, water, nuclear are tapped for power; and compare the advantages and disadvantages of each source. S:PS4:8:3.3 Differentiate between durable goods, which are designed to operate for a long period of time, and non-durable goods, which are only intended to operate for a short period of time.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:PS4:6:4.1 Understand that some form of science is used in most jobs/careers and that some jobs/careers specifically require knowledge of physical science.	S:PS4:8:4.1 Understand that some scientific jobs/careers involve the application of physical science content knowledge and experience in specific ways that meet the goals of the job.

Physical Science		
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).		
	9-11	**11-12 (Advanced)**
1. COMPOSITION	S:PS1:11:1.1 Recognize and describe the structure of an atom and explain how the major components interact with one another. S:PS1:11:1.2 Recognize how elements are arranged in the periodic table; and explain how this arrangement illustrates the repeating patterns among elements with similar properties, such as the relationship between atomic number and atomic mass. S:PS1:11:1.3 Explain that neutrons and protons are made up of even smaller constituents. S:PS1:11:1.4 Define isotopes; recognize that most elements have two or more isotopes; and explain that although the number of neutrons has little affect on how the atom interacts with others, they do affect the mass and stability of the nucleus. S:PS1:11:1.5 Scientific thought about atoms has changed over time. Using information (narratives or models of atoms) provided, cite evidence that changed our understanding of the atom and the development of atomic theory. [PS1(9-**11**)MAS+NOS-**2**] S:PS1:11:1.6 Model and explain the structure of an atom or explain how an atom's electron configuration, particularly the outermost electron(s), determines how that atom can interact with other atoms. [PS1(9-**11**)MAS+FAF-**4**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.* S:PS1:12:1.1 Understand the basic building blocks of matter are quarks and leptons. S:PS1:12:1.2 Recognize the main ideas of string theory. S:PS1:12:1.3 Identify the sub-orbital shapes and geometric orientations of the orbitals electrons can occupy in atoms.

Physical Science		
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).		
	9-11	**11-12 (Advanced)**
2. PROPERTIES	S:PS1:11:2.1 Explain that the physical properties of a compound are determined by its molecular structure and the interactions among the molecules. S:PS1:11:2.2 Determine whether an atom is either electrically neutral or an ion by referring to its number of electrons. S:PS1:11:2.3 Explain how the chemical properties of an element are governed by the electron configuration of atoms, and describe how atoms interact with one another by transferring or sharing the outermost electrons. S:PS1:11:2.4 Explain that radioactive materials are unstable and undergo spontaneous nuclear reactions, which emit particles and/or wavelike radiation. S:PS1:11:2.5 Explain that states of matter rely on the arrangement and motion of molecules; and differentiate between the structures of solids, liquids, and gases. S:PS1:11:2.6 Use physical and chemical properties as determined through an investigation to identify a substance. [PS1(9-**11**)INQ-**1**] S:PS1:11:2.7 Explain how properties of elements and the location of elements on the periodic table are related. [PS1(9-**11**)POC-**3**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	9-11	**11-12 (Advanced)**
1. CHANGE	S:PS2:11:1.1 Recognize and explain that atoms may be bonded together into molecules or formula units (crystalline solids). S:PS2:11:1.2 Recognize that atoms interact with one another by transferring or sharing electrons that are furthest from the nucleus; and explain that the outer electrons govern the chemical properties of an element. S:PS2:11:1.3 Explain that compounds are formed through both ionic and covalent bonding. S:PS2:11:1.4 Recognize that the rates of chemical reactions can vary greatly; and identify the factors that influence these reaction rates, such as how often the reacting atoms and molecules encounter one another, the temperature, and the properties of the reacting species, including shape. S:PS2:11:1.5 Explain relationships between and among electric charges, magnetic fields, electromagnetic forces, and atomic particles. [PS2(9-**11**)SAE-**7**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.* S:PS2:12:1.1 Explain the complete mole concept and identify ways in which it can be used, such as to differentiate between actual and relative mass.

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	9-11	**11-12 (Advanced)**
2. CONSERVATION	S:PS2:11:2.1 Explain that chemical reactions either release or consume energy. S:PS2:11:2.2 Explain that chemical reactions can be accelerated by catalysts, such as enzymes. S:PS2:11:2.3 Recognize that a large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. S:PS2:11:2.4 Identify the variety of structures that may be formed from the bonding of carbon atoms, and describe their roles in various chemical reactions, including those required for life processes. S:PS2:11:2.5 Demonstrate how transformations of energy produce some energy in the form of heat and therefore the efficiency of the system is reduced (chemical, biological, and physical systems). [PS2(9-**11**)POC+SAE-**5**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	9-11	**11-12 (Advanced)**
3. ENERGY	S:PS2:11:3.1 Explain that all energy can be considered to be either kinetic energy, potential energy, or energy contained by a field. S:PS2:11:3.2 Provide examples of how kinetic and potential energy can be transformed from one to the other. S:PS2:11:3.3 Describe how the energy associated with individual atoms and molecules can be used to identify the substances they comprise; and explain that each kind of atom or molecule can gain or lose energy only in particular discrete amounts, absorbing and emitting light only at wavelengths corresponding to these amounts. S:PS2:11:3.4 Explain the range of the electromagnetic spectrum as it relates to both wavelength and energy; and provide examples of practical applications of the different wavelengths in the spectrum. S:PS2:11:3.5 Recognize that the human eye can only see a narrow range of wavelengths within the electromagnetic spectrum; and explain how the variations of wavelength within that range of visible light are perceived as differences in color. S:PS2:11:3.6 Describe the relationship between heat and temperature, explaining that heat energy consists of the random motion and vibrations of atoms, molecules, and ions; and that the higher the temperature, the greater the atomic or molecular motion.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.* S:PS2:12:3.1 Explain the concept of entropy. S:PS2:12:3.2 Understand that activation energy is required to make a chemical reaction proceed, whether or not it is exothermic or endothermic.

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	9-11	**11-12 (Advanced)**
	S:PS2:11:3.7 Explain that waves, such as light, seismic, sound waves, have energy and can transfer energy when they interact with matter. S:PS2:11:3.8 Explain that nuclear reactions convert a fraction of the mass of interacting particles into energy and release much greater amounts of energy than atomic interactions. S:PS2:11:3.9 Describe how electrons flow easily in some materials, such as metals, whereas in insulating materials, such as glass, they can hardly flow at all. S:PS2:11:3.10 Using information provided about chemical changes, draw conclusions about the energy flow in a given chemical reaction (e.g., exothermic reactions, endothermic reactions). [PS2(9-**11**)INQ+SAE-**6**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Physical Science		
PS3– The motion of an object is affected by force.		
	9-11	**11-12 (Advanced)**
1. FORCES	S:PS3:11:1.1 Explain that magnetic forces are related to the action of electrons and can be thought of as different aspects of a single electromagnetic force; and describe how the interplay of these forces is the basis for electric motors, generators, radio, television, and many other modern technologies. S:PS3:11:1.2 Recognize that the strength of the electric force between two charged objects is proportional to the charges and, as with gravitation, is inversely proportional to the square of the distance between them. S:PS3:11:1.3 Recognize that the strength of the gravitational force between two masses is proportional to the masses and inversely proportional to the square of the distance between them. S:PS3:11:1.4 Compare the strength of nuclear, electromagnetic and gravitational forces; and explain that the strength of nuclear forces account for the great amounts of energy released from the nuclear reactions in atomic or hydrogen bombs, and in the Sun and other stars. S:PS3:11:1.5 Recognize that electromagnetic forces exist within and between atoms. S:PS3:11:1.6 Recognize that different kinds of materials respond to electric forces in various ways; and differentiate between insulators, semiconductors, conductors and superconductors. S:PS3:11:1.7 Describe the difference between materials that contain equal proportions of positive and negative charges and those that have a very small excess or deficit of negative charges. S:PS3:11:1.8 Given information (e.g., graphs, data, diagrams), use the relationships between or among force, mass, velocity, momentum, and acceleration to predict and explain the motion of objects. [PS3(9-**11**)INQ+POC-**8**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.* S:PS3:12:1.1 Understand the four fundamental forces found in nature: gravitation, electromagnetism, strong nuclear force, and weak nuclear force. S:PS3:12:1.2 Describe the gauge particles that are exchanged by each of the fundamental forces. S:PS3:12:1.3 Understand the basic principles of unified field theories.

Physical Science		
PS3– The motion of an object is affected by force.		
	9-11	**11-12 (Advanced)**
2. MOTION	S:PS3:11:2.1 Interpret and apply the laws of motion to determine the effects of forces on the motion of objects. S:PS3:11:2.2 Recognize that apparent changes in wavelength can provide information about changes in motion; explain that the observed wavelength of a wave depends upon the relative motion of the source and the observer; and relate these to the differences between shorter and longer wavelengths. S:PS3:11:2.3 Apply the concepts of inertia, motion, and momentum to predict and explain situations involving forces and motion, including stationary objects and collisions. [PS3(9-**11**)POC-**9**] S:PS3:11:2.4 Explain the effects on wavelength and frequency as electromagnetic waves interact with matter (e.g., light diffraction, blue sky). [PS3(9-**11**)SAE-**10**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.* S:PS3:12:2.1 Explain general concepts related to the theory of special relativity: time dilation, length contraction, and mass expansion. S:PS3:12:2.2 Understand the basic idea behind the theory of general relativity. S:PS3:12:2.3 Describe the predictions made by the theory of general relativity, and the evidence that supports it.

Physical Science		
PS4– The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	9-11	**11-12 (Advanced)**
1. DESIGN TECHNOLOGY	S:PS4:11:1.1 Recognize that the basic principles of energy, work and power are related to design technology.	S:PS4:12:1.1 Relate the transfer of energy through conduction, convection and radiation to design technologies.
2. TOOLS	S:PS4:11:2.1 Identify tools, such as thermostats and thermal sensors, and explain their use in environmental control systems.	S:PS4:12:2.1 Demonstrate the appropriate use of a variety of input devices, such as scanners, voice/sound recorders, and digital cameras.
3. SOCIAL ISSUES (LOCAL AND GLOBAL) ENERGY, POWER, AND TRANSPORTATION MANUFACTURING	S:PS4:11:3.1 Explain that power systems have a source of energy, a process, loads, and some have a feedback system. S:PS4:11:3.2 Demonstrate and explain how an engine converts chemical energy in the form of fuel, into mechanical energy in the form of motion. S:PS4:11:3.3 Calculate the efficiency of an engine, and explain why a perfectly efficient engine is impossible. S:PS4:11:3.4 Explain the relationship between energy and power. S:PS4:11:3.5 Explain the benefits of standardization of parts.	S:PS4:12:3.1 Compare two different energy systems that are used to produce large amounts of electrical power for New Hampshire residents, and describe the advantages and disadvantages of each system. S:PS4:12:3.2 Design a transportation system that meets most humans' need for reliable and affordable transportation, while having a minimal impact on the environment. S:PS4:12:3.3 Describe the various types of manufacturing systems, such as customized production, batch production, and continuous production, and explain that manufacturing results in two types of good, durable and non-durable goods. S:PS4:12:3.4 Understand that a manufacturing system includes design of the product and methods of obtaining raw materials, as well as actual production, marketing, sales, maintenance, servicing, repair, and final disposal of the remains of the product.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:PS4:11:4.1 Explain the kinds of applications of knowledge and skills necessary for jobs/careers specific to the physical sciences.	S:PS4:12:4.1 Understand the various scientific fields that use scientific content and skills and distinguish between professional and skilled science jobs/careers in the physical sciences.

New Hampshire Curriculum Framework

Measurement Specifics for Science

(Adapted from NECAP Mathematics Assessment GLEs grades 3-8)

The following is a list of the measurement benchmarks and equivalences that ***can be used*** in mathematics problems across the science domains at each specific grade. In addition to measurement benchmarks identified below students should be expected to use the appropriate units when solving problems involving area, volume, surface area, conversions, and rates (e.g., miles per hour, price per pound, and pounds per square inch) in science.

Connection to the Mathematics GLEs is **M:G&M:2.7 (Uses units of measures appropriately and consistently, and makes conversions within systems when solving problems across the content strands.)**

Measures	By Grade 2	By Grade 4	End of Grade 8
Length	**Unit (accuracy):** Inch (to whole inch); Foot (to whole inch); Centimeter (to whole centimeter); Meter (to whole centimeter) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter	**Unit (accuracy):** Inch (to 1/4 inch); Foot; Centimeter (to 0.5 centimeter); Meter (to 0.5 centimeter); Yard; Mile (use in scale questions); Kilometer (use in scale questions) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter; 3 feet in 1 yard; 36 inches in 1 yard	**Units (accuracy):** Inch (to 1/16 inch); Foot; Centimeter (to 1/10 centimeter); Meter (to 1/100 meter); Yard; Mile (use in scale and rate questions); Kilometer (use in scale and rate questions) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter; 3 feet in 1 yard; 36 inches in 1 yard; 10 millimeters in 1 centimeter; 1000 millimeters in 1 meter
Time	**Unit (accuracy):** Hour (to 15 minute interval) **Equivalencies:** 60 minutes in 1 hour	**Unit (accuracy):** Hour (to 5 minute interval); Day; Year **Equivalencies:** 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year; 60 seconds in 1 minute; 60 minutes in 1 hour	**Unit (accuracy):** Hour (to 1 minute); Day; Year **Equivalencies:** 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year; 60 seconds in 1 minute; 60 minutes in 1 hour
Temperature	**Unit (accuracy):** Degree (to 1 degree)	**Unit (accuracy):** °C and °F (to 1 degree)	**Unit (accuracy):** °C and °F (to 1 degree)
Capacity		**Unit (accuracy):** Quart (to whole quart)	**Unit (accuracy):** Quarts (to 1 ounce); Gallon; Pint; Liter **Equivalencies:** 32 ounces in 1 quart; 4 quarts in 1 gallon; 2 pints in 1 quart; 1000 milliliters in 1 liter
Mass		**Unit (accuracy):** Kilogram (to whole kilogram); Gram (to whole gram)	**Unit (accuracy):** Kilogram; Gram (to 1/10 gram)
Weight		**Unit (accuracy):** Pound (to whole pound)	**Unit (accuracy):** Pound (to 1 ounce) **Equivalencies:** 16 ounces in 1 pound
Angles and Rotation			**Unit (accuracy):** Degree (to 2 degrees) **Equivalencies:** 360° in 1 circle; 90° in 1 right angle

New Hampshire Curriculum Framework

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Achieve's Comparison of the American Diploma Project (ADP) English Benchmarks with the Rhode Island High School Grade-Span Expectations (GSEs) for Reading, Writing, and Oral Communication for Grades 9-10, 11-12

June 30, 2006

ACHIEVE'S
BENCHMARKING INITIATIVE

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ACHIEVE'S METHODOLOGY

Achieve, Inc. has been asked to review the Rhode Island expectations for high school exit in reading, writing and oral communication against the American Diploma Project (ADP) English Benchmarks to determine any gaps in alignment. For the purposes of this comparison, Achieve staff constructed a side-by-side chart comparing Achieve's ADP Benchmarks to the draft Rhode Island High School Grade Span Expectations (GSEs) for Grades 9-10 and Grades 11-12 in reading, writing, and oral communication.

Achieve has been conducting reviews of standards for seven years, by benchmarking a state's Academic Standards to "exemplary standards." In this review, Achieve's American Diploma Project (ADP) Benchmarks for College and Workplace Readiness were used as the basis of comparison for the review of the Rhode Island GSEs.

THE DEVELOPMENT OF THE AMERICAN DIPLOMA PROJECT (ADP) BENCHMARKS FOR COLLEGE AND WORKPLACE READINESS

The American Diploma Project (ADP) commissioned leading economists to examine labor market projections for the most promising jobs—those that pay enough to support a small family and provide real potential for career advancement—to pinpoint the academic knowledge and skills required for success in those occupations. ADP then surveyed officials from 22 occupations, ranging from manufacturing to financial services, about the skills they believe are most useful for their employees to bring to the job. Following those conversations, ADP worked closely with two- and four-year postsecondary leaders in the partner states to determine the prerequisite English and mathematics knowledge and skills required for success in entry-level, credit-bearing courses in English, mathematics, the sciences and the humanities. The resulting ADP Benchmarks reflect an unprecedented convergence in what these employers and postsecondary faculty say are needed for new employees and freshmen entering credit-bearing coursework to be successful. In mathematics, the Benchmarks reflect a rigorous four-year course sequence that includes content typically taught in Algebra I, Geometry and Algebra II, as well as some data analysis and statistics. In English, the Benchmarks reflect four years of grade-level high school courses that emphasize logic, writing and research. The ADP Benchmarks and sample tasks from employers and postsecondary faculty may be found at www.achieve.org .

Achieve, Education Trust and the Thomas B. Fordham Foundation launched ADP to help states restore the diploma's value by anchoring high school graduation standards to those of jobs and colleges. Toward that end, ADP moves beyond the kinds of standards that reflect experts' consensus view of what is *desirable* for students to learn, to expectations linked directly to the *essential* demands faced by students preparing for college, work and citizenship. These benchmarks are not test blueprints; a fair number of the benchmarks are not able to be assessed through on-demand measures, for example. Rather, they are intended to describe the knowledge and skills that are needed by high school graduates in order to be prepared to achieve in multiple postsecondary venues.

DOCUMENTS USED FOR REVIEW

The New England Common Assessment Program Reading and Writing Grade Level Expectations (GLEs) have been developed as a means to identify the reading and writing content knowledge and skills expected of all students of reading in Grades 3-8 and of writing in Grades 5 and 8. Reviewed in this report are the draft Rhode Island High School GSEs for Grades 9-10 and Grades 11-12, which have been developed for public review and comment. GLEs and GSEs are intended to capture the "big ideas" of reading, writing, and speaking that can be assessed without narrowing the curriculum locally.

Achieve also analyzed the Rhode Island Board of Governors for Higher Education Entry-Level Expectations, which were developed by the PK-16 Language Arts Advisory Committee, a working committee of the PK-16 Council chaired by Governor Donald Carcieri, which describe the skills and knowledge required by incoming students if they are to succeed in the state's higher education institutions. Since these were developed with the same intention of assuring that Rhode Island's high school graduates are ready to succeed in the postsecondary world, Achieve examined the alignment of these two sets of goals for high school students.

ALIGNMENT OF RHODE ISLAND'S HIGH SCHOOL ENGLISH GSES WITH THE ADP BENCHMARKS

In general, the Rhode Island GSEs for reading, writing, and oral communication align quite well with the ADP Benchmarks. The state acknowledges that these expectations are not intended to define the complete range of instruction for reading, writing, and oral communication, and, in the same manner, the ADP Benchmarks are not intended to encompass all instruction but rather to call out those skills that are necessary for postsecondary success. Both documents align in terms of major skills in language, oral communication, writing, research, informational text, and literature. Particularly strong agreement, for example, is evident in both documents' descriptions of what is entailed in effective oral presentations.

ADP	Rhode Island GSE
B6. Make oral presentations that: ▪ **exhibit a logical structure appropriate to the audience, context and purpose;** ▪ **group related ideas and maintain a consistent focus;**	**OC—10—2 [OC—12—2] In oral communication, students make oral presentations …** OC—10—2.1 Exhibiting logical organization and language use, appropriate to audience, context, and purpose OC—10—2.2 [OC—12—2.2] Maintaining a consistent focus
▪ **include smooth transitions** ▪ **support judgments with sound evidence and well-chosen details;** ▪ **make skillful use of rhetorical devices;** ▪ **provide a coherent conclusion;**	OC—10—2.3 [OC—12—2.3] Including smooth transitions, supporting thesis with well-chosen details, and providing a coherent conclusion
▪ **employ proper eye contact, speaking rate, volume, enunciation, inflection and gestures to communicate ideas effectively**	OC—10—2.5 [OC—12—2.5] Using a variety of strategies of address (e.g., eye contact, speaking rate, volume, articulation, enunciation, pronunciation, inflection, voice modulation, intonation, rhythm, and gesture) to communicate ideas effectively

Rhode Island's GSEs are among the few state standards that document the criteria for an effective oral presentation so well. Indeed, the necessity for being able to present ideas in an oral presentation format is present in many venues, both in the academic and business world. It is important that such skills be clearly delineated and practiced.

Only two elements cited in the ADP Benchmarks are absent from the Rhode Island GSE—supporting judgments with sound evidence and making skillful use of rhetorical devices (highlighted in the above table). Although seemingly minor, these elements of rigor that are repeatedly emphasized in the ADP document and may be somewhat weak in the Rhode Island GLEs. As argued by George Hillocks, Jr. in his book *The Testing Trap: How State Writing Assessments Control Learning*[1]:

[1] Teachers College Press, 2002.

> Most scoring rubrics that we examined do not call for evidence, only support. In most cases, the benchmark papers indicate that support means general elaboration . . . rather than specific, warranted evidence. (202)

Although Hillocks is referring specifically here to writing assessments, the caution remains the same—details are not the same as evidence. Just as Hillocks argues for logic and evidence, so do the ADP Benchmarks place a priority on critical thinking in messages delivered in all media, including the both the oral and the written.

In the case of the academic essay, however, the GSEs are not only aligned to the ADP Benchmarks, but also go beyond those set by ADP in terms of the level of detail provided. These GSEs should prove extremely helpful both to students and teachers in determining those elements of writing an essay that contribute to a successful piece of writing, thus guiding the development of both internal and external criteria for students.

ADP	Rhode Island GSE
C9.Write an academic essay (for example, a summary, an explanation, a description, a literary analysis essay) that: ▪ **develops a thesis;**	**W—10—3 [W—12—3] In response to literary or informational text, students make and support analytical judgments about text by…** W—10—3.1a Establishing an interpretive claim/assertion in the form of a thesis (purpose), when responding to a given prompt (state) W—10—3.1b [W—12—3.1b] Establishing an interpretive claim/assertion in the form of a thesis (purpose) W—10—7.2 [W—12—7.2] Stating and maintaining a focus/controlling idea/thesis
▪ **creates an organizing structure appropriate to purpose, audience and context;**	W—10—1.4 [W—12—1.4] Applying a format and text structure appropriate to purpose, audience, and context W—10—7.3 Writing with a sense of audience, when appropriate

▪ **includes relevant information and excludes extraneous information;** ▪ **makes valid inferences;** ▪ **supports judgments with relevant and substantial evidence and well-chosen details; and provides a coherent conclusion.**	W—10—6.2 [W—12—6.2] Selecting appropriate and relevant information (excluding extraneous details) to set context W—10—8.2 [W—12—8.2] Including facts and details relevant to focus/controlling idea or thesis, and excluding extraneous information W—10—3.2 [W—12—3.2] Making inferences about the relationship(s) among content, events, characters, setting, theme, or author's craft W—10—3.3 [W—12—3.3] Using specific details and references to text or relevant citations to support thesis, interpretations, or conclusions W—10—8.3 [W—12—8.3] Including sufficient details or facts for appropriate depth of information: naming, describing, explaining, comparing, contrasting, or using visual images to support intended purpose W—10—3.4 [W—12—3.4] Organizing ideas, using transitional words/phrases and drawing a conclusion by synthesizing information (e.g., demonstrate a connection to the broader world of ideas) W—10—6.4 [W—12—6.4] Drawing a conclusion by synthesizing information

In other areas, the match between the ADP Benchmarks and the GSEs is weaker, as in, for instance, the research essay. ADP found an unprecedented convergence between the knowledge and skills employers seek in new workers and those that college faculty expect of entering students. Both groups expect that high school graduates can complete a significant research report, for example. Several significant aspects of the research essay are called out by the ADP Benchmarks, but the Rhode Island GSEs address only parts of these criteria and also do not stipulate explicitly the production of such a piece of writing.

ADP	Rhode Island GSE
D5.Write an extended research essay (approximately six to 10 pages), building on primary and secondary sources, that: ▪ **marshals evidence in support of a clear thesis statement and related claims;** ▪ **paraphrases and summarizes with accuracy and fidelity the range of arguments and evidence supporting or refuting the thesis, as appropriate; and** ▪ **cites sources correctly and documents quotations, paraphrases and other information using a standard format.**	R—10—15.3 [R—12—15.3] Organizing, analyzing, and interpreting the information R—10—15.4 [R—12—15.4] Drawing conclusions/judgments and supporting them with evidence W—10—6.6 [W—12—6.6] Listing and citing sources using standard format

Additionally, although the state expects students to participate in structured discussions, the demands of functioning within a work team as described by the ADP Benchmarks are markedly different.

ADP	Rhode Island GLE
B7. Participate productively in self-directed work teams for a particular purpose (for example, to interpret literature, write or critique a proposal, solve a problem, make a decision), including: ▪ **posing relevant questions;** ▪ **listening with civility to the ideas of others;** ▪ **extracting essential information from others' input;** ▪ **building on the ideas of others and contributing relevant information or ideas in group discussions;** ▪ **consulting texts as a source of ideas;** ▪ **gaining the floor in respectful ways;** ▪ **defining individuals' roles and responsibilities and setting clear goals;** ▪ **acknowledging the ideas and contributions of individuals in the group;** ▪ **understanding the purpose of the team project and the ground rules for decision-making;** ▪ **maintaining independence of judgment, offering dissent courteously, ensuring a hearing for the range of positions on an issue and avoiding premature consensus;** ▪ **tolerating ambiguity and a lack of consensus; and** ▪ **selecting leader /spokesperson when necessary.**	R—10—17.2 [R—12—17.2] Participating in in-depth discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others. OC—10—1.4 [OC—12—1.4] Participating in large and small group discussions showing respect for a range of individual ideas OC—10—1.5 [OC—12—1.5] Reaching consensus to solve a problem, make a decision, or achieve a goal

The ability to participate productively in work teams is more and more an aspect of both collegiate classrooms and the world of work at all levels. The more specifically the characteristics of performances are identified, the more likely it is that clear criteria are set and achieved by students, and the more likely the success.

A side-by-side chart that compares all of the ADP English Benchmarks to the Rhode Island GSEs in reading, writing, and speaking is included in Appendix A at the end of this report.

Areas of Non-Alignment of Rhode Island GSEs with the ADP Benchmarks

A major area of non-alignment between the ADP Benchmarks and the state's GSEs occurs because the high school standards do not explicitly address the analysis and evaluation of media. Unlike printed materials, electronic media use sound and moving images; therefore, they can convey information, entertain, and persuade in ways that are distinct from the printed word alone. Students need to view non-print media with an equally appreciative, yet discriminating, eye to learn how a work changes when it is

adapted from print to non-print media. Similarly, an equally appreciative, yet discriminating, eye is necessary for students when learning how to create their own media.

Other areas that are emphasized in the ADP Benchmarks and not in the Rhode Island GSEs include some logic, writing, and literature elements. A full listing of all the expectations included in the ADP Benchmarks and not addressed by the Rhode Island GSEs is included with commentary in Appendix B at the end of this report.

Alignment of Rhode Island GSEs to the RIBGHE Entry-Level Expectations

The RIBGHE Entry-Level Expectations also describe the skills and knowledge required of the state's students in order to succeed in the state's higher education institutions.

Addressing the areas of reading and writing, these expectations are clearly stated and are well matched by the states GSEs. Both the high school and the college-ready expectations place an emphasis on like skills in reading, including attention to vocabulary, the use of reading strategies, reading informational as well as literary texts. In terms of writing, the two sets are also well aligned, focusing on both the products of writing in a variety of genres, and also on the processes of composition. The GSEs also include expectations for oral presentations and active listening. Although the college-ready expectations do not include these areas, attention to such skills could only serve to increase a student's success in a college course.

The two sets of expectations deliver a singular message to the state's high school students. Students who meet the high school skill levels described will also be well prepared to meet those expectations described by RIBGHE.

Conclusion

The standard against which student expectations are measured is whether or not the public description of the knowledge and skills is clear enough to articulate a goal for students and transparent enough to guide instruction toward that goal. The Rhode Island GSEs appear to provide sufficient guidance in many aspects of the ADP Benchmarks so that the state's students are offered the opportunity to succeed in their postsecondary endeavors.

In English, the ADP Benchmarks demand strong communication skills, as well as the analytic and reasoning skills typically associated with today's advanced and honors classes. Whether interpreting an introductory economics text in a college classroom or communicating safety rules to a construction crew, high school graduates must master content and skills beyond those expected by present state standards. The state's GSEs appear to approach quite clearly those postsecondary needs.

APPENDIX A: SIDE-BY-SIDE COMPARISON OF THE ADP ENGLISH BENCHMARKS TO THE RHODE ISLAND GRADE SPAN EXPECTATIONS

American Diploma Project	Rhode Island Grade Span Expectations POST Field Review draft NH and RI High School Reading GSEs Version 5.0; 9/2004 Written and Oral Communication GSEs Version 4.0; 9/2004
A. Language	
A1. Demonstrate control of standard English through the use of grammar, punctuation, capitalization and spelling.	**W—10—9 [W—12—9] In independent writing, students demonstrate command of appropriate English conventions by…** W—10—9.1 [W—12—9.1]Applying rules of standard English usage to correct grammatical errors W—10—9.2 [W—12—9.2] Applying capitalization rules W—10—9.4 [W—12—9.4] Applying appropriate punctuation to various sentence patterns to enhance meaning W—10—9.5 [W—12—9.5] Applying conventional and word-derivative spelling patterns/rules
A2. Use general and specialized dictionaries, thesauruses and glossaries (print and electronic) to determine the definition, pronunciation, etymology, spelling and usage of words.	R—10—2.1 [R—12—2.1] Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes, base words, common roots, or word origins; or context clues; or general and specialized print or electronic resources, including dictionaries, glossaries, or thesauruses to determine definition, pronunciation, etymology, or usage of words; or prior knowledge)
A3. Use roots, affixes and cognates to determine the meaning of unfamiliar words.	
A4. Use context to determine the meaning of unfamiliar words.	
A5. Identify the meaning of common idioms, as well as literary, classical and biblical allusions; use them in oral and written communication.	R—10—3.1 [R—12—3.1] Identifying synonyms, antonyms, homonyms/ homophones, shades of meaning, analogies, idioms, or word origins, including words from dialects, or other languages that have been adopted into our language/standard English.
A6. Recognize nuances in the meanings of words; choose words precisely to enhance communication.	R—10—3.2 [R—12—3.2] Selecting appropriate words or explaining the use of words in context, including connotation or denotation, shades of meanings of words/nuances, or idioms; or use of content-specific vocabulary, words with multiple meanings, precise language, or technical vocabulary
A7. Comprehend and communicate quantitative, technical and mathematical information.	
B. Communication	
B1. Give and follow spoken instructions to perform specific tasks, to answer questions or to	OC—10—1.1 [OC—12—1.1] Following verbal instructions, to perform specific tasks, to answer

American Diploma Project	Rhode Island Grade Span Expectations POST Field Review draft NH and RI High School Reading GSEs Version 5.0; 9/2004 Written and Oral Communication GSEs Version 4.0; 9/2004
solve problems.	questions, or to solve problems
B2. Summarize information presented orally by others.	OC—10—1.2 Summarizing, paraphrasing, questioning, or contributing to information presented [OC—12—1.2: to advance understanding]
B3. Paraphrase information presented orally by others.	
B4. Identify the thesis of a speech and determine the essential elements that elaborate it.	OC—10—1.3 [OC—12—1.3] Identifying the thesis of a presentation, determining the essential elements of elaboration, and interpreting or evaluating the message
B5. Analyze the ways in which the style and structure of a speech support or confound its meaning or purpose.	W—10—1.3 [W—12—1.3] Recognizing organizational structures within paragraphs or within texts EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation, deductive/inductive
B6. Make oral presentations that: ▪ **exhibit a logical structure appropriate to the audience, context and purpose;**	**OC—10—2 [OC—12—2] In oral communication, students make oral presentations …** OC—10—2.1 Exhibiting logical organization and language use, appropriate to audience, context, and purpose
▪ **group related ideas and maintain a consistent focus;**	OC—10—2.2 [OC—12—2.2] Maintaining a consistent focus
▪ **include smooth transitions**	OC—10—2.3 [OC—12—2.3] Including smooth transitions, supporting thesis with well-chosen details, and providing a coherent conclusion
▪ **support judgments with sound evidence and well-chosen details;**	
▪ **make skillful use of rhetorical devices;**	
▪ **provide a coherent conclusion;**	
▪ **employ proper eye contact, speaking rate, volume, enunciation, inflection and gestures to communicate ideas effectively.**	OC—10—2.5 [OC—12—2.5] Using a variety of strategies of address (e.g., eye contact, speaking rate, volume, articulation, enunciation, pronunciation, inflection, voice modulation, intonation, rhythm, and gesture) to communicate ideas effectively
B7. Participate productively in self-directed work teams for a particular purpose (for example, to interpret literature, write or critique a proposal, solve a problem, make a decision), including: ▪ **posing relevant questions;** ▪ **listening with civility to the ideas of others;** ▪ **extracting essential information from others' input;** ▪ **building on the ideas of others and contributing relevant information or ideas in group discussions;** ▪ **consulting texts as a source of ideas;** ▪ **gaining the floor in respectful ways;** ▪ **defining individuals' roles and responsibilities**	R—10—17.2 [R—12—17.2] Participating in in-depth discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others. OC—10—1.4 [OC—12—1.4] Participating in large and small group discussions showing respect for a range of individual ideas OC—10—1.5 [OC—12—1.5] Reaching consensus to solve a problem, make a decision, or achieve a

American Diploma Project	Rhode Island Grade Span Expectations POST Field Review draft NH and RI High School Reading GSEs Version 5.0; 9/2004 Written and Oral Communication GSEs Version 4.0; 9/2004
and setting clear goals; ▪ **acknowledging the ideas and contributions of individuals in the group;** ▪ **understanding the purpose of the team project and the ground rules for decision-making;** ▪ **maintaining independence of judgment, offering dissent courteously, ensuring a hearing for the range of positions on an issue and avoiding premature consensus;** ▪ **tolerating ambiguity and a lack of consensus; and** ▪ **selecting leader /spokesperson when necessary.**	goal
C. Writing	
C1. Plan writing by taking notes, writing informal outlines and researching.	
C2. Select and use formal, informal, literary or technical language appropriate for the purpose, audience and context of the communication.	W—10—7.4 [W—12—7.4] Establishing an authoritative voice W—10—7.5 [W—12—7.5]Using precise and descriptive language that clarifies and supports intent W—12—7.3 Selecting and using formal, informal, literary, or technical language appropriate to audience and context
C3. Organize ideas in writing with a thesis statement in the introduction, well-constructed paragraphs, a conclusion and transition sentences that connect paragraphs into a coherent whole.	W—10—3.4 [W—12—3.4]Organizing ideas, using transitional words/phrases and drawing a conclusion by_synthesizing information (e.g., demonstrate a connection to the broader world of ideas) **W—10—1 [W—12—1] Students demonstrate command of the structures of sentences, paragraphs, and text by…** W—10—1.2 [W—12—1.2] Using paragraph structures appropriately (e.g., block or indented format) W—10—6.3 [W—12—6.3] Using transitional words or phrases appropriate to text structure
C4. Drawing on readers' comments on working drafts, revise documents to develop or support ideas more clearly, address potential objections, ensure effective transitions between paragraphs and correct errors in logic.	
C5. Edit both one's own and others' work for grammar, style and tone appropriate to audience, purpose and context.	**W—10—9 [W—12—9] In independent writing, students demonstrate command of appropriate English conventions by…** W—10—9.1 [W—12—9.1]Applying rules of

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	standard English usage to correct grammatical errors W—10—9.2 [W—12—9.2] Applying capitalization rules W—10—9.4 [W—12—9.4] Applying appropriate punctuation to various sentence patterns to enhance meaning W—10—9.5 [W—12—9.5] Applying conventional and word-derivative spelling patterns/rules
C6. Cite print or electronic sources properly when paraphrasing or summarizing information, quoting, or using graphics.	W—10—6.6 [W—12—6.6] Listing and citing sources using standard format
C7. Determine how, when and whether to employ technologies (such as computer software, photographs and video) in lieu of, or in addition to, written communication.	OC—10—2.6 [OC—12—2.6] Using tools of technology to enhance message
C8. Present written material using basic software programs (such as Word, Excel and PowerPoint) and graphics (such as charts, ratios and tables) to present information and ideas best understood visually.	
C9.Write an academic essay (for example, a summary, an explanation, a description, a literary analysis essay) that: ▪ **develops a thesis;**	**W—10—3 [W—12—3] In response to literary or informational text, students make and support analytical judgments about text by…** W—10—3.1a Establishing an interpretive claim/assertion in the form of a thesis (purpose), when responding to a given prompt (state) W—10—3.1b [W—12—3.1b] Establishing an interpretive claim/assertion in the form of a thesis (purpose) W—10—7.2 [W—12—7.2] Stating and maintaining a focus/controlling idea/thesis
▪ **creates an organizing structure appropriate to purpose, audience and context;**	W—10—1.4 [W—12—1.4] Applying a format and text structure appropriate to purpose, audience, and context W—10—7.3 Writing with a sense of audience, when appropriate
▪ **includes relevant information and excludes extraneous information;**	W—10—6.2 [W—12—6.2] Selecting appropriate and relevant information (excluding extraneous details) to set context W—10—8.2 [W—12—8.2] Including facts and details relevant to focus/controlling idea or thesis,

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	and excluding extraneous information
▪ **makes valid inferences;**	W—10—3.2 [W—12—3.2] Making inferences about the relationship(s) among content, events, characters, setting, theme, or author's craft
▪ **supports judgments with relevant and substantial evidence and well-chosen details; and**	W—10—3.3 [W—12—3.3] Using specific details and references to text or relevant citations to support thesis, interpretations, or conclusions W—10—8.3 [W—12—8.3] Including sufficient details or facts for appropriate depth of information: naming, describing, explaining, comparing, contrasting, or using visual images to support intended purpose
▪ **provides a coherent conclusion.**	W—10—3.4 [W—12—3.4] Organizing ideas, using transitional words/phrases and drawing a conclusion by synthesizing information (e.g., demonstrate a connection to the broader world of ideas) W—10—6.4 [W—12—6.4] Drawing a conclusion by synthesizing information
C10. Produce work-related texts (for example, memos, e-mails, correspondence, project plans, work orders, proposals, bios) that: ▪ **address audience needs, stated purpose and context;**	
▪ **translate technical language into non-technical English;**	
▪ **include relevant information and exclude extraneous information;**	W—10—6.2 [W—12—6.2] Selecting appropriate and relevant information (excluding extraneous details) to set context
▪ **use appropriate strategies, such as providing facts and details, describing or analyzing the subject, explaining benefits or limitations, comparing or contrasting, and providing a scenario to illustrate;**	W—10—8.5 [W—12—8.5] Commenting on the significance of the information (in reports, throughout the piece; in procedural or persuasive writing, as appropriate)
▪ **anticipate potential problems, mistakes and misunderstandings that might arise for the reader;**	W—10—8.4 [W—12—8.4] Addressing readers' concerns (anticipating and addressing potential problems, mistakes, or misunderstandings that might arise for the audience)
▪ **create predictable structures through the use of headings, white space and graphics, as appropriate; and**	
▪ **adopt a customary format, including proper salutation, closing and signature, when appropriate.**	
D. Research	
D1. Define and narrow a problem or research topic.	

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D2. Gather relevant information from a variety of print and electronic sources, as well as from direct observation, interviews and surveys.	R—10—15.1 [R—12—15.] Identifying and evaluating potential sources of information W—10—6.5 Synthesizing information from multiple research studies, including primary sources
D3. Make distinctions about the credibility, reliability, consistency, strengths and limitations of resources, including information gathered from Web sites.	R—10—15.2 [R—12—15.2] Evaluating and selecting the information presented, in terms of completeness, relevance, and validity
D4. Report findings within prescribed time and/or length requirements, as appropriate.	
D5. Write an extended research essay (approximately six to 10 pages), building on primary and secondary sources, that: ▪ **marshals evidence in support of a clear thesis statement and related claims;**	R—10—15.3 [R—12—15.3] Organizing, analyzing, and interpreting the information R—10—15.4 [R—12—15.4] Drawing conclusions/judgments and supporting them with evidence
▪ **paraphrases and summarizes with accuracy and fidelity the range of arguments and evidence supporting or refuting the thesis, as appropriate; and**	
▪ **cites sources correctly and documents quotations, paraphrases and other information using a standard format.**	W—10--6.6 [W—12—6.6] Listing and citing sources using standard format
E. Logic	
E1. Distinguish among facts and opinions, evidence and inferences.	R—10—8.4 Distinguishing fact from opinion, and evaluating possible bias/propaganda or conflicting information within or across texts
E2. Identify false premises in an argument.	
E3. Describe the structure of a given argument; identify its claims and evidence; and evaluate connections among evidence, inferences and claims.	
E4. Evaluate the range and quality of evidence used to support or oppose an argument.	R—12—8.4 Critiquing author's use of strategies to achieve intended purpose or message (e.g., to inform, explain, entertain, persuade) EXAMPLE (critique public documents): May include analysis of using anecdotes, addressing counterclaims, appealing to audience, using emotionally-laden language EXAMPLE (critique functional documents): May include visual appeal, logical sequences, awareness of possible reader misunderstanding
E5. Recognize common logical fallacies, such as the appeal to pity (*argumentum ad misericordiam*), the personal attack (*argumentum ad hominem*), the appeal to common opinion (*argumentum ad populum*) and the false dilemma (assuming only two options when there are more options available); understand why these	

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fallacies do not prove the point being argued.	
E6. Analyze written or oral communications for false assumptions, errors, loaded terms, caricature, sarcasm, leading questions and faulty reasoning.	
E7. Understand the distinction between a deductive argument (where, if the premises are all true and the argument's form is valid, the conclusion is inescapably true) and inductive argument (in which the conclusion provides the best or most probable explanation of the truth of the premises, but is not necessarily true).	W—10—1.3 [W—12—1.3] Recognizing organizational structures within paragraphs or within texts EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation, deductive/inductive
E8. Analyze two or more texts addressing the same topic to determine how authors reach similar or different conclusions.	R—10—8.1 Explaining connections about information *within* a text, *across* texts, or to related ideas R—12—8: Analyze and interpret informational text (which may include technical writing), citing evidence as appropriate by… R—12—8.1 Explaining connections among ideas *across multiple* texts
E9. Construct arguments (both orally and in writing) that: ▪ **develop a thesis that demonstrates clear and knowledgeable judgment;** ▪ **structure ideas in a sustained and logical fashion;** ▪ **use a range of strategies to elaborate and persuade, such as descriptions, anecdotes, case studies, analogies and illustrations;** ▪ **clarify and defend positions with precise and relevant evidence, including facts, expert opinions, quotations and/or expressions of commonly accepted beliefs and logical reasoning;** ▪ **anticipate and address the reader's concerns and counterclaims; and** ▪ **provide clear and effective conclusions.**	
F. Informational Text	
F1. Follow instructions in informational or technical texts to perform specific tasks, answer questions or solve problems.	R—12—7.2 Using information from the text to answer questions, perform specific tasks, or solve problems; to state the main/central ideas; to provide supporting details; to explain visual components supporting the text; or to interpret maps, charts, timelines, tables, or diagrams
F2. Identify the main ideas of informational text and determine the essential elements that elaborate them.	R—10—7.2 Using information from the text to answer questions, to state the main/central ideas, to provide supporting details, to explain visual components supporting the text, or to interpret

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	maps, charts, timelines, tables, or diagrams.
F3. Summarize informational and technical texts and explain the visual components that support them.	R—10—7.3 [R—12—7.3] Organizing information to show understanding or relationships among facts, ideas, and events (i.e., representing main/central ideas or details within text through charting, mapping, paraphrasing, summarizing, comparing/contrasting, outlining, or connecting information with related ideas) W—10—2.1 [W—12—2.1] Selecting and summarizing key ideas to set context, appropriate to audience
F4. Distinguish between a summary and a critique.	
F5. Interpret and use information in maps, charts, graphs, time lines, tables and diagrams.	R—10—7.1 [R—12—7.1] Obtaining information from text features [e.g., table of contents, glossary, index, transition words/phrases, transitional devices (including use of white space), bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations W—12—2.4 Explaining the visual components (e.g., charts, diagrams, artwork) of the text, when appropriate
F6. Identify interrelationships between and among ideas and concepts within a text, such as cause-and-effect relationships.	R—10—8.1 Explaining connections about information *within* a text, *across* texts, or to related ideas
F7. Synthesize information from multiple informational and technical sources.	R—10—8.2 [R—12—8.2]Synthesizing and evaluating information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas) R—12—8.1 Explaining connections among ideas *across multiple* texts W—12—6.5 Synthesizing information from multiple sources to draw conclusions beyond those found in any single source
F8. Draw conclusions based on evidence from informational and technical texts.	R—10—8.3 [R—12—8.3] Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or explaining how purpose may affect the interpretation of the text; or using supporting evidence to form or evaluate opinions/judgments and assertions about central ideas that are relevant
F9. Analyze the ways in which a text's organizational structure supports or confounds its meaning or purpose.	W—10—1.3 [W—12—1.3] Recognizing organizational structures within paragraphs or within texts
F10. Recognize the use or abuse of ambiguity, contradiction, paradox, irony, incongruities,	R-10-8.6 [R-12--8.6] Evaluating the clarity and

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overstatement and understatement in text and explain their effect on the reader.	accuracy of information (e.g. consistency, effectiveness of organizational pattern, or logic of arguments)
F11. Evaluate informational and technical texts for their clarity, simplicity and coherence and for the appropriateness of their graphics and visual appeal.	
G. Media	
G1. Evaluate the aural, visual and written images and other special effects used in television, radio, film and the Internet for their ability to inform, persuade and entertain (for example, anecdote, expert witness, vivid detail, tearful testimony and humor).	
G2. Examine the intersections and conflicts between the visual (such as media images, painting, film and graphic arts) and the verbal.	
G3. Recognize how visual and sound techniques or design (such as special effects, camera angles and music) carry or influence messages in various media.	
G4. Apply and adapt the principles of written composition to create coherent media productions using effective images, text, graphics, music and/or sound effects — if possible — and present a distinctive point of view on a topic (for example, PowerPoint presentations, videos).	
H. Literature	
H1. Demonstrate knowledge of 18th and 19th century foundational works of American literature.	
H2. Analyze foundational U.S. documents for their historical and literary significance (for example, The Declaration of Independence, the Preamble to the U.S. Constitution, Abraham Lincoln's "Gettysburg Address," Martin Luther King's "Letter from Birmingham Jail").	
H3. Interpret significant works from various forms of literature: poetry, novel, biography, short story, essay and dramatic literature; use understanding of genre characteristics to make deeper and subtler interpretations of the meaning of the text.	R—10—4.4 [R—12—4.4] Identifying the characteristics of a variety of types/genres of literary text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, legends, myths, short stories, epics, novels, dramatic presentations, comedies, tragedies, satires, parodies, memoirs, epistles) R—10—4.5 [R—12—4.5] Identify literary devices as appropriate to genre (e.g., similes, metaphors,

American Diploma Project	Rhode Island Grade Span Expectations POST Field Review draft NH and RI High School Reading GSEs Version 5.0; 9/2004 Written and Oral Communication GSEs Version 4.0; 9/2004
	alliteration, rhyme scheme, onomatopoeia, imagery, repetition, flashback, foreshadowing, personification, hyperbole, symbolism, allusion, diction, syntax, bias, or point of view R—10—5.4 Explaining how the narrator's point of view or author's style is evident and affects the reader's interpretation R—12—5.4 Explaining how the narrator's point of view, or author's style, or tone is evident and affects the reader's interpretation or is supported throughout the text(s) R—10—6.1 Demonstrating knowledge of author's style or use of literary elements and devices (i.e., [R—12—6.1: simile, metaphor, point of view] imagery, repetition, flashback, foreshadowing, personification, hyperbole, symbolism, allusion, diction, syntax, genre, or bias, or use of punctuation) to analyze literary works
H4. Analyze the setting, plot, theme, characterization and narration of classic and contemporary short stories and novels.	R—10—4.1 [R—12—4.1] Identifying, describing, or making logical predictions about character (such as protagonist or antagonist), setting, problem/solution, or plots/subplots, as appropriate to text; or identifying any significant changes in character, relationships, or setting over time; or identifying rising action, climax, or falling action R—10—5.1 [R—12—5.1] Explaining and supporting logical predictions or logical outcomes (e.g., drawing conclusions based on interactions between characters or evolving plot) R—10—5.2 [R—12—5.2] Examining characterization (e.g., stereotype, antagonist, protagonist), motivation, or interactions (including relationships), citing thoughts, words, or actions that reveal character traits, motivations, or changes over time
H5. Demonstrate knowledge of metrics, rhyme scheme, rhythm, alliteration and other conventions of verse in poetry.	W—10—13.2 [W—12—13.2] Using rhyme, rhythm, meter, literary elements (e.g., setting, plot, characters) or figurative language
H6. Identify how elements of dramatic literature (for example, dramatic irony, soliloquy, stage direction and dialogue) articulate a playwright's vision.	
H7. Analyze works of literature for what they suggest about the historical period in which they were written.	

American Diploma Project	Rhode Island Grade Span Expectations POST Field Review draft NH and RI High School Reading GSEs Version 5.0; 9/2004 Written and Oral Communication GSEs Version 4.0; 9/2004
H8. Analyze the moral dilemmas in works of literature, as revealed by characters' motivation and behavior.	
H9. Identify and explain the themes found in a single literary work; analyze the ways in which similar themes and ideas are developed in more than one literary work.	R—10—5.3 Making inferences about cause/effect, internal or external conflicts (e.g., person versus self, person versus person, person versus nature/society/fate), or the relationship among elements within text (e.g., describing the interaction among plot/subplots [R—12--5.3: theme/setting, symbolism/characterization)] R—10—5.5 [R—12—5.5] Explaining how the author's message or theme (which may include universal themes) is supported within the text R—10—14.3 [R—12—14.3] Reading multiple texts for depth of understanding an author, a subject, a theme, or genre

APPENDIX B: ADP BENCHMARKS NOT INCLUDED IN RHODE ISLAND HIGH SCHOOL STANDARDS

American Diploma Project	Achieve Commentary
B. Communication	
B7. Participate productively in self-directed work teams for a particular purpose (for example, to interpret literature, write or critique a proposal, solve a problem, make a decision), including: ▪ **posing relevant questions;** ▪ **listening with civility to the ideas of others;** ▪ **extracting essential information from others' input;** ▪ **building on the ideas of others and contributing relevant information or ideas in group discussions;** ▪ **consulting texts as a source of ideas;** ▪ **gaining the floor in respectful ways;** ▪ **defining individuals' roles and responsibilities and setting clear goals;** ▪ **acknowledging the ideas and contributions of individuals in the group;** ▪ **understanding the purpose of the team project and the ground rules for decision-making;** ▪ **maintaining independence of judgment, offering dissent courteously, ensuring a hearing for the range of positions on an issue and avoiding premature consensus;** ▪ **tolerating ambiguity and a lack of consensus; and** ▪ **selecting leader /spokesperson when necessary.**	Although some elements of **ADP B7** are addressed by elements within the Rhode Island high school standards, the most important aspect of this Benchmark is that students have experience in working in groups. Not only is such collaboration a prime expectation in the workplace, but also often in the post-secondary classroom as well.
C. Writing	
C1. Plan writing by taking notes, writing informal outlines and researching.	Not including the planning stage of the writing process may simply be an oversight here, but Achieve reviewers regard the planning process as so necessary to the successful execution of writing that it should be called out in any set of writing standards.
C4. Drawing on readers' comments on working drafts, revise documents to develop or support ideas more clearly, address potential objections, ensure effective transitions between paragraphs and correct errors in logic.	Likewise, attention needs to be drawn to the necessity of peer review and collaboration in the revision process.
C10. Produce work-related texts (for example, memos, e-mails, correspondence, project plans, work orders, proposals, bios) that: **• address audience needs, stated purpose and context;** **• translate technical language into non-technical English;** **• include relevant information and exclude extraneous information;** **• use appropriate strategies, such as providing facts and details, describing or analyzing the subject, explaining benefits or limitations, comparing or contrasting, and providing a scenario to illustrate;** **• anticipate potential problems, mistakes and misunderstandings that might arise for the reader;** **• create predictable structures through the use of headings, white space and graphics, as appropriate;** **• adopt a customary format, including proper**	Although as noted in regard to workgroups, the Colorado standards address some elements of workplace documents. Since the ADP is focused not solely on academic writing, however, the reviewers suggest that more explicit attention be drawn to the need for the student to be familiar with a broader range of writing tasks.

American Diploma Project	Achieve Commentary
salutation, closing and signature, when appropriate.	
D. Research	
D1. Define and narrow a problem or research topic.	The vast majority of secondary and post-secondary teachers cite the definition and specification of a research topic as a major element in successful research. For this reason, this skill is worthy of being singled out for attention in standards.
D4. Report findings within prescribed time and/or length requirements, as appropriate.	Although timelines are typically a part of any secondary assignment, the necessity of producing materials on time is so crucial to success in both the college and work place that it is helpful to draw attention to this ability.
E. Logic	
E2. Identify false premises in an argument.	High school standards typically pay scant attention to elements of logic, but clear and substantiated thinking is highly valued in any venue. Attention, therefore, is recommended to these elements.
E3. Describe the structure of a given argument; identify its claims and evidence; and evaluate connections among evidence, inferences and claims.	
E5. Recognize common logical fallacies, such as the appeal to pity (*argumentum ad misericordiam*), the personal attack (*argumentum ad hominem*), the appeal to common opinion (*argumentum ad populum*) and the false dilemma (assuming only two options when there are more options available); understand why these fallacies do not prove the point being argued.	
E6. Analyze written or oral communications for false assumptions, errors, loaded terms, caricature, sarcasm, leading questions and faulty reasoning.	
E9. Construct arguments (both orally and in writing) that: • develop a thesis that demonstrates clear and knowledgeable judgment; • structure ideas in a sustained and logical fashion; • use a range of strategies to elaborate and persuade, such as descriptions, anecdotes, case studies, analogies and illustrations; • clarify and defend positions with precise and relevant evidence, including facts, expert opinions, quotations and/or expressions of commonly accepted beliefs and logical reasoning; • anticipate and address the reader's concerns and counterclaims; and • provide clear and effective conclusions.	Argumentation is part and parcel of the academic life as well as in business. The elements of this type of presentation need to be clarified and taught in order to prepare students for their futures.
Informational Text	
F4. Distinguish between a summary and a critique.	A typical error made by students at all levels is to regard summary as critique, believing that a re-telling is also an analysis. ADP poses this Benchmark as an important element in students' response to informational texts.
G. Media	
G1. Evaluate the aural, visual and written images and other special effects used in television, radio, film and the Internet for their ability to inform, persuade and entertain (for example, anecdote, expert witness, vivid detail, tearful testimony and humor).	Rhode Island should consider drawing attention to the need for students to be thoughtful consumers of media by addressing this area specifically.
G2. Examine the intersections and conflicts between the visual (such as media images, painting, film and graphic arts) and the verbal.	
G3. Recognize how visual and sound techniques or design (such as special effects, camera angles and music) carry or influence messages in various media.	

American Diploma Project	Achieve Commentary
G4. Apply and adapt the principles of written composition to create coherent media productions using effective images, text, graphics, music and/or sound effects — if possible — and present a distinctive point of view on a topic (for example, PowerPoint presentations, videos).	
H. Literature	
H1. Demonstrate knowledge of 18th and 19th century foundational works of American literature.	ADP calls out these specific areas of study to acknowledge the power of literature to teach cultural as well as literary values. It may be the case that Rhode Island has developed a recommended or model reading list that highlights such texts. If not, the state may consider doing so.
H2. Analyze foundational U.S. documents for their historical and literary significance (for example, The Declaration of Independence, the Preamble to the U.S. Constitution, Abraham Lincoln's "Gettysburg Address," Martin Luther King's "Letter from Birmingham Jail").	
H6. Identify how elements of dramatic literature (for example, dramatic irony, soliloquy, stage direction and dialogue) articulate a playwright's vision.	The state should consider adding a standard that draws attention to the need to understand dramatic conventions as well as poetic.
H7. Analyze works of literature for what they suggest about the historical period in which they were written.	Although great works of literature are so because they are relevant to any historical period, it is the case that texts do grow out of the culture and times in which they are created. Attention to the era of a text can expand the analysis of it.
H8. Analyze the moral dilemmas in works of literature, as revealed by characters' motivation and behavior.	Employers report that employees who have considered the moral dilemmas encountered by literary characters are better able to tolerate ambiguity and nurture problem solving in the workplace.

APPENDIX C: BIOGRAPHIES

ACHIEVE STAFF

JOANNE THIBAULT ERESH, SENIOR ASSOCIATE, ENGLISH LANGUAGE ARTS, ACHIEVE

JoAnne Thibault Eresh is a senior associate at Achieve, where she leads the English language arts aspects of the reviews of standards and assessments. She taught writing at the university level and English at public and private high schools in St. Louis, Mo., and in Fitchburg, Mass. She began her work in curriculum design and performance assessment in 1979 under Superintendent Richard C. Wallace, Jr., and from 1981 to 1994 was director of the Division of Writing and Speaking for the Pittsburgh Public Schools. During that time, she directed The Pittsburgh Discussion Model Project, funded by the Rockefeller Foundation and part of the CHART network, and she later directed the imaginative writing part of the ARTS Propel Project, a joint project with Harvard's Project Zero and the Educational Testing Service. She was the Pittsburgh district coordinator for the New Standards Project and wrote the teachers' guides for the New Standards ELA Portfolios. In 1995, she was one of the original resident fellows at the Institute for Learning at the University of Pittsburgh's Learning Research and Development Center. She also coordinated the New Standards Linking Projects. From 1997 to March 2001, she was the coordinator of staff development in Community District Two in New York City where she was responsible for the hiring, training, and coordination of that district's staff development group. JoAnne holds a bachelor's degree in English from Webster College in St. Louis, Mo., and a master's degree in English from the University of Missouri, St. Louis.

LAURA MCGIFFERT SLOVER, DIRECTOR, CONTENT & POLICY RESEARCH, ACHIEVE

Laura McGiffert Slover is director of Content & Policy Research at Achieve, where she has senior responsibility for overseeing a number of Achieve's major initiatives. She supervises Achieve's Benchmarking Initiative, leads its work with states on building mathematics capacity, and oversees the organization's research agenda. Laura has extensive experience reviewing academic standards and education policies in the United States and abroad, and she has written a number of reports and articles on the topic. Before joining Achieve in 1998, Laura was a high school English teacher in Eagle County, Colorado, where she was involved in the district's early efforts to develop standards and benchmark assessments. She also taught writing and composition at Colorado Mountain College. A native Washingtonian, Laura earned a bachelor's degree in English and American Literature from Harvard University; a master's in Education Curriculum and Instruction from the University of Colorado at Boulder; and a master's in Education Policy from Georgetown University. She is a mentor and a member of the Board of Directors of Project Northstar, an organization that provides mentoring and tutoring to homeless and at-risk students in the District of Columbia.

Achieve, Inc.

Achieve's Comparison of the American Diploma Project (ADP) Mathematics Benchmarks with the Rhode Island High School Grade-Span Expectations (GSEs) for Mathematics for Grades 9-10, 11-12 and Advanced Mathematics

June 30, 2006

ACHIEVE'S
BENCHMARKING INITIATIVE

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ACHIEVE'S METHODOLOGY

Achieve, Inc. has been asked to review Rhode Island's expectations for high school mathematics to determine the degree to which they align with the American Diploma Project (ADP) Mathematics Benchmarks. For purposes of this analysis, Achieve staff constructed a side-by-side chart comparing Achieve's American Diploma Project (ADP) Mathematics Benchmarks with the Rhode Island Mathematics Grade-Span Expectations (GSEs) for grade spans 9-10, 11-12 and Advanced Mathematics (AM). Since the ADP Benchmarks are cumulative in nature, in select instances content from Grades 5-8 was used to complete the chart.

THE DEVELOPMENT OF THE AMERICAN DIPLOMA PROJECT (ADP) BENCHMARKS FOR COLLEGE AND WORKPLACE READINESS

The American Diploma Project (ADP) commissioned leading economists to examine labor market projections for the most promising jobs—those that pay enough to support a small family and provide real potential for career advancement—to pinpoint the academic knowledge and skills required for success in those occupations. ADP then surveyed officials from 22 occupations, ranging from manufacturing to financial services, about the skills they believe are most useful for their employees to bring to the job. Following those conversations, ADP worked closely with two- and four-year postsecondary leaders in the partner states to determine the prerequisite English and mathematics knowledge and skills required for success in entry-level, credit-bearing courses in English, mathematics, the sciences and the humanities. The resulting ADP Benchmarks reflect an unprecedented convergence in what these employers and postsecondary faculty say are needed for new employees and freshmen entering credit-bearing coursework to be successful. In mathematics, the Benchmarks reflect a rigorous four-year course sequence that includes content typically taught in Algebra I, Geometry and Algebra II, as well as some data analysis and statistics. In English, the Benchmarks reflect four years of grade-level high school courses that emphasize logic, writing and research. The ADP Benchmarks and sample tasks from employers and postsecondary faculty may be found at www.achieve.org .

Achieve, Education Trust and the Thomas B. Fordham Foundation launched ADP to help states restore the diploma's value by anchoring high school graduation standards to those of jobs and colleges. Toward that end, ADP moves beyond the kinds of standards that reflect experts' consensus view of what is *desirable* for students to learn, to expectations linked directly to the *essential* demands faced by students preparing for college, work and citizenship. These benchmarks are not test blueprints; a fair number of the benchmarks are not able to be assessed through on-demand measures, for example. Rather, they are intended to describe the knowledge and skills that are needed by high school graduates in order to be prepared to achieve in multiple postsecondary venues.

In the area of mathematics, the ADP Benchmarks include expectations that are roughly equivalent to what students should encounter in a 4-year high school mathematics program that includes Algebra I, Geometry, Algebra II and at least a portion of Precalculus. Certain ADP Mathematics Benchmarks are marked with an asterisk (*). These asterisked benchmarks

represent content that is recommended for all students but is required for those students who plan to take calculus in college—a requisite for mathematics majors and many mathematics-intensive majors.

DOCUMENTS USED FOR REVIEW

Reviewed in this report are the draft GSEs for Grades 9-10 and 11-12, plus GSEs for Advanced Mathematics. The ADP Benchmarks in mathematics are used as the basis of comparison in this analysis to help Rhode Island ensure that its high school graduates are ready to succeed in the postsecondary world.

The Rhode Island High School Grade-Span Expectations (GSEs) that are being reviewed in this report have been developed as a means to identify the mathematics content knowledge and skills expected of high school students. The GSEs for Grades 9-10 include expectations that are to be assessed on the state-level assessment administered in the fall of Grade 11, plus other expectations that will be a local curriculum and assessment option. As such, the GSEs defined for Grades 9-10 describe expectations for the end of Grade 10, or the beginning of Grade 11. The high school GSEs are an extension of the expectations defined in the New England Common Assessment Program (NECAP) Mathematics Grade Level Expectations (GLEs) that identify the concepts and skills expected of all students for large-scale assessment of mathematics in Grades 3-8. These expectations are not intended to represent the full mathematics curriculum at each grade level but rather to capture concepts and skills related to the "big ideas" of mathematics that can be assessed in an on-demand setting. They are intended to focus—but not narrow—the curriculum. All expectations are organized into four content strands: Number and Operations, Geometry and Measurement, Functions and Algebra, and Data, Statistics, and Probability. The mathematical process expectations—problem solving, reasoning, connections, and communications—are embedded throughout the GLEs and GSEs instead of being in separate strands.

The College Readiness Standards reviewed in this report consist of guidelines for college readiness in mathematics developed by Rhode Island's PK-16 Mathematics Advisory Council. The committee was chaired by Professor Lewis Pakula of URI and co-chaired by Judith Keeley of RIDE, with representatives from RIC, CCRI, RIDE, and a number of Rhode Island high school. The expectations are comprised of two sets of standards. The first is a set of Basic Skill and Knowledge Expectations that apply to all students entering four-year college programs or intending to transfer to such programs from a community college, and these standards indicate the level of proficiency implicit in Geometry and Algebra II expectations. The second set of standards defines readiness for technical/scientific programs and acknowledges that students intending to enter such programs need more substantial training in precalculus mathematics, including trigonometry and advanced topics in algebra.

ALIGNMENT OF RHODE ISLAND'S HIGH SCHOOL MATHEMATICS GSES WITH THE ADP BENCHMARKS

In general, there is very strong alignment between the ADP Mathematics Benchmarks and the Rhode Island GSEs for Grades 9-10, 11-12, and Advanced Mathematics (AM). The state acknowledges that these expectations are not intended to define the complete range of instruction for high school mathematics, and, in the same manner, the ADP Benchmarks are not intended to encompass all instruction, but rather to call out the knowledge and skills necessary for postsecondary success. Although the nuances of the language may be somewhat different, most of the ADP Benchmarks have at least one Rhode Island expectation that aligns with them. There are several Rhode Island expectations that are not explicitly addressed in the ADP Benchmarks, and a number of Rhode Island expectations extend beyond the expectations articulated in the ADP Benchmarks.

What follows is a description of commonalities and differences found between the two sets of standards.

- Both the ADP Benchmarks and the Rhode Island Geometry and Measurement GSEs clearly address the concept of mathematical proof. The ADP Benchmarks, however, are much more explicit in that they provide examples of the types of theorems students should be expected to prove. The Rhode Island GSEs tend to cluster expectations with respect to proof in more generically-worded statements than the ADP Benchmarks, but these expectations can have the same effect if they are presumed to overarch all aspects of the domain. Rhode Island explicitly mentions only two theorems: the Pythagorean Theorem and the Triangle Inequality Theorem. The GSEs related to proof are as follows:

M(G&M)—10—2 Creates formal proofs of propositions (e.g. angles, lines, circles, distance, midpoint and polygons including triangle ratios).
M(G&M)—10—2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).
M(G&M)—12—2 Creates formal proofs of propositions (e.g. angles, lines, circles, distance, midpoint and polygons including triangle congruence and similarity).
M(G&M)—AM—2 Extends and deepens knowledge and usage of proofs and proof techniques.

It is important, however, that teachers have clear and consistent understandings of what types and levels of proof students are expected to perform, and it may be that Rhode Island provides such detail in supporting documents. Simply listing angles, lines, circles, distance, midpoint, triangle ratios, right triangle ratios (sine, cosine, tangent) and polygons including triangle congruence and similarity is not explicit enough to ensure consistent levels of expectation across high school geometry courses in the state. More importantly, it is not clear how the rigor of the expectations changes from grade span 9-10 to grade span 11-12 to AM. This variation in specificity between the ADP

Benchmarks and the Rhode Island GSEs is illustrated in the side-by-side chart included as an appendix to this report. The Rhode Island GSEs involving proof are repeatedly cited as the expectations aligning with the ADP Benchmarks involving proof of basic theorems (K1.2), parallel lines (K2.1), perpendicular lines (K2.2), angles (K2.3), congruence and similarity (K3), circles (K4), Pythagorean Theorem (K5), right triangle trigonometry (K11.1) (K11.2), and again in MR3 (mathematical reasoning involving proof). Regardless, the inclusion of geometric proof in mathematics is a topic of contention in the mathematics world, and it is noteworthy that both Rhode Island and the ADP Benchmarks include it.

- The ADP Benchmarks include geometric construction, which is parsed across a number of Benchmarks, including examples of constructions provided that tie to the content defined in the individual Benchmarks. While Rhode Island includes a reference to construction, it does not include any specificity as to types of geometric construction within its GSEs.

M(G&M)—12—10 Perform and justify construction with compass and straightedge or dynamic geometric software.

The GSEs would benefit from greater specificity if the intent is to ensure that all students receive the same rich mathematics education with the same level of mathematical rigor.

- Both the ADP Benchmarks and the Rhode Island GSEs clearly expect student to use appropriate technology in the classroom to further their mathematical understandings. The ADP Benchmarks address technology both in stand-alone Benchmarks and embedded within content-focused Benchmarks, calling on students not only to use calculators and computers but also to understand the capabilities and limitations of technology in solving problems. The Rhode Island GSEs tend to be explicit about technology use within the context of content-specific expectations. They also make clear the intent that students meet most expectations with and/or without using technology and that students be able to use dynamic geometry software for spatial reasoning and geometric constructions.

- There are no instances where Rhode Island's expectations for a student completing two years of high school level mathematics, as defined by the GSEs for Grades 9-10, exceed those of the non-asterisked ADP Benchmarks identified as needed by all students.

- There are several instances where Rhode Island's expectations for a student completing four years of high school level mathematics, as defined by the GSEs for Grades 11-12, exceed those of the non-asterisked Benchmarks. The following Rhode Island GSEs for Grades 11-12 align wholly or in part with ADP Benchmarks identified with asterisks—indicating that they are recommended for all students but required for students intending to take calculus. The expectations identified below do not include those GSEs identified as AM, which exceed those articulated for Grades 9-10 and 11-12. Bolded text indicates

those portions of GSEs that extend beyond the ADP Benchmarks for all students. GSEs containing no bolded text align in their entirety with asterisked ADP Benchmarks.

RHODE ISLAND EXPECTATIONS (GRADES 11-12) ALIGNING WITH ASTERISKED ADP BENCHMARKS
Number and Operations
M(N&O)—12—4 Solves problems involving scientific notation or uses significant digits to assess the precision of an answer. **Interprets rational exponents and their relation to radicals**. Computes by hand in simple cases (e.g.$4^{3/2}$), and using a calculator when appropriate. Interprets numbers given in scientific notation and carries out computations of them with and without a calculator.
Functions and Algebra
M(F&A)—12—1 Identifies arithmetic and geometric sequences and finds the nth term; then uses the generalization to find a specific term.
M(F&A)—12—3 Understands properties of logarithms and can convert between logarithmic and exponential forms.
M(F&A)—12—3 Manipulates, evaluates, and simplifies expressions involving rational exponents and radicals and can convert between expressions with rational exponents and expressions with radicals.
M(F&A)—12—4 Understands and applies the various processes of solving equations and systems of equations or inequalities. Interprets the solutions algebraically and graphically. Solves 2x2 and **3x3 systems of linear equations** and graphically interprets the solutions.
Geometry and Measurement
M(G&M)—12—3 Knows the characterization of circles as loci of points in the plane satisfying certain distance requirements, and uses the distance formula to obtain equations for circles
M(G&M)—12—6 Applies trigonometric formulas (law of sines/cosines, A= 1/2 ab sinC) to find angles, lengths and areas of polygons.

- There are also several asterisked ADP Benchmarks that align with expectations defined in Rhode Island's AM topics. All Rhode Island students are currently required to pass two years of mathematics, with requirements increasing in 2008 to three years of high school mathematics and a fourth year of an applied course. Students who are intending to pursue mathematics-related careers will likely take courses that include these expectations but only if they complete the expectations listed in the GSEs for Grades 9-10 and 11-12 in three years or less. With the state's assessment occurring in the fall of Grade 11, it is likely that a number of students will not exceed the content expectations defined in the GSEs for Grades 9-10, with fewer encountering the Grade 11-12 GSEs, and only the most mathematically advanced students enrolling in courses that address the AM expectations.

RHODE ISLAND EXPECTATIONS FROM ADVANCED MATHEMATICS THAT ALIGN WITH ASTERISKED ADP BENCHMARKS
Functions and Algebra
M(F&A)—AM—1 Computes partial sums of infinite arithmetic and geometric sequences, determines when an infinite geometric series converges, and finds its sum. Connects arithmetic and geometric sequences to linear and exponential functions, respectively. (Study of this concept begins in 11-12)
M(F&A)—AM—2 Understands domain restriction and the effects of it on the function and its properties.
M(F&A)—AM—2 Understands functions and relations from a set-theoretic perspective, and **operations on functions including composition** and **inverse including computing inverses algebraically.**
M(F&A)—AM—2 Analyzing characteristic of classes of functions and **inverse functions (exponential, logarithmic**, trigonometric) to include domain, range, intercepts, increasing and decreasing intervals and rates of change, periodicity, end behavior, maximum and minimum values, continuity, and asymptotes. (Study of this concept begins in 11-12)
M(F&A)—AM—2 Recognizes properties of families of functions including logarithmic and **trigonometric, and graphs them.**
M(F&A)—AM—4 Solves equations and verifies identities involving trigonometric expressions.
Geometry and Measurement
M(G&M)—AM—3 Explores and interprets the characteristics of conic sections graphically and algebraically. Understands how different planar slices of a double cone yield different conic sections. Knows the characterization of conic sections as loci of points in the plane satisfying certain distance requirements, and uses the distance formula to obtain equations for the conic sections.
M(G&M)—AM—7 Understands why radian measure is useful and converts between radian measure of angles and degrees.
M(G&M)—AM— 9 Solves specific problems using analytic geometry (including in three dimensions) and **circular trigonometry** (e.g. find the equation of a circle inscribed in a triangle given the coordinates of the vertices; the distance between opposite vertices in a rectangular solid).

- There are a few ADP Benchmarks defined for all students that are not included in the Rhode Island expectations prior to the AM topics.

M(N&O)—AM—1 Understands the structure of the real number system as an extension of the rational numbers by representing real numbers as infinite decimal expansions (that provide successive rational approximations to the number) and as points on a number line. Determines whether the decimal expansion of a rational number eventually repeats or terminates (without using a calculator).
M(N&O)—AM—8 Knows and uses the principle of mathematical induction
M(G&M)—AM—6 Derives and uses formulas for lengths of arcs and areas of sectors and segments.
M(DSP)—AM—2 Analyzes and interprets measures of dispersion (standard deviation, variance, and percentiles) and central tendency for normal distributions.

- There are several instances where the Rhode Island GSEs are more detailed and explicit than the ADP Benchmarks. For example, ADP Benchmark J2 states that students need to be able to understand functions, their representations, and their properties. More detailed expectations categorized under this broad ADP Benchmark reference students recognizing whether a relationship is a function, determining domain, using notation, performing composition and operations on functions, understanding inverses, and knowing/applying the inverse relationship between exponential and logarithmic functions. The Rhode Island GSEs include all of the ADP Benchmarks but also include:

M(F&A)—10—2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).
M(F&A)—12—2 Represents and analyzes functions in several ways. Recognizes properties of functions and characteristics properties of families of functions. Applies knowledge of functions to interpret, model, and solve problems. Analyzes characteristics of classes of functions (polynomial, rational, and exponential) to include domain, range, intercepts, increasing and decreasing intervals and rates of change. Represents functions numerically, algebraically, graphically, and verbally (i.e. in written words). Recognizes properties of a function from these representations, and transfers information from one representation to another. Graphs polynomial, rational and exponential functions, including vertical and horizontal shifts, stretches, and compressions as well as reflections across vertical and horizontal axes. Applies knowledge of functions to interpret and understand situations, design mathematical models, and solve problems in mathematics as well as in natural and social sciences
M(F&A)—12—4 Finds approximate solutions to equations by graphing each side as a function using technology. Understand that any equation in x can be interpreted as the equation $f(x) = g(x)$ and interpret the solutions of the equation as the x-value(s) of the intersection point(s) of the graphs of $y = f(x)$ and $y = g(x)$.
M(F&A)—AM—2 Analyzes properties of functions including injectivity (1-1), surjectivity (onto), critical points and inflection points. Determine graphically and analytically whether a function is even, odd or neither. Analyzes informally the idea of continuity and limits.
M(F&A)—AM—2 Analyzes characteristics of classes of functions and inverse functions (exponential, logarithmic, trigonometric) to include domain, range, intercepts, increasing and decreasing intervals and rates of change, periodicity, end behavior, maximum and minimum values, continuity, and asymptotes
M(F&A)—AM—2 Recognizes properties of families of functions including logarithmic and trigonometric, and graphs them.

Rhode Island exceeds the ADP Benchmarks' expectations within this strand particularly with respect to the families of functions students are to identify and work with. Included

in the GSEs are function families that the ADP Benchmarks exclude, such as logarithmic, trigonometric, polynomial, rational, and exponential functions. Students graph polynomial, rational, and exponential functions, including vertical and horizontal shifts, stretches, and compressions as well as reflections across vertical and horizontal axes. These expectations, although consistent with the ADP Benchmarks, extend beyond the comparable ADP Benchmarks.

Rhode Island includes relatively sophisticated expectations with respect to properties of functions and their inverses, including the domain, range, intercepts, increasing and decreasing intervals and rates of change, periodicity, end behavior, maximum and minimum values, continuity, asymptotes, injectivity (1-1), surjectivity (onto), critical points, and inflection points. Rhode Island also expects students to determine graphically and analytically whether a function is even, odd, or neither and to analyze informally the idea of continuity and limits. This comprehensive set of expectations involving function analysis will build strong mathematics reasoning skills in students and equip them with powerful tools for recognizing and modeling functions arising in real world applications across disciplines.

- In addition to the function extensions mentioned above, the Rhode Island standards include additional content in each strand that is not part of the ADP Benchmarks. The majority of this content is contained in the AM topics. This additional content includes:

Rhode Island Expectations That are Either not Included in the ADP Benchmarks or are Extensions of ADP Benchmarks
Number and Operation
M(N&O)—**10**—6 Mentally calculates benchmark perfect squares and related square roots (e.g., 12, 22 , …, 122, 152, 202, 252, 1002, 10002). Determines any whole number percentage of a number or any multiples of 100% up to 500%. **Determines benchmark fractions of a number.** (IMPORTANT: The intent of this GSE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.)
M(N&O)—**12**—4 Demonstrates understanding of complex numbers by interpreting them geometrically and by computing with them (e.g., adding, multiplying, dividing, finding the nth root, or by finding conjugates). Understand complex numbers as an extension of the real numbers (e.g. arising in solutions of polynomial equations). Manipulates complex numbers using rectangular and polar coordinates. Knows the fundamental theorem of algebra and knows that non-constant polynomials always factor into linear factors over the complex numbers.
M(N&O)—**12**—4 Solves problems involving scientific notation or **uses significant digits to assess the precision of an answer.** Interprets rational exponents and their relation to radicals. Computes by hand in simple cases (e.g. $4^{3/2}$), and using a calculator when appropriate. Interprets numbers given in scientific notation and carries out computations of them with and without a calculator.
M(N&O)—**12**—8 Determine whether a given subset of numbers is closed under a given arithmetic operation.
M(N&O)—**AM**—8 Add and multiply numerical matrices with attention to the arithmetic properties of these operations. Algebraically and geometrically interpret vectors, vector addition, and scalar multiplication in the plane, with attention to arithmetic properties.

Functions and Algebra
M(F&A)—**10**—1 **Identifies, extends, and generalizes a variety of patterns** (linear and nonlinear) represented by models, tables, sequences, or graphs to solve problems.
M(F&A)—**12**—4 **Solves equations involving polynomial, rational, and radical expressions**. Graphs and interprets the solutions.
M(F&A)—**12**—4 Solves **systems of equations involving nonlinear expressions** and graphically interprets the solutions.
M(F&A)—**12**—4 Solves **systems of linear** and quadratic **inequalities.**
M(F&A)—**AM**—3 Uses the **remainder theorem, the factor theorem and rational root theorem** for polynomials.
M(F&A)—**AM**—3 Understands the difference between factoring polynomials over integer, rational, real and complex numbers
M(F&A)—AM—4 Solves equations involving exponential and logarithmic expressions. Graphs and interprets the solutions.
M(F&A)—**AM**—4 Knows and applies the **intermediate value theorem** to find exact or approximate solutions of equations or zeros of continuous functions.
M(F&A)—**AM**—4 Interprets **systems as matrix equations** and solves them by computing the appropriate matrix inverse and multiplication, with or without technology.
Geometry and Measurement
M(G&M)—**10**—7 Applies informal concepts of **successive approximation, upper and lower bounds, and limits in measurement situations** (e.g., use successive approximation to find the area of a pond); uses measurement conversion strategies (e.g., unit/dimensional analysis).
M(G&M)—**AM**—3 Explores and interprets the characteristics of **conic sections** graphically and algebraically. Understands how different planar slices of a double cone yield different conic sections. Knows the characterization of conic sections as loci of points in the plane satisfying certain distance requirements, and uses the distance formula to obtain equations for the conic sections.
M(G&M)—**AM**—4 Uses matrices to represent reflections, translations, rotations.
M(G&M)—**AM**—6 Knows Cavalieri's principle and uses it to find volumes.
M(G&M)——**AM**—9 Solves specific problems using analytic geometry (including in **three dimensions**) and circular trigonometry (e.g. find the equation of a circle inscribed in a triangle given the coordinates of the vertices; **the distance between opposite vertices in a rectangular solid).**
Data, Statistics and Probability
M(DSP)—**10**—4 Uses counting techniques to solve contextualized problems involving combinations or permutations (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or others).
M(DSP)—**12**—1 Given a regression function (linear, **quadratic, and exponential**), analyze the data to make inferences and to formulate, justify, and critique conclusions.
M(DSP)—**12**—3 Find or estimate linear, **quadratic, and exponential regression** functions by organizing and displaying data with or without using technology.
M(DSP)—**12**—4 Solves problems involving combinations and permutations using a variety of strategies including nCr, nPr, or n!. Finds unions, intersections, and complements of sets.
M(DSP)—**AM**—3 Uses technology to explore the method of **least squares and median-median** for linear regression.

- There are also instances in which content that is clearly addressed in the ADP Benchmarks is not **explicitly** cited in the Rhode Island expectations. For example, it is apparent that Rhode Island values mathematical modeling, but the ADP Benchmarks are much more specific about the types of functions to be modeled and cite examples that clarify the intent.

ADP Benchmarks That are not Explicitly Cited in the Rhode Island Expectations
Algebra
J5.3. Recognize and solve problems that can be modeled using a quadratic equation, such as the motion of an object under the force of gravity.
J5.5. * Recognize and solve problems that can be modeled using an exponential function but whose solution requires facility with logarithms, such as exponential growth and decay problems.
J5.6. Recognize and solve problems that can be modeled using a finite geometric series, such as home mortgage problems and other compound interest problems.
J6. * Understand the binomial theorem and its connections to combinatorics, Pascal's triangle and probability.
Geometry
K1.1. Identify, explain the necessity of and give examples of definitions, axioms and theorems.
Data Interpretation, Statistics and Probability
L1.4. Compare data sets using graphs and summary statistics.
L2.1. Evaluate reports based on data published in the media by considering the source of the data, the design of the study, and the way the data are analyzed and displayed.
L2.2. Identify and explain misleading uses of data.
L2.3. Recognize when arguments based on data confuse correlation with causation.
L3.3. Explain the differences between randomized experiments and observational studies.
L4.2. Explain how the relative frequency of a specified outcome of an event can be used to estimate the probability of the outcome.
L4.3. Explain how the law of large numbers can be applied in simple examples.
Mathematical Reasoning
MR4. Using the special symbols of mathematics correctly and precisely.
MR6. Distinguishing relevant from irrelevant information, identifying missing information and either finding what is needed or making appropriate estimates.
MR8. When solving problems, thinking ahead about strategy, testing ideas with special cases, trying different approaches, checking for errors and reasonableness of solutions as a regular part of routine work, and devising independent ways to verify results.

- The ADP Benchmarks and the Rhode Island expectations tend to be "packaged" differently. Many of the Rhode Island expectations are compound in nature, encompassing multiple ADP Benchmarks in one expectation statement. They are, therefore, repeated multiple times in the side-by-side chart. For example, the ADP Benchmarks have separate expectations in algebra for the laws of integer exponents and

roots (J1.1), operations with and the simplification of rational expressions (J1.5), and evaluation of polynomial, rational, radical, and absolute value expressions (J1.6). The Rhode Island GSE M(F&A)—10—3 appears to address all three topics in one expectation.

M(F&A)—10—3 Demonstrates conceptual understanding of algebraic expressions by solving problems involving algebraic expressions, by simplifying expressions (e.g., simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions.

Similarly, the ADP Benchmarks tend to have separate expectations for solving, graphing, and modeling various types of equations and functions while the Rhode Island expectations tend to combine these performances in one objective. For example, aspects of Rhode Island's GSE M(F&A)—10—4 align with nine separate ADP Benchmarks.

M(F&A)—10—4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.

Other examples of compound expectations from the Rhode Island standards document that tend to be repeated several times in the side-by-side chart include:

M(G&M)—10—2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem). M(G&M)—10—2 Creates formal proofs of propositions (e.g. angles, lines, circles, distance, midpoint and polygons including triangle ratios). *(Used as a match for 10 ADP Benchmarks)*
M(DSP)—10—1 Interprets a given representation (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts) to make observations, to answer questions, to analyze the data to formulate or justify conclusions, critique conclusions, make predictions, or to solve problems within mathematics or across disciplines or contexts (e.g. media, workplace, social and environmental situations). (IMPORTANT: Analyzes data consistent with concepts and skills in M(DSP)—10—2.)
M(DSP)—10—2 Analyzes patterns, trends, or distributions in data in a variety of contexts by determining, using, or analyzing measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, estimated line of best fit, regression line, or correlation (strong positive, strong negative, or no correlation) to solve problems; and solve problems involving conceptual understanding of the sample from which the statistics were developed.

M(DSP)—10—3 Identifies or describes representations or elements of representations that best display a given set of data or situation, consistent with the representations required in M(DSP)—10—1. M(DSP)—10—3 Organizes and displays one- and two-variable data using a variety of representations (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts). Analyzes the data to formulate or justify conclusions, make predictions, or to solve problems. Identifies representations that best display a given set of data.

The organization and grain size of Rhode Island's GSEs vary—most noticeably between the GSEs for Grades 9-10 and 11-12. As seen in the preceding table, a number of GSEs for Grades 9-10, which guide development of the state assessment, are compound in nature. It would seem that this grade span might benefit from expectations with more specificity and clarity about exactly what is expected with respect to each skill and concept defined in the GSEs. In contrast, the GSEs for Grades 11-12 tend to be composed of more finely grained statements that are often listed separately but identified using a single GSE label, such as M(F&A)—12—3. Examples of more finely grained expectation statements—from across the various GSE levels—include:

M(F&A)—12—3 Factors quadratic and higher degree polynomials, including difference of squares.
M(F&A)—12—3 Adds, subtracts, multiplies and divides rational expressions.
M(F&A)-12—3 Simplifies complex fractions.
M(F&A)—AM—2 Understands domain restriction and the effects of it on the function and its properties.
M(F&A)—AM—3 Uses the remainder theorem, the factor theorem and rational root theorem for polynomials.
M(G&M)—10—5 Applies concepts of similarity by solving problems within mathematics or across disciplines or contexts.

- The Rhode Island GSEs are to be commended for clearly placing considerable emphasis on conceptual understanding of content. For example, the following expectations specifically highlight conceptual understanding:

M(F&A)—10—2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).
M(F&A)—10—3 Demonstrates conceptual understanding of algebraic expressions by solving problems involving algebraic expressions, by simplifying expressions (e.g., simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic

expressions.
M(F&A)—10—4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.
M(G&M)—10—10 Demonstrates conceptual understanding of spatial reasoning and visualization by sketching or using dynamic geometric software to generate three-dimensional objects from two-dimensional perspectives, or to generate two-dimensional perspectives from three-dimensional objects, or by solving related problems.

Other Rhode Island expectations are explicit about how conceptual understanding will be demonstrated. The expectations often include the phrases such as "demonstrate understanding of... by..." and "understand... by...".

M(N&O)— AM—1 Understands the structure of the real number system as an extension of the rational numbers by representing real numbers as infinite decimal expansions (that provide successive rational approximations to the number) and as points on a number line. Determines whether the decimal expansion of a rational number eventually repeats or terminates (without using a calculator).
M(F&A)—12—3 Understands properties of logarithms and can convert between logarithmic and exponential forms.

When the verb "understand" is used alone, it would be wise to include modifiers explaining how the understanding should be demonstrated. Examples of Rhode Island expectations that would benefit from such modification include:

M(F&A)—12—4 Understands the effect of simplifying radical or rational expressions on the solution set of equations involving such expressions. (e.g. x^2/x =x for $x \neq 0$).
M(F&A)—AM—2 Understands domain restriction and the effects of it on the function and its properties.
M(F&A)—AM—2 Understands functions and relations from a set-theoretic perspective, and operations on functions including composition and inverse including computing inverses algebraically.
M(F&A)—AM—3 Understands the difference between factoring polynomials over integer, rational, real and complex numbers

- The performance expectations in the Rhode Island GSEs, through the use of certain verbs, clearly convey a high level of cognitive demand. Students are asked to represent, analyze, solve, apply, design and critique, graph, describe, construct, interpret, model, create, make and defend, perform and justify, and derive and use. Even the verb "know," which usually is ambiguous and can be interpreted as low level recall, tends to be coupled with "use," implying a higher level of demand. Similarly, the verb "understand" is often clarified in the GSEs by explanation of how the student will be expected to show understanding. There are very few expectations that are unclear with regard to the

performances expected. The only ones noted are:

M(N&O)—12—1 Knows that rational numbers are precisely those with eventually repeating or terminating decimal expansions
M(F&A)—12—4 Understands the effect of simplifying radical or rational expressions on the solution set of equations involving such expressions. (e.g. x^2/x =x for $x \neq 0$).
M(F&A)—AM—3 Understands the difference between factoring polynomials over integer, rational, real and complex numbers

- Rhode Island is quite specific about its intent that mental mathematics and estimation are to be embedded throughout the curriculum. This is a commendable goal, and the GSEs are much more specific about this aspect of mathematics than the ADP Benchmarks. Specifically, these two GSEs are as follows:

M(N&O)—10—6 Mentally calculates benchmark perfect squares and related square roots (e.g., 12, 22 , ..., 122, 152, 202, 252, 1002, 10002). Determines any whole number percentage of a number or any multiples of 100% up to 500%. Determines benchmark fractions of a number. (IMPORTANT: The intent of this GSE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.)
M(N&O)—10—7 Makes appropriate estimates in a given situation by determining the level of accuracy needed and analyzing the accuracy of results. Estimates tips, discounts, and tax and estimates the value of a non-perfect square root or cube root. (IMPORTANT: The intent of this GSE is to embed estimation throughout the instructional program, not to teach it as a separate unit.)

- The Rhode Island high school expectations tend to be less comprehensive than the ADP Benchmarks with respect to Data Interpretation, Statistics, and Probability. For example, ADP Benchmark L2 and its subcomponents address the need for students to be able to explain and critique alternative ways of presenting and using information. Specifically, the ADP Benchmarks call for students to be able to evaluate reports based on data published in the media by considering the source of the data, the design of the study, and the way the data are analyzed and displayed, identify and explain misleading uses of data, and recognize when arguments based on data confuse correlation with causation. The Rhode Island GSE that most closely aligns with this Benchmark is neither explicit about precisely what is expected nor about the depth of understanding expected, as seen in the language below:

M(DSP)—10—1 Interprets a given representation (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts) to make observations, to answer questions, to analyze the data to formulate or justify conclusions, critique conclusions, make predictions, or to solve problems within mathematics or across disciplines or contexts (e.g. media, workplace, social and environmental situations).(IMPORTANT: Analyzes data consistent with concepts and skills in M(DSP)—10—2.)

Likewise, the ADP Benchmarks call for students to be explicit in explaining the differences between randomized experiments and observational studies, to explain how

the relative frequency of a specified outcome of an event can be used to estimate the probability of the outcome, and to explain how the law of large numbers can be applied in simple examples. The Rhode Island expectations are not explicit about these concepts but rather place more emphasis on solving probability problems using concepts not explicitly addressed in the ADP Benchmarks.

- The ADP Benchmarks articulated under Benchmark J5 are very explicit about the types of real world problems students should be able to model and solve (i.e., time/rate/distance problems, percentage increase or decrease problems, ratio and proportion problems, mixture problems, motion of an object under the force of gravity, compound interest problems, exponential growth and decay problems, home mortgage problems, and other compound interest problems). Rhode Island does not specifically list types of problems but instead uses the generic phrase "model and solve problems." Greater specificity—either in this document or in a supplementary resource—would prove helpful to teachers.

Alignment of Rhode Island's High School Mathematics GSEs with the Rhode Island College Readiness Standards

Rhode Island's PK-16 Mathematics Advisory Committee has developed guidelines for college readiness in mathematics that define two tiers of expectations. First, a set of basic skill and knowledge expectations defines the level of mathematics needed for all students to enter college and be successful. These standards indicate the scope and level of proficiency implicit in Geometry and Algebra II expectations. By design, they do not include all of the mathematics—such as statistics—that constitutes a strong high school mathematics program. Rather, they focus on areas that college mathematics professors define as critical underpinnings for success in entry-level college mathematics courses. The second set of standards defines readiness for technical/scientific programs and acknowledges that students intending to enter mathematics-intensive programs need substantially more exposure in high school to precalculus topics, including trigonometry and more advanced topics in algebra. The College Readiness Standards are intentionally light on data, probability, and statistics—unlike the Rhode Island GSEs and the ADP Benchmarks. In fact, they contain only one expectation addressing this area—an expectation involving permutations, combinations, and probability calculations that is in the basic skill and knowledge expectations. With respect to the more advanced levels of knowledge and skill, there is only one asterisked ADP Benchmark—dealing with the binomial theorem—that is not included in the Rhode Island College Readiness Standards.

A student who completes a course of study in high school that encompasses the expectations defined in the GSEs for Grades 9-10 and 11-12 should be prepared for college—as defined by the basic skill and knowledge expectations component of Rhode Island's College Readiness Standards. Such a student will have even been taught content—most particularly in data, probability, and statistics—that is not deemed by the PK-16 Mathematics Advisory Committee that drafted the College Readiness Standards—to be an important precursor to success in college. An issue seems to be, however, whether all students completing high school—even those with four credits of mathematics—and intending to enter college with a mathematics-

intensive major will be able to meet the expectations defined in the College Readiness Standards. Many of the expectations defined in the College Readiness Standards applicable to these students will only be studied by students who have taken courses that address the AM expectations defined to build on the GSEs for Grades 9-10 and 11-12. Rhode Island's plan to move from a graduation requirement of two years of mathematics to three years of mathematics plus a fourth year of an applied course will be instrumental in ensuring that students have adequate preparation to pursue college majors and careers of their choosing.

Conclusion

In general, the Rhode Island GSEs and AM expectations are comprehensive in scope and rigorous in their level of cognitive demand. They tend to align well with the ADP Benchmarks, and students who learn the content and skills defined in the GSEs should be prepared for success in entry-level mathematics in college. It is only those students completing a more rigorous mathematics program in high school—one that addresses the expectations defined for AM—who will be prepared for success in mathematics-intensive majors. As revisions are made to the high school GSEs, consideration should be given to adding detail in the areas of mathematical modeling and geometry. Another recommendation is to separate the compound expectations that comprise many of the GSEs for Grades 9-10 into more manageable subsets that would clearly delineate the specific expectations with regard to how students will demonstrate their knowledge and more clearly outline what they will be expected to know. This detail will help teachers focus on the important mathematics and ensure that all students across the state are not only being held to the same high expectations but also engaged with challenging tasks and rich applications of mathematics.

APPENDIX A: SIDE-BY-SIDE COMPARISON OF THE ADP MATHEMATICS BENCHMARKS TO THE RHODE ISLAND GRADE SPAN EXPECTATIONS

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
Certain mathematics benchmarks are marked with an **asterisk (*).** These asterisked benchmarks represent **content that is recommended for all students, but is required for those students who plan to take calculus** in college, a requisite for mathematics and many mathematics intensive majors.	In the case of RI expectations with compound performance and/or content expectations the subset of content that aligns with the ADP benchmark is **bolded**. Shaded rows denote extensions of ADP benchmarks.	**COMMENTS ARE DIRECTED TOWARDS ISSUES WITH ADP ALIGNMENT.**
I. Number Sense and Numerical Operations - The high school graduate can:	**Numbers and Operations**	
I1. Compute with rational numbers fluently and accurately without a calculator:		
I1.1. Add, subtract, multiply and divide integers, fractions and decimals.	M(N&O)—10—6 Mentally calculates benchmark perfect squares and related square roots (e.g., 12, 22 , …, 122, 152, 202, 252, 1002, 10002). Determines any whole number percentage of a number or any multiples of 100% up to 500%. **Determines benchmark fractions of a number.** (IMPORTANT: The intent of this GSE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.)	**Mental math is not included in the ADP Benchmarks.**
	M(N&O)—10—8 Applies properties of numbers to solve problems, to **simplify computations**, or to compare and contrast the properties of numbers and number systems.	
	M(N&O)—6—4 Accurately solves problems involving single or multiple operations on fractions (proper, improper, and mixed), or decimals; and addition or subtraction of integers; percent of a whole; or problems involving greatest common factor or least common multiple.	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
	M(N&O)—8—4 Accurately solves problems involving proportional reasoning (percent increase or decrease, interest rates, markups, or rates); multiplication or division of integers; and squares, cubes, and taking square or cube roots.	
I1.2. Calculate and apply ratios, proportions, rates and percentages to solve problems.	M(N&O)—8—4 Accurately solves problems involving proportional reasoning (percent increase or decrease, interest rates, markups, or rates); multiplication or division of integers; and squares, cubes, and taking square or cube roots.(IMPORTANT: Applies the conventions of order of operations.)	
	M(N&O)—10—4 Accurately solves problems that involve but are not limited to proportional relationships, percents, ratios, and rates. (The problems might be drawn from contexts outside of and within mathematics including those that cut across content strands or disciplines.) Solves problems involving compound interest	
	M(N&O)—10—6 Mentally calculates benchmark perfect squares and related square roots (e.g., 12, 22 , …, 122, 152, 202, 252, 1002, 10002). **Determines any whole number percentage of a number or any multiples of 100% up to 500%**. Determines benchmark fractions of a number. (IMPORTANT: The intent of this GSE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.)	
	M(N&O)—10—7 Makes appropriate estimates in a given situation by determining the level of accuracy needed and analyzing the accuracy of results. **Estimates tips, discounts, and tax** and estimates the value of a non-perfect square root or cube root. (IMPORTANT: The intent of this GSE is to embed estimation throughout the instructional program, not to teach it as a separate unit.)	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
I1.3. Use the correct order of operations to evaluate arithmetic expressions, including those containing parentheses.	M(N&O)—8—4 Accurately solves problems involving proportional reasoning (percent increase or decrease, interest rates, markups, or rates); multiplication or division of integers; and squares, cubes, and taking square or cube roots.**(IMPORTANT: Applies the conventions of order of operations.)**	
I1.4. Explain and apply basic number theory concepts such as prime number, factor, divisibility, least common multiple and greatest common divisor.	M(N&O)—8—8 Applies **properties of numbers (odd, even, remainders, divisibility, and prime factorization)** and field properties (commutative, associative, identity [including the multiplicative property of one, e.g. 20 x 23 = 20+3 = 23, so 20 = 1], distributive, inverses) to solve problems and to simplify computations, and demonstrates conceptual understanding of field properties as they apply to subsets of real numbers when addition and multiplication are not defined in the traditional ways.	
	M(N&O)—5—4 Accurately solves problems involving multiple operations on whole numbers or the use of the properties of **factors, multiples, prime, or composite numbers**; and addition or subtraction of fractions (proper) and decimals to the hundredths place. (Division of whole numbers by up to a two-digit divisor.)	
	M(N&O)—6—4 Accurately solves problems involving single or multiple operations on fractions (proper, improper, and mixed), or decimals; and addition or subtraction of integers; percent of a whole; or problems involving **greatest common factor or least common multiple.**	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
I1.5. Multiply and divide numbers expressed in scientific notation.	M(N&O)—12—4 **Solves problems involving scientific notation** or uses significant digits to assess the precision of an answer. Interprets rational exponents and their relation to radicals. Computes by hand in simple cases (e.g.$4^{3/2}$), and using a calculator when appropriate. **Interprets numbers given in scientific notation and carries out computations of them with and without a calculator.**	**ADP designates this Benchmark for all. RI includes this Benchmark at the 11-12th grade level.**
I2. Recognize and apply magnitude (absolute value) and ordering of real numbers:		
I2.1. Locate the position of a number on the number line, know that its distance from the origin is its absolute value and know that the distance between two numbers on the number line is the absolute value of their difference.	M(N&O)—10—2 Demonstrates understanding of the relative magnitude of real numbers by solving problems involving ordering or comparing rational numbers, common irrational numbers (e.g., square root of 2 , π), rational bases with integer exponents, square roots, **absolute values**, integers, or numbers represented in scientific notation **using number lines** or equality and inequality symbols.	
I2.2. Determine the relative position on the number line of numbers and the relative magnitude of numbers expressed in fractional form, in decimal form, as roots or in scientific notation.	M(N&O)—10—2 Demonstrates understanding of the relative magnitude of real numbers by solving problems involving ordering or comparing rational numbers, common irrational numbers (e.g., square root of 2 , π), rational bases with integer exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality symbols.	
	M(N&O)—12—2 Demonstrates understanding of the relative magnitude of real numbers by solving problems that involve ordering or comparing.	**How does this expectation differ from the expectation at Grades 9-10?**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
	M(N&O)— AM—1 Understands the structure of the real number system as an extension of the rational numbers by representing real numbers as infinite decimal expansions (that provide successive rational approximations to the number) and **as points on a number line**. Determines whether the decimal expansion of a rational number eventually repeats or terminates (without using a calculator).	**RI designates this standard as advanced. ADP holds this expectation for all.**
I3. Understand that to solve certain problems and equations, number systems need to be extended from whole numbers to the set of all integers (positive, negative and zero), from integers to rational numbers, from rational numbers to real numbers (rational and irrational numbers) and from real numbers to complex numbers; define and give examples of each of these types of numbers.	M(N&O)—10—8 Applies properties of numbers to solve problems, to simplify computations, or to **compare and contrast the properties of numbers and number systems**.	
	M(N&O)—12—1 Knows that rational numbers are precisely those with eventually repeating or terminating decimal expansions	**All students will not study the structure of the number system since these expectations are included at grade span 11-12 and advanced mathematics.**
	M(N&O)— AM—1 Understands the structure of the real number system as an extension of the rational numbers by representing real numbers as infinite decimal expansions (that provide successive rational approximations to the number) and as points on a number line. Determines whether the decimal expansion of a rational number eventually repeats or terminates (without using a calculator).	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
	M(N&O)—12—4 Demonstrates understanding of complex numbers by interpreting them geometrically and by computing with them (e.g., adding, multiplying, dividing, finding the nth root, or by finding conjugates). Understand complex numbers as an extension of the real numbers (e.g. arising in solutions of polynomial equations). Manipulates complex numbers using rectangular and polar coordinates. Knows the fundamental theorem of algebra and knows that non-constant polynomials always factor into linear factors over the complex numbers.	**This Benchmark is an extension of ADP. The study of complex numbers is a much more in-depth in the RI standards.**
	M(N&O)—12—8 Determine whether a given subset of numbers is closed under a given arithmetic operation	**This concept is an extension of ADP.**
	M(N&O)—AM—8 Add and multiply numerical matrices with attention to the arithmetic properties of these operations. Algebraically and geometrically interpret vectors, vector addition, and scalar multiplication in the plane, with attention to arithmetic properties. Knows and uses the principle of mathematical induction.	**Matrices and Vectors are not included in ADP.**
I4. Understand the capabilities and the limitations of calculators and computers in solving problems:		
I4.1. Use calculators appropriately and make estimations without a calculator regularly to detect potential errors.	M(N&O)—10—7 Makes appropriate estimates in a given situation by determining the level of accuracy needed and analyzing the accuracy of results. Estimates tips, discounts, and tax and estimates the value of a non-perfect square root or cube root. (IMPORTANT: The intent of this GSE is to embed estimation throughout the instructional program, not to teach it as a separate unit.)	**ADP does not explicitly include the intent of "embedding estimation throughout the instructional program."**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
	M(N&O)—12—7 Makes appropriate estimates in a given situation by determining the level of accuracy needed and analyzing the accuracy of results. (IMPORTANT: The intent of this GSE is to embed estimation throughout the instructional program, not to teach it as a separate unit.)	
I4.2. Use graphing calculators and computer spreadsheets.	M(DSP)—12—3 Find or estimate linear, quadratic, and exponential regression functions by organizing and displaying data **with or without using technology**	
	M(N&O)—AM—1 Understands the structure of the real number system as an extension of the rational numbers by representing real numbers as infinite decimal expansions (that provide successive rational approximations to the number) and as points on a number line. Determines whether the decimal expansion of a rational number eventually repeats or terminates (**without using a calculator)**.	
	M(N&O)—12—4 Solves problems involving scientific notation or uses significant digits to assess the precision of an answer. Interprets rational exponents and their relation to radicals. Computes by hand in simple cases (e.g.), and **using a calculator when appropriate**. Interprets numbers given in scientific notation and carries out computations of them **with and without a calculator**	
	M(G&M)—10—10 Demonstrates conceptual understanding of spatial reasoning and visualization by sketching or using **dynamic geometric software** to generate three-dimensional objects from two-dimensional perspectives, or to generate two-dimensional perspectives from three- dimensional objects, or by solving related problems.	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
	M(G&M)—12—10 Perform and justify construction with compass and straightedge or **dynamic geometric software.**	
	M(F&A)—12—4 Finds approximate solutions to equations by graphing each side as a function **using technology**. Understand that any equation in x can be interpreted as the equation f(x) = g(x) and interpret the solutions of the equation as the x-value(s) of the intersection point(s) of the graphs of y = f(x) and y = g(x).	
	M(F&A)—AM—4 Interprets systems as matrix equations and solves them by computing the appropriate matrix inverse and multiplication, **with or without technology**.	
	M(DSP)—AM—3 **Uses technology** to explore the method of least squares and median-median for linear regression	
	M(DSP)—12—5 Designs and critiques experimental models **(with or without technology)** to approximate desired probabilities.	
J. Algebra - The high school graduate can:	**Functions and Algebra**	
J1. Perform basic operations on algebraic expressions fluently and accurately:		
	M(F&A)—10—1 Identifies, extends, and generalizes a variety of patterns (linear and nonlinear) represented by models, tables, sequences, or graphs to solve problems.	**Generalizing patterns is not included in ADP.**
J1.1. Understand the properties of integer exponents and roots and apply these properties to simplify algebraic expressions.	M(F&A)—10—3 Demonstrates conceptual understanding of algebraic expressions by solving problems involving algebraic expressions, by simplifying expressions (e.g., **simplifying** polynomial or rational expressions, or **expressions involving integer exponents, square roots,** or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions.	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
J1.2. * Understand the properties of rational exponents and apply these properties to simplify algebraic expressions.	M(N&O)—12—4 Solves problems involving scientific notation or uses significant digits to assess the precision of an answer. **Interprets rational exponents and their relation to radicals**. Computes by hand in simple cases (e.g.$4^{3/2}$), and using a calculator when appropriate. Interprets numbers given in scientific notation and carries out computations of them with and without a calculator.	
	M(F&A)—12—3 Manipulates, evaluates, and simplifies expressions involving rational exponents and radicals and can convert between expressions with rational exponents and expressions with radicals.	
J1.3. Add, subtract and multiply polynomials; divide a polynomial by a low degree polynomial.	M(F&A)—12—3 Manipulates, evaluates, and simplifies algebraic and numerical expressions. Adds, subtracts, multiplies and divides polynomials.	**ADP designates this Benchmark for all. RI includes this Benchmark at the 11-12th grade level.**
Polynomial Theorems	M(F&A)—AM—3 Uses the remainder theorem, the factor theorem and rational root theorem for polynomials.	**The polynomial theorems are an extension of ADP.**
J1.4. Factor polynomials by removing the greatest common factor; factor quadratic polynomials.	M(F&A)—12—3 Factors quadratic and higher degree polynomials, including difference of squares.	**ADP designates this Benchmark for all. RI includes this Benchmark at the 11-12th grade level.**
	M(F&A)—AM—3 Understands the difference between factoring polynomials over integer, rational, real and complex numbers	**This concept is an extension of ADP.**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
J1.5. Add, subtract, multiply, divide and simplify rational expressions.	M(F&A)—10—3 Demonstrates conceptual understanding of algebraic expressions by solving problems involving algebraic expressions, by simplifying expressions (e.g., **simplifying** polynomial or **rational expressions**, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions.	
	M(F&A)—12—3 Adds, subtracts, multiplies and divides rational expressions. Simplifies complex fractions.	**ADP designates this Benchmark for all.. RI includes this Benchmark at the 11-12th grade level.**
J1.6. Evaluate polynomial and rational expressions and expressions containing radicals and absolute values at specified values of their variables.	M(F&A)—10—3 Demonstrates conceptual understanding of algebraic expressions by solving problems involving algebraic expressions, by simplifying expressions (e.g., **simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values)**, by **evaluating expressions,** or by translating problem situations into algebraic expressions.	
	M(F&A)—12—4 Understands the effect of simplifying radical or rational expressions on the solution set of equations involving such expressions. (e.g. $x^2/x = x$ for $x \neq 0$).	**Consistent with the intent of ADP but not explicitly referenced in ADP.**
J1.7. * Derive and use the formulas for the general term and summation of finite arithmetic and geometric series; find the sum of an infinite geometric series whose common ratio, r, is in the interval (-1, 1).	M(F&A)—12—1 Identifies arithmetic and geometric sequences and finds the nth term; then uses the generalization to find a specific term.	
	M(F&A)—AM—1 Computes partial sums of infinite arithmetic and geometric sequences, determines when an infinite geometric series converges, and finds its sum. Connects arithmetic and geometric sequences to linear and exponential functions,	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
	respectively.	
J2 Understand functions, their representations and their properties:		
Conceptual understanding of linear and nonlinear functions	M(F&A)—10—2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).	**The general study of classes or families of functions is not referenced in the ADP Benchmarks.** **These expectations are laudable. The goal of building conceptual understanding is explicitly highlighted and thus valued. Looking across functions for analysis of characteristics and properties such as constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change and working between and among different representations**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
Families of functions	M(F&A)—12—2 Represents and analyzes functions in several ways. Recognizes properties of functions and characteristics properties of families of functions. Applies knowledge of functions to interpret, model, and solve problems. Analyzes characteristics of classes of functions (polynomial, rational, and exponential) to include domain, range, intercepts, increasing and decreasing intervals and rates of change. Represents functions numerically, algebraically, graphically, and verbally (i.e. in written words). Recognizes properties of a function from these representations, and transfers information from one representation to another. Graphs polynomial, rational and exponential functions, including vertical and horizontal shifts, stretches, and compressions as well as reflections across vertical and horizontal axes. Applies knowledge of functions to interpret and understand situations, design mathematical models, and solve problems in mathematics as well as in natural and social sciences	**of functions and relations (e.g., graphs, tables, equations, function notation) will give students the foundations of a more generalized function study that can be more readily applied to real world problems across the disciplines.**
Classes of functions/inverses	M(F&A)—AM—2 Analyzing characteristic of classes of functions and inverse functions (exponential, logarithmic, trigonometric) to include domain, range, intercepts, increasing and decreasing intervals and rates of change, periodicity, end behavior, maximum and minimum values, continuity, and asymptotes	**Consistent with the intent of ADP, but not all of these characteristics are explicitly referenced in ADP.**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
Properties of Functions	M(F&A —AM—2 Analyzes properties of functions including injectivity (1-1), surjectivity (onto), critical points and inflection points. Determine graphically and analytically whether a function is even, odd or neither. Analyzes informally the idea of continuity and limits.	**These properties of functions are beyond the scope of ADP.**
Understanding solutions to equations as two functions	M(F&A)—12—4 Finds approximate solutions to equations by graphing each side as a function using technology. Understand that any equation in x can be interpreted as the equation f(x) = g(x) and interpret the solutions of the equation as the x-value(s) of the intersection point(s) of the graphs of y = f(x) and y = g(x).	**This concept is not explicitly referenced in ADP but was a MAP 6-8 expectation.**
J2.1 Recognize whether a relationship given in symbolic or graphical form is a function	M(F&A)—12—2 Represents and analyzes functions in several ways. **Recognizes properties of functions** and characteristics properties of families of functions. Applies knowledge of functions to interpret, model, and solve problems.	**ADP designates this Benchmark for all. RI includes this Benchmark at the 11-12th grade level.**
J2.2. * Determine the domain of a function represented in either symbolic or graphical form.	M(F&A)—AM—2 Understands domain restriction and the effects of it on the function and its properties.	**Only students in Advanced Mathematics will encounter this concept, it is not included in the four year expectations.**
J2.3. Understand functional notation and evaluate a function at a specified point in its domain.	M(F&A)—10—2 describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, **function notation**).	
J2.4. * Combine functions by composition, as well as by addition, subtraction, multiplication and division.	M(F&A)—AM—2 Understands functions and relations from a set-theoretic perspective, and **operations on functions including composition** and inverse including computing inverses algebraically.	**Only students in Advanced Mathematics will encounter this concept, it is not included in the four year expectations.**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
J2.5. * Identify whether a function has an inverse and when functions are inverses of each other; explain why the graph of a function and its inverse are reflections of one another over the line y = x.	M(F&A)—AM—2 Understands functions and relations from a set-theoretic perspective, and operations on functions including composition and **inverse including computing inverses algebraically.**	**Only students in Advanced Mathematics will encounter this concept; it is not included in the four year expectations.**
J2.6. * Know the inverse of an exponential function is a logarithm, prove basic properties of a logarithm using properties of its inverse and apply those properties to solve problems.	M(F&A)—12—3 Understands properties of logarithms and can convert between logarithmic and exponential forms.	
	M(F&A)—AM—2 Analyzing characteristic of classes of functions and **inverse functions** (**exponential, logarithmic**, trigonometric) to include domain, range, intercepts, increasing and decreasing intervals and rates of change, periodicity, end behavior, maximum and minimum values, continuity, and asymptotes	
J3. Apply basic algebraic operations to solve equations and inequalities:	M(F&A)—10—4 Works with a wide variety of equations.	
J3.1. Solve linear equations and inequalities in one variable including those involving the absolute value of a linear function.	M(F&A)—10—4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by **solving linear equations** (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.	
J3.2. Solve an equation involving several variables for one variable in terms of the others.	M(F&A)—10—2 d**escribes how change in the value of one variable relates to change in the value of a second variable**; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
	M(F&A)—8—4 Demonstrates conceptual understanding of equality by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, **solving formulas for a variable requiring one transformation (e.g., *d* = *rt*; *d*/*r* = *t*);** by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.	
J3.3. Solve systems of two linear equations in two variables.	M(F&A)—10—4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or **by solving problems involving systems of linear equations** in a context (using equations or graphs) or using models or representations.	
J3.4. * Solve systems of three linear equations in three variables.	M(F&A)—12—4 Understands and applies the various processes of solving equations and systems of equations or inequalities. Interprets the solutions algebraically and graphically. Solves 2x2 and 3x3 systems of linear equations and graphically interprets the solutions.	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
J3.5. Solve quadratic equations in one variable.	M(F&A)—12—4 Factors, completes the square, uses the quadratic formula, and graphs quadratic functions to solve quadratic equations.	**ADP designates this Benchmark for all. RI includes this Benchmark at the 11-12th grade level.**
Polynomial, Rational, and Radical Equations	M(F&A)—12—4 Solves equations involving polynomial, rational, and radical expressions. Graphs and interprets the solutions.	**These expectations are extensions of ADP J3 Benchmarks involving solving equations.**
Exponential and Logarithmic Equations	M(F&A)—AM—4 Solves equations involving exponential and logarithmic expressions. Graphs and interprets the solutions.	
Intermediate Value Theorem	M(F&A)—AM–4 Knows and applies the intermediate value theorem to find exact or approximate solutions of equations or zeros of continuous functions.	
J4. Graph a variety of equations and inequalities in two variables, demonstrate understanding of the relationships between the algebraic properties of an equation and the geometric properties of its graph, and interpret a graph:		
J4.1. Graph a linear equation and demonstrate that it has a constant rate of change.	M(F&A)—10—4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving **linear equations (symbolically and graphically)** and expressing the solution set symbolically or **graphically,** or p**rovides the meaning of the graphical interpretations of solution(s)** in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
	M(F&A)—8—2 Demonstrates conceptual understanding of linear relationships (y = kx; y = mx + b) **as a constant rate of change** by solving problems involving the relationship between slope and rate of change; informally and formally determining slopes and intercepts represented in graphs, tables, or problem situations; or describing the meaning of slope and intercept in context; and distinguishes between linear relationships (constant rates of change) and nonlinear relationships (varying rates of change) represented in tables, graphs, equations, or problem situations; or describes how change in the value of one variable relates to change in the value of a second variable in problem situations with constant and varying rates of change.	
J4.2. Understand the relationship between the coefficients of a linear equation and the slope and x- and y-intercepts of its graph.	M(F&A)—10—4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and **graphically)** and expressing the solution set symbolically or **graphically,** or p**rovides the meaning of the graphical interpretations of solution(s)** in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
	M(F&A)—8—2 Demonstrates conceptual understanding of linear relationships (y = kx; y = mx + b) as a constant rate of change by solving problems involving the relationship between slope and rate of change; informally and formally determining slopes and intercepts represented in graphs, tables, or problem situations; or **describing the meaning of slope and intercept in context;** and distinguishes between linear relationships (constant rates of change) and nonlinear relationships (varying rates of change) represented in tables, graphs, equations, or problem situations; or describes how change in the value of one variable relates to change in the value of a second variable in problem situations with constant and varying rates of change.	
J4.3. Understand the relationship between a solution of a system of two linear equations in two variables and the graphs of the corresponding lines.	M(F&A)—10—4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or **provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.**	
	M(F&A)—12—4 Solves 2x2 and 3x3 systems of linear equations and graphically interprets the solutions.	
Solving using matrices	M(F&A)—AM—4 Interprets systems as matrix equations and solves them by computing the appropriate matrix inverse and multiplication, with or without technology.	**Matrices are not included in ADP.**
Systems of nonlinear equations	M(F&A)—12—4 Solves systems of equations involving nonlinear expressions and graphically	**Only linear systems are included in ADP.**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
	interprets the solutions.	
J4.4. Graph the solution set of a linear inequality and identify whether the solution set is an open or a closed half-plane; graph the solution set of a system of two or three linear inequalities.	M(F&A)—12—4 Solves **systems of linear** and quadratic **inequalities.**	**Systems of quadratic inequalities are not included in ADP** **ADP expects this Benchmark from all students. RI includes linear inequalities at 11-12.**
J4.5. Graph a quadratic function and understand the relationship between its real zeros and the x-intercepts of its graph.	M(F&A)—12—4 Factors, completes the square, uses the quadratic formula, and g**raphs quadratic functions** to solve quadratic equations.	**ADP designates this Benchmark for all.** **RI includes this Benchmark at the 11-12th grade level.**
J4.6. * Graph ellipses and hyperbolas whose axes are parallel to the x and y axes and demonstrate understanding of the relationship between their standard algebraic form and their graphical characteristics.	M(G&M)—AM—3 Explores and interprets the characteristics of conic sections graphically and algebraically. Understands how different planar slices of a double cone yield different conic sections. Knows the characterization of conic sections as loci of points in the plane satisfying certain distance requirements, and uses the distance formula to obtain equations for the conic sections.	**Only students in Advanced Mathematics will encounter this concept, it is not included in the four year expectations.**
J4.7. Graph exponential functions and identify their key characteristics.	M(F&A)—12—2 Graphs polynomial, rational and **exponential functions,** including vertical and horizontal shifts, stretches, and compressions as well as reflections across vertical and horizontal axes.	**ADP designates this Benchmark for all.** **RI includes this Benchmark at the 11-12th and advanced level.** **Graphing polynomial, rational and logarithmic equations are not included in the ADP Benchmarks under J4.**
	M(F&A)—AM—4 Solves equations involving **exponential** and logarithmic expressions. **Graphs and interprets the solutions**.	
J4.8. Read information and draw conclusions from graphs; identify properties of a graph that provide useful information about the original problem.	This ADP Benchmark is embedded throughout the expectations in the RI Function and Algebra strand.	
	M(F&A)—12—4 Understands and applies the various processes of solving equations and systems of equations or inequalities. **Interprets the solutions algebraically and graphically.**	
Logrithmic Function Graphs	M(F&A)—AM—2 Recognizes properties of families of functions including logarithmic and trigonometric, and graphs them.	**ADP does not explicitly include logarithmic graphs.**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
J5. Solve problems by converting the verbal information given into an appropriate mathematical model involving equations or systems of equations; apply appropriate mathematical techniques to analyze these mathematical models; and interpret the solution obtained in written form using appropriate units of measurement:	M(F&A)—12—2 Applies knowledge of functions to interpret and understand situations, design mathematical models, and solve problems in mathematics as well as in natural and social sciences	**This expectation is not specific enough to know which classes of functions students will be expected to apply.**
J5.1. Recognize and solve problems that can be modeled using a linear equation in one variable, such as time/rate/distance problems, percentage increase or decrease problems, and ratio and proportion problems.	M(F&A)—10—4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) **in problem-solving situations**; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.	
J5.2. Recognize and solve problems that can be modeled using a system of two equations in two variables, such as mixture problems.	M(F&A)—10—4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by **solving problems involving systems of linear equations in a context (using equations or graphs) or using models or** representations.	
J5.3. Recognize and solve problems that can be modeled using a quadratic equation, such as the motion of an object under the force of gravity.		**There is not explicit mention of using quadratic equations to model problems.**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
J5.4. Recognize and solve problems that can be modeled using an exponential function, such as compound interest problems.	M(N&O)—10—4 Solves problems involving compound interest	
J5.5. * Recognize and solve problems that can be modeled using an exponential function but whose solution requires facility with logarithms, such as exponential growth and decay problems.		**There is not explicit mention of using exponential functions to model problems.**
J5.6. Recognize and solve problems that can be modeled using a finite geometric series, such as home mortgage problems and other compound interest problems.		**There is not explicit mention of using finite geometric series to model situations.**
J6. * Understand the binomial theorem and its connections to combinatorics, Pascal's triangle and probability.		**These concepts are not explicitly addressed in RI.**
K. Geometry - The high school graduate can:	**Geometry and Measurement**	
K1. Understand the different roles played by axioms, definitions and theorems in the logical structure of mathematics, especially in geometry:		
K1.1. Identify, explain the necessity of and give examples of definitions, axioms and theorems.	M(G&M)—AM—2 Extends and deepens knowledge and usage of proofs and proof techniques.	**Definitions, axioms and theorems are not referenced in the RI expectations with the intent of ADP.**
K1.2. State and prove key basic theorems in geometry such as the Pythagorean theorem, the sum of the angles of a triangle is 180 degrees, and the line joining the midpoints of two sides of a triangle is parallel to the third side and half its length.	M(G&M)—10—2 Creates formal proofs of propositions (e.g. angles, lines, circles, distance, midpoint and polygons including triangle ratios).	
	M(G&M)—10—2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
	Theorem).	
	M(G&M)—12—2 Creates formal proofs of propositions (e.g. angles, lines, circles, distance, midpoint and polygons including triangle congruence and similarity).	
K1.3. Recognize that there are geometries, other than Euclidean geometry, in which the parallel postulate is not true.	M(G&M)—10—2 Uses geometric models to represent and distinguish between Euclidian and non-Euclidian systems.	
K2. Identify and apply the definitions related to lines and angles and use them to prove theorems in (Euclidean) geometry, solve problems, and perform basic geometric constructions using a straight edge and compass:	M(G&M)—12—10 Perform and justify construction with compass and straightedge or dynamic geometric software.	**Constructions are included in ADP for all students. RI includes constructions at grade span 11-12.**
K2.1. Identify and apply properties of and theorems about parallel lines and use them to prove theorems such as two lines parallel to a third are parallel to each other and to perform constructions such as a line parallel to a given line through a point not on the line.	M(G&M)—10—2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, **lines**, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).	
	M(G&M)—10—2 Creates formal proofs of propositions (e.g. angles, **lines**, circles, distance, midpoint and polygons including triangle ratios).	
	M(G&M)—12—2 Creates formal proofs of propositions (e.g. angles, **lines,** circles, distance, midpoint and polygons including triangle congruence and similarity).	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
K2.2. Identify and apply properties of and theorems about perpendicular lines and use them to prove theorems such as the perpendicular bisectors of line segments are the set of all points equidistant from the two end points and to perform constructions such as the perpendicular bisector of a line segment.	M(G&M)—10—2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, **lines,** polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).	
	M(G&M)—10—2 Creates formal proofs of propositions (e.g. angles, **lines,** circles, distance, midpoint and polygons including triangle ratios).	
	M(G&M)—12—2 Creates formal proofs of propositions (e.g. angles, **lines**, circles, distance, midpoint and polygons including triangle congruence and similarity).	
K2.3. Identify and apply properties of and theorems about angles and use them to prove theorems such as two lines are parallel exactly when the alternate interior angles they make with a transversal are equal and to perform constructions such as the bisector of an angle	M(G&M)—10—2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving **angles**, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).	
	M(G&M)—10—2 Creates formal proofs of propositions (e.g. **angles**, lines, circles, distance, midpoint and polygons including triangle ratios).	
	M(G&M)—12—2 Creates formal proofs of propositions (e.g. **angles**, lines, circles, distance, midpoint and polygons including triangle congruence and similarity).	
K3. Know the basic theorems about congruent and similar triangles and use them to prove additional theorems and solve problems.	M(G&M)—12—2 Creates formal proofs of propositions (e.g. angles, lines, circles, distance, midpoint and polygons including **triangle congruence and similarity**).	**ADP expects proof involving congruence and similarity for all. RI places these proofs at grade span 11-12.**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
K4. Know the definitions and basic properties of a circle and use them to prove basic theorems and solve problems.	M(G&M)—10—2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, **circles**, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).	
	M(G&M)—10—2 Creates formal proofs of propositions (e.g. angles, lines, **circles**, distance, midpoint and polygons including triangle ratios).	
	M(G&M)—12—2 Creates formal proofs of propositions (e.g. angles, lines, **circles**, distance, midpoint and polygons including triangle congruence and similarity).	
	M(G&M)—AM—6 Derives and uses formulas for lengths of arcs and areas of sectors and segments.	**ADP expects the properties of circles for all. RI places these properties in advanced mathematics.**
K5. Apply the Pythagorean theorem, its converse and properties of special right triangles to solve problems.	M(G&M)—10—2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., **Pythagorean Theorem**, Triangle Inequality Theorem).	
	M(G&M)—8—2 Applies the Pythagorean Theorem to find a missing side of a right triangle, or in problem solving situations.	
K6. Use rigid motions (compositions of reflections, translations and rotations) to determine whether two geometric figures are congruent and to create and analyze geometric designs.	M(G&M)—10—4 Applies the concepts of congruency by solving problems on or off a coordinate plane involving reflections, translations, or rotations; or solves problems using congruency involving problems within mathematics or across disciplines or contexts	
Matrices	M(G&M)—AM—4 Uses matrices to represent	**Matrices are not included in ADP**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
	reflections, translations, rotations.	
K7. Know about the similarity of figures and use the scale factor to solve problems.	M(G&M)—10—5 Applies concepts of similarity by solving problems within mathematics or across disciplines or contexts.	
K8. Know that geometric measurements (length, area, perimeter, volume) depend on the choice of a unit and that measurements made on physical objects are approximations; calculate the measurements of common plane and solid geometric figures:	;	
K8.1. Understand that numerical values associated with measurements of physical quantities must be assigned units of measurement or dimensions; apply such units correctly in expressions, equations and problem solutions that involve measurements; and convert a measurement using one unit of measurement to another unit of measurement.	M(G&M)—10—7 Uses units of measure appropriately and consistently when solving problems across content strands; makes conversions within or across systems and makes decisions concerning an appropriate degree of accuracy in problem situations involving measurement in other GSEs.	
	M(G&M)—10—6 Applies the appropriate unit of measure	
K8.2. Determine the perimeter of a polygon and the circumference of a circle; the area of a rectangle, a circle, a triangle and a polygon with more than four sides by decomposing it into triangles; the surface area of a prism, a pyramid, a cone and a sphere; and the volume of a rectangular box, a prism, a pyramid, a cone and a sphere.	M(G&M)—10—6 Solves problems involving perimeter, circumference, or area of two-dimensional figures (including composite figures) or surface area or volume of three-dimensional figures (including composite figures) within mathematics or across disciplines or contexts.	
Cavalieri's principle	M(G&M)—AM—6 Knows Cavalieri's principle and uses it to find volumes.	**Cavalieri's principle is not included in ADP.**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
K8.3. Know that the effect of a scale factor *k* on length, area and volume is to multiply each by *k, k²* and *k³*, respectively.	M(G&M)—6—5 Demonstrates conceptual understanding of similarity by **describing the proportional effect on the linear dimensions of polygons** or circles when scaling up or down while preserving the angles of polygons, or by solving related problems (including applying scales on maps). Describes effects using models or explanations	
	M(G&M)—7—5 Applies concepts of similarity by solving problems involving scaling up or down and their **impact on angle measures, linear dimensions and areas** of polygons, and circles when the linear dimensions are multiplied by a constant factor. Describes effects using models orsc explanations.	
	M(G&M)—8—5 Applies concepts of similarity to determine the **impact of scaling on the volume or surface area** of three-dimensional figures when linear dimensions are multiplied by a constant factor; to determine the length of sides of similar triangles, or to solve problems involving growth and rate.	
K9. Visualize solids and surfaces in three-dimensional space when given two-dimensional representations (e.g., nets, multiple views) and create two-dimensional representations for the surfaces of three-dimensional objects.	M(G&M)—10—10 Demonstrates conceptual understanding of spatial reasoning and visualization by sketching or using dynamic geometric software to generate three-dimensional objects from two-dimensional perspectives, or to generate two-dimensional perspectives from three- dimensional objects, or by solving related problems.	
	M(G&M)—7—10 Demonstrates conceptual understanding of spatial reasoning and visualization by sketching three-dimensional solids; and draws nets of rectangular and triangular prisms, cylinders, and pyramids and uses the nets as a technique for finding surface area.	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
K10. Represent geometric objects and figures algebraically using coordinates; use algebra to solve geometric problems:	M(G&M)——AM—9 Solves specific problems using analytic geometry (including in three dimensions) and circular trigonometry (e.g. find the equation of a circle inscribed in a triangle given the coordinates of the vertices; the distance between opposite vertices in a rectangular solid).	**These concepts though not inconsistent with ADP are not explicitly addressed in ADP.**
K10.1. Express the intuitive concept of the "slant" of a line in terms of the precise concept of slope, use the coordinates of two points on a line to define its slope, and use slope to express the parallelism and perpendicularity of lines.	M(G&M)—10—9 Solves problems on and off the coordinate plane involving distance, midpoint, **perpendicular and parallel lines, or slope.**	
K10.2. Describe a line by a linear equation.	M(F&A)—10—4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.	
K10.3. Find the distance between two points using their coordinates and the Pythagorean theorem.	M(G&M)—10—9 Solves problems on and off the coordinate plane involving **distance**, midpoint, perpendicular and parallel lines, or slope.	
K10.4. * Find an equation of a circle given its center and radius and, given an equation of a circle, find its center and radius.	M(G&M)—12—3 Knows the characterization of circles as loci of points in the plane satisfying certain distance requirements, and uses the distance formula to obtain equations for circles	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
Conic Sections	M(G&M)—AM—3 Explores and interprets the characteristics of conic sections graphically and algebraically. Understands how different planar slices of a double cone yield different conic sections. Knows the characterization of conic sections as loci of points in the plane satisfying certain distance requirements, and uses the distance formula to obtain equations for the conic sections.	**Conic Sections in general are not a benchmark in ADP. ADP does include circles K10.4, ellipses and hyperbolas J4.6 and parabolas J4.5.**
K11. Understand basic right-triangle trigonometry and apply it to solve problems:		
K11.1. Understand how similarity of right triangles allows the trigonometric functions sine, cosine and tangent to be defined as ratios of sides and be able to use these functions to solve problems.	M(G&M)—10—2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, circles, or **right triangle ratios (sine, cosine, tangent)** within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).	
	M(G&M)—12—5 Knows that similarity of right triangles allows the trigonometric functions to be defined as ratios of sides of triangles, and uses the ratios of the sides of special right triangles (30-60-90 and 45-45-90) to determine the sine, cosine and tangent (30,45, 60) and solve related problems.	**ADP includes this Benchmark for all. RI places this expectation at 11-12.**
K11.2. Apply the trigonometric functions sine, cosine and tangent to solve for an unknown length of a side of a right triangle, given one of the acute angles and the length of another side.	M(G&M)—10—2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, circles, or **right triangle ratios (sine, cosine, tangent)** within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
K11.3. Use the standard formula for the area of a triangle, $A = ½bh$, to explain the area formula, $A = ½ab\sin C$ where a and b are the lengths of two sides of a triangle and C is the measure of the included angle formed by these two sides, and use it to find the area of a triangle when given the lengths of two of its sides and the included angle.	M(G&M)—12—6 Applies trigonometric formulas (law of sines/cosines, A= 1/2 *ab* sinC) to find angles, lengths and areas of polygons.	**ADP includes this Benchmark for all. RI places this expectation at 11-12.**
K12. * Know how the trigonometric functions can be extended to periodic functions on the real line, derive basic formulas involving these functions, and use these functions and formulas to solve problems:		
K12.1. * Know that the trigonometric functions sine and cosine, and thus all trigonometric functions, can be extended to periodic functions on the real line by defining them as functions on the unit circle, that radian measure of an angle between 0 and 360 degrees is the arc length of the unit circle subtended by that central angle, and that by similarity, the arc length *s* of a circle of radius *r* subtended by a central angle of measure *t* radians is $s = rt$.	M(G&M)—AM—7 Understands why radian measure is useful and converts between radian measure of angles and degrees.	**ADP 12.1-ADP 12.3 will only be studied by students in the advanced level.**
	M(G&M)——AM—9 Solves specific problems using analytic geometry (including in three dimensions) and **circular trigonometry** (e.g. find the equation of a circle inscribed in a triangle given the coordinates of the vertices; the distance between opposite vertices in a rectangular solid).	
K12.2. * Know and use the basic identities, such as $\sin^2(x) + \cos^2(x) = 1$ and $\cos(\Pi/2-x) = \sin(x)$ and formulas for sine and cosine, such as addition and double angle formulas.	M(F&A)—AM—4 Solves equations and verifies identities involving trigonometric expressions.	
K12.3. * Graph sine, cosine and tangent as well as their reciprocals, secant, cosecant and	M(F&A)—AM—2 Recognizes properties of families of functions including logarithmic and	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
cotangent; identify key characteristics.	trigonometric, and graphs them.	
K12.4. * Know and use the law of cosines and the law of sines to find missing sides and angles of a triangle.	M(G&M)—12—6 Applies trigonometric formulas (law of sines/cosines, A= 1/2 *ab* sinC) to find angles, lengths and areas of polygons.	
L. Data Interpretation, Statistics and Probability - The high school graduate can:	**Data, Statistics, and Probability**	
L1. Explain and apply quantitative information:		
L1.1. Organize and display data using appropriate methods (including spreadsheets) to detect patterns and departures from patterns.	M(DSP)—10—1 **Interprets** a given representation (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts) to make observations, to answer questions, to **analyze** the data to formulate or justify conclusions, critique conclusions, make predictions, or to solve problems within mathematics or across disciplines or contexts (e.g. media, workplace, social and environmental situations).(IMPORTANT: Analyzes data consistent with concepts and skills in M(DSP)—10—2.)	
L1.2. Read and interpret tables, charts and graphs.		
	M(DSP)—10—3 Identifies or describes representations or elements of representations that best display a given set of data or situation, consistent with the representations required in M(DSP)—10—1.	
	M(DSP)—10—3 Organizes and displays one- and two-variable data using a variety of representations (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts). Analyzes the data to formulate or justify conclusions, make predictions, or to solve problems. Identifies representations that best display a given set of data.	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
L1.3. Compute and explain summary statistics for distributions of data including measures of center (mean, median) and spread (range, percentiles, variance, standard deviation).	M(DSP)—10—2 Analyzes patterns, trends, or distributions in data in a variety of contexts by determining, using, or analyzing measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, estimated line of best fit, regression line, or correlation (strong positive, strong negative, or no correlation) to solve problems; and solve problems involving conceptual understanding of the sample from which the statistics were developed.	
	M(DSP)—12—2 Calculates and analyzes measures of dispersion (standard deviation, variance, and percentiles).	**ADP includes this Benchmark for all. RI places this expectation at 11-12.**
L1.4. Compare data sets using graphs and summary statistics.		**Comparing data sets is not explicitly included in RI.**
L1.5. Create scatter plots, analyze patterns and describe relationships in paired data.	M(DSP)—10—3 Organizes and displays one- and two-variable data using a variety of representations (e.g., box-and-whisker plots, **scatter plots,** bar graphs, line graphs, circle graphs, histograms, frequency charts). Analyzes the data to formulate or justify conclusions, make predictions, or to solve problems. Identifies representations that best display a given set of data.	
	M(DSP)—10—2 Analyzes patterns, trends, or distributions in data in a variety of contexts by determining, using, or analyzing measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, **estimated line of best fit, regression line, or correlation (strong positive, strong negative, or no correlation)** to solve problems; and solve problems involving conceptual understanding of the sample from which the statistics were developed.	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
L1.6. Know the characteristics of the Gaussian normal distribution (bell-shaped curve).	M(DSP)—AM—2 Analyzes and interprets measures of dispersion (standard deviation, variance, and percentiles) and central tendency for normal distributions.	**ADP expects the characteristics of the Gaussian normal distribution for all. RI places this distribution in advanced mathematics.**
L2. Explain and critique alternative ways of presenting and using information:	M(DSP)—10—1 Interprets a given representation (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts) to make observations, to answer questions, to analyze the data to formulate or **justify conclusions, critique conclusions,** make predictions, or to solve problems within mathematics or across disciplines or contexts (e.g. **media, workplace, social and environmental situations)**.(IMPORTANT: Analyzes data consistent with concepts and skills in M(DSP)—10—2.)	**ADP L2 does not have parallel expectations with strong alignments in RI.**
L2.1. Evaluate reports based on data published in the media by considering the source of the data, the design of the study, and the way the data are analyzed and displayed.		
L2.2. Identify and explain misleading uses of data.		
L2.3. Recognize when arguments based on data confuse correlation with causation.		
L3. Explain the use of data and statistical thinking to draw inferences, make predictions and justify conclusions:		

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
L3.1. Explain the impact of sampling methods, bias and the phrasing of questions asked during data collection and the conclusions that can rightfully be made.	M(DSP)—10—2 Analyzes patterns, trends, or distributions in data in a variety of contexts by determining, using, or analyzing measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, estimated line of best fit, regression line, or correlation (strong positive, strong negative, or no correlation) to solve problems; and solve problems involving conceptual **understanding of the sample from which the statistics were developed.**	
L3.2. Design simple experiments or investigations to collect data to answer questions of interest.	M(DSP)—10—6 Designs an experiment in response to a teacher or student generated question or hypothesis. Designs an effective methodology to answer the questions (e.g., survey, observation, research, experimentation). **Uses an appropriate sampling techniques to collect the data necessary to answer the question (e.g., random sample, stratified random sample)**. Collects, organizes, and appropriately displays the data. Analyzes the data to draw conclusions about the questions or hypothesis being tested while considering the limitations of the data that could affect interpretations. Finally when appropriate makes predictions, asks new questions, or makes connections to real-world situations. (IMPORTANT: Analyzes data consistent with concepts and skills in M(DSP)—10—2.)	
L3.3. Explain the differences between randomized experiments and observational studies.		**This expectation is not included in RI.**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
L3.4. Construct a scatter plot of a set of paired data, and if it demonstrates a linear trend, use a graphing calculator to find the regression line that best fits this data; recognize that the correlation coefficient measures goodness of fit and explain when it is appropriate to use the regression line to make predictions	M(DSP)—AM—3 Uses technology to explore the method of least squares and median-median for linear regression	**Linear regression is expected for all students in ADP.** **RI designates this expectation as advanced.** **RI includes quadratic and exponential regression.**
	M(DSP)—12—3 Find or estimate linear, quadratic, and exponential regression functions by organizing and displaying data with or without using technology.	
	M(DSP)—12—1 Given a regression function (linear, quadratic, and exponential), analyze the data to make inferences and to formulate, justify, and critique conclusions.	
L4. Explain and apply probability concepts and calculate simple probabilities:		
L4.1. Explain how probability quantifies the likelihood that an event occurs in terms of numbers.	M(DSP)—5—5 For a probability event in which the sample space may or may not contain equally likely outcomes, determines the experimental or theoretical probability of an event and expresses the result as a fraction; and predicts the likelihood of an event as a fraction and tests the prediction through experiments; and determines if a game is fair.	
	M(DSP)—3—5 For a probability event in which the sample space may or may not contain equally likely outcomes, determines the likelihood of the occurrence of an event (using “more likely”, “less likely”, or “equally likely”); and predicts the likelihood of an event using “more likely,” “less likely,” “equally likely,” certain, or impossible and tests the prediction through experiments; and determines if a game is fair.	
L4.2. Explain how the relative frequency of a specified outcome of an event can be used to estimate the probability of the outcome.		**Not specifically mentioned in RI**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
L4.3. Explain how the law of large numbers can be applied in simple examples.		**Not specifically mentioned in RI**
L4.4. Apply probability concepts such as conditional probability and independent events to calculate simple probabilities.	M(DSP)—12—5 Designs and critiques experimental models (with or without technology) to approximate desired probabilities. Solves probability problems by applying concepts of counting, random variables, independence/dependence of events, and conditional probability.	**Conditional probability is included for all students in ADP. RI includes it in 11-12.**
	M(DSP)—10—4 Uses counting techniques to solve contextualized problems involving combinations or permutations (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or others).	
	M(DSP)—10—5 Solves problems involving experimental or theoretical probability.	
	M(DSP)—12—4 Solves problems involving combinations and permutations using a variety of strategies including nCr, nPr, or n!.Finds unions, intersections, and complements of sets.	**All extensions of ADP**
L4.5. Apply probability concepts to practical situations to make informed decisions.	M(DSP)—10—4 Uses counting techniques to solve contextualized problems involving combinations or permutations (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or others).	
	M(DSP)—12—5 Designs and critiques experimental models (with or without technology) to approximate desired probabilities. Solves probability problems by applying concepts of counting, random variables, independence/dependence of events, and conditional probability.	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
Mathematical Reasoning: Woven throughout the four domains of mathematics — Number Sense and Numerical Operations; Algebra; Geometry; and Data Interpretation, Statistics and Probability — are the following mathematical reasoning skills:		
MR1. Using inductive and deductive reasoning to arrive at valid conclusions.	M(N&O)—AM—8 Knows and uses the principle of mathematical induction	**ADP includes this Benchmark for all. RI places this expectation in advanced mathematics.**
MR2. Using multiple representations (literal, symbolic, graphic) to represent problems and solutions.	M(F&A)—10—2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or w**orks between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).**	
MR3. Understanding the role of definitions, proofs and counterexamples in mathematical reasoning; constructing simple proofs.	M(G&M)—AM—2 Extends and deepens knowledge and usage of proofs and proof techniques.	
	M(G&M)—10—2 Creates formal proofs of propositions (e.g. angles, lines, circles, distance, midpoint and polygons including triangle ratios).	
	M(G&M)—10—2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).	

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
	M(G&M)—12—2 Creates formal proofs of propositions (e.g. angles, lines, circles, distance, midpoint and polygons including triangle congruence and similarity).	
MR4. Using the special symbols of mathematics correctly and precisely.		**This process standard is not specifically mentioned in RI.**
MR5. Recognizing when an estimate or approximation is more appropriate than an exact answer and understanding the limits on precision of approximations.	M(N&O)—12—4 Solves problems involving scientific notation or **uses significant digits to assess the precision of an answer.** Interprets rational exponents and their relation to radicals. Computes by hand in simple cases (e.g. $4^{3/2}$), and using a calculator when appropriate. Interprets numbers given in scientific notation and carries out computations of them with and without a calculator.	
	M(N&O)—10—7 **Makes appropriate estimates in a given situation by determining the level of accuracy needed and analyzing the accuracy of results**. Estimates tips, discounts, and tax and estimates the value of a non-perfect square root or cube root.	
	M(N&O)—12—7 Makes appropriate estimates in a given situation by determining the level of accuracy needed and analyzing the accuracy of results. (IMPORTANT: The intent of this GSE is to embed estimation throughout the instructional program, not to teach it as a separate unit.)	
	M(G&M)—10—7 Applies informal concepts of successive approximation, upper and lower bounds, and limits in measurement situations (e.g., use successive approximation to find the area of a pond); uses measurement conversion strategies (e.g., unit/dimensional analysis).	
MR6. Distinguishing relevant from irrelevant information, identifying missing information and either finding what is needed or making appropriate estimates.		**This process standard is not specifically mentioned in RI.**

ADP Benchmarks: Mathematics	Rhode Island GSEs 9-10, 11-12 and Advanced Mathematics	COMMENTARY
MR7. Recognizing and using the process of mathematical modeling: recognizing and clarifying mathematical structures that are embedded in other contexts, formulating a problem in mathematical terms, using mathematical strategies to reach a solution, and interpreting the solution in the context of the original problem.	M(F&A)—12—2 Applies knowledge of functions to interpret and understand situations, design mathematical models, and solve problems in mathematics as well as in natural and social sciences	**ADP includes this Benchmark for all. RI places this expectation in 11-12.**
MR8. When solving problems, thinking ahead about strategy, testing ideas with special cases, trying different approaches, checking for errors and reasonableness of solutions as a regular part of routine work, and devising independent ways to verify results.		**This process standard is not specifically mentioned in RI.**
MR9. Shifting regularly between the specific and the general, using examples to understand general ideas, and extending specific results to more general cases to gain insight.	M(N&O)—AM—8 Knows and uses the principle of mathematical induction	**ADP includes this Benchmark for all. RI places this expectation in advanced mathematics.**

APPENDIX B: BIOGRAPHIES

ACHIEVE STAFF

KAYE FORGIONE, SENIOR ASSOCIATE, MATHEMATICS, ACHIEVE

Kaye Forgione joined Achieve as senior associate for mathematics in March 2001 where she leads Achieve's Standards and Benchmarking Initiatives involving mathematics. Prior to joining Achieve, Kaye served as assistant director of the Systemic Research Collaborative for Mathematics, Science and Technology Education (SYRCE), a project at the University of Texas at Austin funded by the National Science Foundation. Her responsibilities at the University of Texas also included management and design responsibilities for UTeach, a collaborative project of the College of Education and the College of Natural Sciences to train and support the next generation of mathematics and science teachers in Texas. Before her work at the University of Texas, Kaye was director of academic standards programs at the Council for Basic Education, a nonprofit education organization located in Washington, DC. Prior to joining the Council for Basic Education in 1997, Kaye worked in the K–12 arena in a variety of roles, including several leadership positions with the Delaware Department of Education. Kaye began her education career as a high school mathematics teacher. She taught mathematics at the secondary and college levels as part of adult continuing education programs. Kaye received a bachelor's degree in mathematics and education from the University of Delaware, a master's degree in systems management from the University of Southern California, and a doctorate in educational leadership from the University of Delaware.

LAURA MCGIFFERT SLOVER, DIRECTOR, CONTENT & POLICY RESEARCH, ACHIEVE

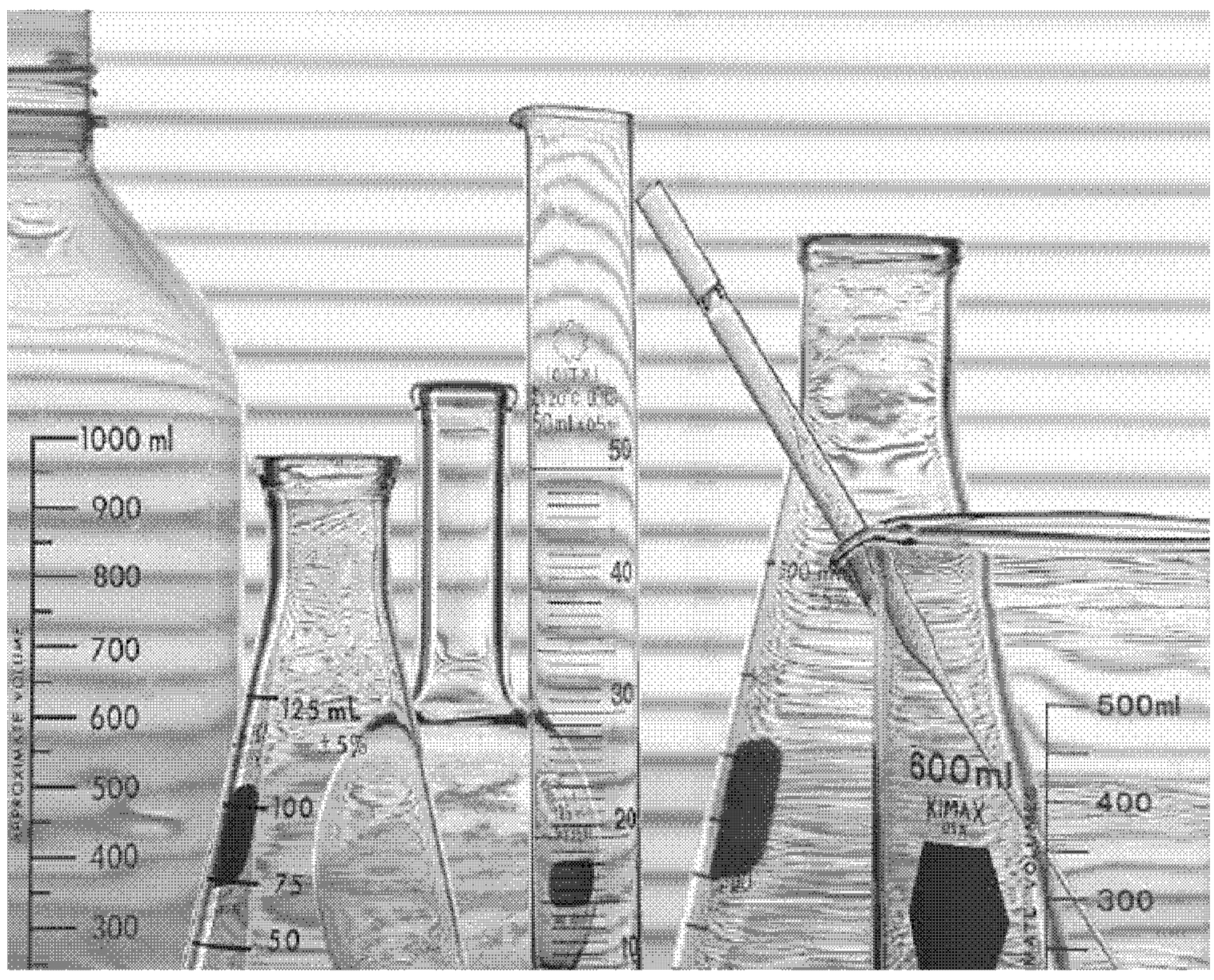
Laura McGiffert Slover is director of Content & Policy Research at Achieve, where she has senior responsibility for overseeing a number of Achieve's major initiatives. She supervises Achieve's Benchmarking Initiative, leads its work with states on building mathematics capacity, and oversees the organization's research agenda. Laura has extensive experience reviewing academic standards and education policies in the United States and abroad, and she has written a number of reports and articles on the topic. Before joining Achieve in 1998, Laura was a high school English teacher in Eagle County, Colorado, where she was involved in the district's early efforts to develop standards and benchmark assessments. She also taught writing and composition at Colorado Mountain College. A native Washingtonian, Laura earned a bachelor's degree in English and American Literature from Harvard University; a master's in Education Curriculum and Instruction from the University of Colorado at Boulder; and a master's in Education Policy from Georgetown University. She is a mentor and a member of the Board of Directors of Project Northstar, an organization that provides mentoring and tutoring to homeless and at-risk students in the District of Columbia.

CONTENT EXPERTS IN MATHEMATICS

MARY LYNN RAITH

Mary Lynn Raith received her B.S in mathematics from Indiana University at Pittsburgh and her M.Ed. in mathematics education from the University of Pittsburgh. She is recently retired from the position of Mathematics Specialist in the Division of Instructional Support of the Pittsburgh Public Schools. As such, her responsibilities included leadership roles in curriculum development, textbook selection, design of alternative assessments, in-service program design and implementation, and coordination of mathematics programs across levels and schools. Ms. Raith was also the Co-Director of the Pittsburgh Reform in Mathematics Education project (PRIME), a K-12 professional development system. She has also been involved with a number of national projects, including the development of both the New Standards Reference Examination and the Portfolio project for the middle grades, the Assessment Communities of Teachers project (ACT), and the Alternative Assessment in Mathematics project (A^2IM). She has also worked extensively with both NCTM and NCEE on its America's Choice school design and has presented at numerous national conferences.

K-12 Science Literacy New Hampshire Curriculum Framework



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The information on the following pages is also available on our website at www.ed.state.nh.us.

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Philosophy of the Frameworks

How do the new frameworks differ from the old ones?

Science should not be approached as a collection of isolated abilities and bits of information, but as a rich fabric of mutually supported ideas and skills that must develop overtime. From primary school to high school what students learn should build on what they learned before, makes sense in terms of what else they are learning, and prepare them for what they will learn next[1].This framework looks at how kids perceive and interact with the world.

One of the major changes from the earlier framework can be seen the structure of the new frameworks reflecting the developmental stages of children. To help districts develop curricula for all grade levels, the new Frameworks for Science Literacy includes Grade Span Expectations (GSEs) that break down the content into specific grade spans (K-2, 3-4, 5-6, 7-8, 9-12). Each span lists proficiencies which indicate what all students should know and be able to do by the end of that grade span.

The old framework had six strands: 1) Inquiry; 2) Science, Technology and Society; 3) Life Science; 4) Earth Space Science; 5) Physical Science; and 6) Unifying Themes. Many district curricula had little to no emphasis on strands 1, 2, and 6. In the new edition, Science is divided into three content domains (Earth Space Science, Life Science, and Physical Science) and one Science Process Skills domain. Ideas and objectives which correspond to the 1995 Science Framework strands 1, 2, and 6 have been rolled into each of the new strands.

Science Process Skills (SPS) is a new addition to the Frameworks. It reflects the need to make sure that in the early years students develop specific skill sets that will help them be successful in future science experiences. The last section of the skills strand, SPS4, looks at goals for Information and Computer Technology standards in Science. This was included to help districts meet the needs of all students and to meet the new ICT requirements for K-8 and 9-12 digital portfolios.

Everything in the old framework could be the subject of the state assessment in science. In the new framework, only specific proficiencies will be part of the upcoming NECAP Science Assessment. These "NECAP Science Targets" are clearly marked in bold boxes throughout the GSEs for each grade span. They are also referenced in the Science Process Skills documents as they connect to Inquiry and the Unifying themes of science. The other proficiencies should become part of each districts local science assessment system.

[1] *Atlas of Science Literacy*, American Association for the Advancement of Science, 2001, page 3

New Hampshire Curriculum Framework Science

Why include Design Technology in Science?

Science comprises our knowledge about the natural world and the processes by which that knowledge is acquired, synthesized, evaluated, and applied. Therefore, science education must emphasize hands-on exploration and direct experience with the natural world. Students should be engaged in the observation of these phenomena whenever possible. Science is, above all, an inquiry activity that seeks answers to questions by collecting and analyzing data in an attempt to offer a rational explanation of naturally-occurring events. The knowledge that results from scientific problem solving is most useful when it is organized into concepts, generalizations, and unifying principles, which lead to further investigation of objects and events in the environment.

Science and technology are practiced in the context of human culture, and therefore, dynamic interactions occur among science, technology, and society. Each component-- inquiry and problem solving, and how these relate to each other and to society-- is critically important to instruction at every grade level.

Technology concerns the human-made world. Technology is much older than science, and has its roots in the very early use of tools by our human-like ancestors. Enabling our children to understand how humans modify the natural world to solve problems and to meet human needs and desires is equally as important as teaching them how to inquire about the natural world. And of course, these two endeavors are related. The reason for including technology along with science in the curriculum is stated in the National Science Education Standards: "Although these are science education standards, the relationship between science and technology is so close that any presentation of science without developing an understanding of technology would portray an inaccurate picture of science." [2] The National Standards goes on to define technology and its relationship to science as follows:

> "As used in the Standards, the central distinguishing characteristic between science and technology is a difference in goal: The goal of science is to understand the natural world, and the goal of technology is to make modifications in the world to meet human needs. Technology as design is included in the Standards as parallel to science as inquiry." [3]

In order to broaden our students' career opportunities and awareness it is also important that they learn distinction between the occupations of scientist and engineer: Scientists propose explanations for questions about the natural world, and engineers propose solutions relating to human problems, needs, and aspirations. Scientists and engineers frequently work together in teams, along with people from other fields, to tackle the essential issues facing our society.

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[2] *National Science Education Standards*, National Research Council, Washington, D.C.: National Academy Press, 1996, page 190.
[3] *Ibid*. page 24.

K-12 Broad Goals of Science Education

1. Students will use inquiry strategies to investigate and understand the natural world.

2. Students will demonstrate an understanding of key concepts and principles central to the biological, physical, and earth sciences, and engineering, while recognizing the interrelationship of all the sciences.

3. Students will demonstrate an understanding of the basic laws which govern and explain phenomena observed in the natural world

4. Students will demonstrate an understanding of, and be able to practice, the basic processes which scientists use to obtain and continually revise knowledge about the natural world.

5. Students will perceive that scientific and technological knowledge is the result of the cumulative efforts of people, past and present, who have attempted to explain the world through an objective, peer-tested, rational approach to understanding natural phenomena and occurrences.

6. Students will display a sense of curiosity and wonder about the natural world, and demonstrate an increasing awareness of the interdependence between all living things and the environment.

7. Students will demonstrate their abilities to identify human needs and concerns and to engage in problem-solving processes to define the problem, research and generate solutions, and develop simulations and prototypes to test their ideas before implementation.

8. Students will be able to apply rational, creative-thinking, and investigative skills and use scientific and technical knowledge in their roles as citizens, workers, family members, and consumers in an increasingly technological society.

9. Students will use oral and written communication, mathematical representation, and physical and conceptual models to describe and explain scientific concepts and ideas, and will be able to apply scientific and technical knowledge.

10. Students will know and employ safe practices and techniques in the laboratory, in field work or any other scientific investigation, and when using scientific or technological materials at home or work.

The History of the New Hampshire Science Frameworks

The state of New Hampshire adopted the NH Science Frameworks in February 1995. These frameworks, based on the draft *National Science Education Standards*[4] and *Benchmarks for Science Literacy*[5], provided guidance for what we would assess in our state science assessment. We tested all students in NH in science at the ends of grades 6 and 10 to determine how well districts were developing science curricula which would improve what all students should know and be able to do in science. Due to budgetary constraints, NH suspended the Science Assessment in school year 2003-2004.

Realizing that NCLB required a science assessment by 2008, in March 2004 we began a thorough review of the NH Science Frameworks and relative research and literature. The goal of this process was to revise our science frameworks to reflect changes in our understanding of how children learn science in the classroom and to guide the development of a rigorous science assessment that will drive change in instructional practice.

As we began our internal review, we joined with Rhode Island and Vermont to develop guidance for a common assessment that would look at specific content covered in all three states frameworks (standards). We spent a great deal of time analyzing the research about how students learn and looked at how to focus our assessment on those things that would improve classroom practice and expose more students, across all three states, to challenging science curricula. The NECAP Science Assessment will be given at the end of Grades 4, 8, and 11 and will consist of three test sessions (one session will be performance).

More than one hundred and fifty NH educators and community members were involved with the revision process. The revised frameworks, now referred to as the *New Hampshire Frameworks for Science Literacy K-12,* were approved by the New Hampshire State Board of Education in June 2006.

The New Hampshire Frameworks for Science Literacy K-12 includes Grade Span Expectations (GSEs) which clearly delineate expected content for 2 or 3 year grade spans. NECAP Science Assessment Targets are highlighted but they are not the only things included in the framework. In order to provide guidance but allow for some local flexibility, grade spans include: K to 4 (K-2, 3-4); 5 to 8 (5-6, 7-8); and 9 to 12 (9-11 basic, 11 -12 advanced level).

[4] *National Science Education Standards*, © 1995, National Academy of Science
[5] *Benchmarks for Science Literacy*, © 1993, American Association for the Advancement of Science

Science in the Grade Spans

ELEMENTARY – GRADES K to 4
USING SCIENCE TO EXPLORE THE WORLD

Children in grades K-4 observe, describe, and interact with the world around them. At this level effective learning environments provide opportunities for developing awareness of and involvement with the world around them through:

- Playing with, exploring, collecting, handling, sorting, and classifying objects.
- Using graphic organizers and other strategies to motivate, organize, and identify the questions children ask about the world. [*Test Guess*]
- Using tools (for example: non standard measures, rulers, and magnifiers) to enhance observations, collect, represent and interpret data.
- Organizing and manipulating data in multiple ways, which may include tools of technology, e.g., calculators, and computers.
- Communicating (through reading, writing, speaking, listening, movement and viewing) to describe their observations of the world.

In summary, the K-4 classroom should provide students opportunities to engage with concrete manipulative activities that will lead children to construct the desired concepts through investigation and analysis of experience. At this level in particular, science should be integrated with other curricular areas (e.g., reading, writing, math, social studies, technology, art, music, or physical education).

MIDDLE LEVEL SCIENCE – GRADES 5 to 8
STUDENTS IDENTIFY AND SHAPE THEIR UNDERSTANDING OF THE WORLD

Children in grades 5-8 will build on their K-4 measurement and observation skills to construct new understandings and validate scientific theories and explanations. At this level, effective learning environments provide opportunities for collaborative inquiry in the field, classroom, and laboratory. These students need content knowledge as well as frequent and varied practice in experimentation and inquiry. Since students in the middle years tend to center on evidence which supports their current beliefs, they need to be able to examine their beliefs and concepts in a safe environment and be provided with scientific theories as alternatives. At this level effective learning environments provide opportunities for students to construct new understandings and validate scientific theories and explanations through:

- Providing frequent opportunities for students to engage in full and partial Inquiries
- Providing students with background content and theories to guide their design of observations and investigations.
- Helping students shape and modify their background knowledge through experiments and observations. Students should develop their abilities in systematic observation, making accurate measurements, and identifying and controlling variables.
- Since students in the middle years tend to center on evidence which supports their current beliefs, teachers need to challenge current beliefs and concepts that students hold and provide scientific theories as alternatives.

- Giving ample opportunity for students to establish and refine methods of experimentation, data collection and reporting.
- Encouraging students to develop skills to present their understandings using the language of science to communicate scientific explanations and ideas. Students should receive constructive criticism and questions and should be able to provide the same for fellow student groups and individuals.
- The use of writing, labeling drawings, completing concept maps, developing spreadsheets, and designing computer images and representations should be part of the middle school science experience.
- Use literature and technology, and graphic organizers to support different explanations and predictions

Science is a way of knowing and understanding the world around us. Because science plays a key role in developing an informed citizen, it is important that all middle school children have experience in the enterprise and content of science.

HIGH SCHOOL – GRADES 9 to 12
REFINING, ENRICHING, AND APPLYING KEY SCIENCE CONCEPTS

It is important that students develop a solid understanding of how specific domains of science operate. Students in high school should learn science in courses with clear content goals and expectations. Understanding the connections of one science domain to another is important but research indicates students need concentrated knowledge and skills in specific science domains.

Courses become more content-intensive without losing the field, experiential, and laboratory components. Although content may take on a more prominent role, instruction should proceed as much as possible on an inquiry basis. Alternative paths may exist to serve increasingly divergent student needs.

- Use formal controlled experimentation to gather data about the natural world. Limit scope, isolate variables, prove or disprove a limited hypothesis.
- Generate their own questions, develop hypotheses, and design or modify experiments to test those hypotheses.
- Manipulate scientific apparatus and use advanced technology to gather data (e.g., air tracks, electrophoresis, lasers, titration glassware.)
- Analyze collected data to validate or refute a hypothesis.
- Articulate clearly and defend a scientific viewpoint.

The importance of linking science content to student lives can not be overemphasized. The ability of students to link new content to their personal science knowledge is critical for students to understand and remember concepts. Collaboration in science as a critical process will be fostered in the classroom. In addition, an increased use of quantitative reasoning should occur throughout high school.

What is Science?

The following information should be of help to teachers, parents, and students. One of the greatest problems in science education centers on this lack of understanding by the general public.

Science teachers teach about science concepts in their classrooms, but rarely do they take time to help students understand what science is and what it is not. The New Hampshire Framework for Science Literacy contains information about what science is and it is intended that teachers will take time to repeatedly help students understand the nature of science. The business of science is to develop theories based on natural explanations about how the natural world works.

Students need to realize how the scientific processes are used to acquire new knowledge. The best way for them to do this is to spend time using scientific inquiry, experimentation, discussing data, drawing inferences based on data, and writing conclusions based on evidence. These processes should be practiced in every science course at every science level. It is also desirable that students be aware of past scientific works that formed the basis for the development of present theories, and the fact that scientific theories are built on the sequential work of many scientists over time.

The Nature of Science

(Adapted from Arkansas Science Framework 1999)

People have many ways of knowing about their world including scientific knowledge, societal knowledge, religious knowledge and cultural knowledge. Science differs from these other ways of knowing in important ways (see: Comparison of Ways of Knowing).

Science is a system of exploring the natural universe through data collected by observation, experimentation and peer verification. This data must be reviewed by many scientists before it is accepted as valid evidence. Based on evidence from collected data, theories are advanced to explain and account for observations. Science must limit itself to explanation about the natural world.

The success and credibility of science are anchored in the willingness of scientists to:

1. Expose their ideas and results to independent testing and replication by other scientists. This requires the complete and open exchange of data, procedures and materials.
2. Abandon or modify accepted conclusions when confronted with more complete or reliable experimental evidence.

Science definitions for the following terms are specific:

Fact: In science, an observation that has been repeatedly confirmed
Hypothesis: A testable statement or prediction about the natural world which can be supported by experiment or observation
Law: A descriptive generalization or pattern about how some aspect of the natural world behaves under stated circumstances; often stated in a form of a mathematical equation
Theory: In science, a well-substantiated explanation of how the natural world works that explains facts, laws, inferences, and tested hypotheses

Before a theory can be included in the system of science, it must meet all of the following criteria:

1. Be able to explain what has been observed;
2. Be able to predict what has not yet been observed; and
3. Be able to be tested by further experimentation and to be modified as required by the acquisition of new data.

People often use the word *theory* to mean a hunch or a guess; but as these criteria show, that is not correct. A scientific theory is held with a high degree of confidence and is supported by

enough evidence to make its abandonment unlikely. As new evidence is found, a theory may be modified but only with compelling evidence, verification and peer review. The business of science is to build theories that explain how the natural world works and predict how it might work in the future.

Science is not a matter of belief; rather, it is a matter of conclusive evidence that can be subjected to the test of observation, reasoning and peer review. The open competition of ideas in published papers is a major part of scientific work.

The goal of science is an understanding of the general principles underlying the functioning of the universe. Such understanding is achieved by means of four components:

1. Observation of specific facts or phenomena
2. Formulation of generalizations about such phenomena
3. Production of causal hypotheses relating the phenomena
4. Test of the causal hypotheses by means of further observation and experimentation

The science is based on two fundamental assumptions:

1. A naturalistic explanation is sufficient to account for the functioning of the universe.
2. The universe can be understood using logic and rational thinking.

Two types of evidence are accepted by practicing scientists:

1. Confirmation of hypothesis by data strengthens their validity.
2. Repeated inconsistency of data with a hypothesis eventually leads to the rejection of the hypothesis.

Science can only deal with events or things that can be measured, observed or detected. It cannot be used to investigate all questions. There are beliefs that cannot be proved or disproved by their very nature (e.g., the meaning of life or the existence of supernatural powers and beings). In other cases, a scientific approach that may be valid is likely to be rejected as irrelevant by people who hold certain beliefs (e.g., astrology, fortune-telling, and superstition). Scientists do not have the means to settle issues concerning good and evil. Answers to these questions must be found in religion, philosophy, cultural ideals and other systems of beliefs.

Scientific Theories

Science theories are not hunches or guesses, but all have been subjected repeated testing and verification. All scientific theories are subject to change as new evidence comes to be accepted by all scientists. Students should develop an understanding of the basic theories that are foundational in science and which guide scientific understanding. A few current scientific theories are listed below:

Atomic Theory: This theory states that the atom is the smallest unit of matter. The atom is composted of the nucleus in the middle of the atom that is composed of neutrons and protons (both of these may break down into smaller particles). The neutrons have no charge. The protons have a positive charge. Surround the nucleus are electrons that swirl around the nucleus in a large region, rather than orbiting in a fixed pattern (electron cloud). The electrons have a negative charge. Many modern scientists have contributed to our current view of the atom in which the electrons swirl around the nucleus in a large region (electron cloud), rather than orbiting in a fixed pattern. Plus modern quantum theory shows how atomic particles such as electrons may also be seen as having wavelike properties (see below).

Big Bang Theory: Big bang theory assumes that the universe began from a singular state of infinite density and expanding from an explosive moment of creation. The theory was further developed in the 1940s by George Gamow and R. A. Alpher. Fred Hoyle coined the term Big Bang. The Big Bang Theory is the dominant scientific theory about the origin of the universe. According to the big bang, the universe was created sometime between 10 billion and 20 billion years ago from a cosmic explosion that hurled matter and in all directions.

Gravity Theory: Gravitation, or gravity, is a force that attracts all objects in the universe. The most familiar of the four fundamental interactions of matter, gravitation has several characteristics that distinguish it from the other interactions: (1) It is universal; (2) It is always attractive; (3) It is a long-range interaction; and (4) It is a long-range attractive force affecting all matter.

Evolution Theory: Evolution theory says that all living things are related to one another through common ancestry from earlier forms that differed from the present forms. Exactly how evolution occurs is still a matter of debate, but that it occurs is a scientific fact. Biologists agree that all living things arose through a long history of changes shaped by physical and chemical processes that are still taking place. According to the theory, variability among individuals in a population of sexually reproducing organisms is produced by mutation and genetic recombination. The resulting genetic variability is subject to natural selection in the environment.

Cell Theory: The cell theory of life states: (1) All living material is made up of cells; (2) All cells are derived from previously existing cells; most cells arise by cell division, but in sexual organisms they may be formed by the fusion of sperm and egg; (3) A cell is the most elementary unit of life; (4) Every cell is bounded by a plasma membrane, an extremely thin skin separating it from the environment and from other cells; (5) All cells have strong biochemical similarities; and (6) Most cells are small, about 0.001 cm (0.0004 in) in length; for example, the smallest cells of

the microorganism mycoplasma are 0.3 micrometers in size, whereas some giant algae cells may be several centimeters long.

The Germ Theory of Disease: French bacteriologist Louis Pasteur is considered the founder of microbiology. Pasteur argued that infectious diseases were caused by germs. The germ theory has affected our views on infectious disease, surgery, hospital management, agriculture, and industry.

Relativity Theories: Albert Einstein's theory of special relativity, published in 1905, revealed that energy and matter are different manifestations of the same phenomenon and can be transformed into each other in terms of the relationship $E = mc^2$. Einstein's theory of general relativity, published in 1917, provided a powerful new way to view gravity as a warping of the four-dimensional space-time continuum by the presence of matter. If space-time is imagined as a rubber sheet, then massive objects such as stars and galaxies create deformations in space-time, just as a bowling ball sitting on a mattress creates a dent into which nearby smaller objects fall. Thus the shape of space-time determines the behavior of matter/energy. At the same time, the presence of matter/energy determines the shape of space-time.

Plate Tectonics Theory: Plate tectonics is an all-embracing theory that the Earth is divided into a number of rigid plates floating on a viscous underlayer in the mantle. Alfred L. Wegener was the first to propose in 1912 that the continents were at one time connected and had drifted apart. In 1960 when H. H. Hess suggested that new ocean floor was created at the mid-oceanic ridges and that the ocean evolved by seafloor spreading.

Quantum Theory: This theory that says that energy exists in tiny discrete units called quanta. Just as earlier theory showed how light, generally seen as a wave motion, could also in some ways be seen as composed of discrete particles (photons), quantum theory shows how atomic particles such as electrons may also be seen as having wavelike properties. Quantum theory is the basis of particle physics, modern theoretical chemistry, and the solid-state physics that describes the behavior of the silicon chips used in computers. Quantum theory and the theory of relativity together form the theoretical basis of modern physics. Later work by scientists elaborated the theory into what is called quantum mechanics (or wave mechanics).

Unified Field Theory: This theory proposes to unify the four known interactions, or forces– the strong, electromagnetic, weak, and gravitational forces– by a simple set of general laws. These four distinct forces control all the observed interactions in matter: gravitation, electromagnetism, the strong force (force that holds atomic nuclei together), and the weak force (force present in some nuclear processes).

Comparison of Ways of Knowing

People have several ways that they know about their world. The chart below lists some of the ways of knowing. One way of knowing is no more valid that another. However, as you read the chart please note that science is a way of knowing that requires the use of certain rules and methods that differs from the other means of knowing. Scientific knowledge is limited to the natural world. The other ways of knowing do not have these limitations. (Adapted from the Arkansas Science Teachers Association website, http://users.aristotle.net/~asta/science.htm)

Religious Knowledge	Philosophic Knowledge	Cultural Knowledge	Scientific Knowledge
Seeks answers to any question that can be posed including answers to the ultimate questions (e.g., What is my purpose? What is the meaning of life? Is there a supreme being?).	Seeks answers to any question that can be posed including answers to the ultimate (e.g., What is my purpose? What is the meaning of life? Is there a supreme being?).	Seeks answers to any question that can be posed including answers to the ultimate questions (e.g., What is my purpose? What is the meaning of life?), but generally relates to how people treat one another.	Can only seek answers about the natural world but cannot answer ultimate questions (e.g., Is there a god? What is the meaning of life? What is my purpose?).
Seeks predictions on any event based on faith and belief.	Seeks predictions on any event based on point of view.	Seeks predictions on any event based on belief and cultural history.	Seeks predictions about future natural events based on observational evidence and testing.
The rules may vary among the different religions.	The rules may vary among the different philosophic views.	The rules may vary among the different cultures.	Has a set of rules that must be followed in order to be called science.
Explanations are based on beliefs and faith and seek to understand and follow an ultimate purpose.	Explanations are based on logic or viewpoint and seek to understand and follow an ultimate purpose and may undergo some type of testing.	Explanations are based on beliefs and seek to understand and follow an ultimate purpose.	Explanations are based on observation, evidence, and testing.
Explanations can include supernatural forces.	Explanations can include supernatural forces and viewpoints.	Explanations can include supernatural forces and other historical viewpoints.	Explanations cannot include supernatural forces.
Hypotheses need not be part of the religion, nor do hypotheses have to be tested nor proved or disproved.	Hypotheses may be a part of the philosophic view and hypotheses may or may not have to be tested and proved or disproved.	Hypotheses need not be part of the cultural view, nor do hypotheses have to be tested nor proven.	The hypothesis used in tests must be able to be disproved.
Is a belief system and seeks truths.	Is a point of view and seeks truths.	May be a belief system rooted in historical views and seeks truths.	Is not a belief system nor seeks truths.
Knowledge may not change greatly over time, but may be swayed by culture.	Knowledge may not change greatly over time and may be influenced by culture.	Knowledge may or may not change slowly over time.	Knowledge may change as new data (evidence) arises.
Accepted knowledge does not need peer review or verification.	Accepted knowledge may seek peer review or verification, but conclusions may differ among individuals.	Accepted knowledge may seek review or verification, but conclusions may differ among individuals.	All knowledge must have peer review and verification.

New Hampshire Curriculum Framework Science

How to Read the Science GSEs

The numbering system for the NH Science GSEs is made up of the following information.
Example: **S:ESS2:11:1.1**

Content Area ➔ *(Science)*
Domain ➔ *(Earth Space)*
Strand ➔ *(ESS2)*
Grade level ➔ *(by end of 11)*
Stem ➔ *(Earth, Sun, and Moon)*
Expectation➔ *(Explain how ...)*

Strand– This is the Enduring Knowledge Statement for this section of the GSE. Strands will be two or three letters and one number. The same strands are used across grade levels.
Example: ESS2

Stem– This is an organizing topic for content and skills. The same stems are used across all grade levels.
Example: 2. Energy

Expectations– These are listed in the columns by grade level. All expectations should be the foundation of your local assessment system. Each expectation has a unique number. The order is not specific.
Example:
S:ESS2:11:2.1 Identify the Earth's major external source of energy as solar energy.

New Hampshire State Curriculum Framework

Earth Space Science		
ESS2– The Earth is part of a solar system, made up of distinct parts, which have		
	9-11	
1. EARTH, SUN, AND MOON	S:ESS2:11:1.1 Explain how the Earth, Moon and Sun were formed.	S:ES fusic struc
2. ENERGY	S:ESS2:11:2.1 Identify the Earth's major external source of energy as solar energy. S:ESS2:11:2.2 Explain how the inclination of incoming solar radiation can impact the amount of energy Earth receives on any given surface area. **S:ESS2:11:2.3 Explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading). [ESS1(9-11)SAE+POC-3]**	Non
3. SOLAR SYSTEM	S:ESS2:11:3.1 Explain how gravitational force influenced the formations of the planets and their moons; and describe how these objects move in patterns under its continued influence. S:ESS2:11:3.2 Explain how the Solar System formed from a giant cloud of gas and debris about 5 billion years ago.	Non
4. VIEW FROM EARTH	*None at this grade span.*	Non

Domain (Science Skills, Earth Space, Life, or Physical)
Example: Earth Space Science

Grade Level– the highest grade in the column.
Example: 11

NECAP Science Assessment Targets– These are indicated by a bold box around the expectation. Each Assessment target will be assessed each year.
Example:
S:ESS2:11:2.3 will be assessed on the NECAP Science Assessment.

Reading the NECAP ASSESSMENT TARGET CODE– Found below the text of the Assessment Target is a unique code that identifies the enduring knowledge statement, the grade levels, and the Big Ideas (Unifying Themes) that the content will be approached from. The last number just is the number in a sequence.
Example: [ESS1(9-**11**)SAE+POC-**3**]
ESS1 – grade 11 – SAE (Systems and Energy) POC (Patterns of Change) – 3 (third item on the NECAP list)

New Hampshire Curriculum Framework Science

Science Process Skills Overview

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs	Page K-4	Page 5-8	Page 9-12
SPS1– Scientific Inquiry and Critical Thinking Skills	1. Making observations and asking questions	**18**	**26**	**36**
	2. Designing scientific investigations	**18**	**27**	**36**
	3. Conducting scientific investigations	**18**	**27**	**37**
	4. Representing and Understanding results of Investigations	**19**	**27**	**37**
	5. Evaluating Scientific Investigations	**19**	**28**	**37**
	NECAP Science Assessment Targets for Inquiry (INQ) *May subject of performance component*	**19**	**28**	**37**
SPS2– Unifying Concepts of Science (including NECAP Science Assessment Targets by Big Idea)	1. Nature of Science (NOS)	**20**	**29**	**38**
	2. Systems and Energy (SAE)	**20**	**30**	**39**
	3. Models and Scale (MAS)	**21**	**31**	**39**
	4. Patterns of Change (POC)	**21**	**32**	**40**
	5. Form and Function (FAF)	**21**	**32**	**41**
SPS3– Personal, Social, and Technological Perspectives	1. Collaboration in Scientific Endeavors	**22**	**33**	**42**
	2. Environment, Natural Resources, and Conservation	**22**	**33**	**42**
	3. Science, Technology, and Design	**23**	**34**	**43**
SPS4– Science Skills for Information, Communication and Media Literacy	1. Information and Media Literacy	**24**	**35**	**44**
	2. Communication Skills	**24**	**35**	**44**
	3. Critical Thinking and Systems Thinking	**24**	**35**	**44**
	4. Problem Identification, Formulation, and Solution	**24**	**35**	**44**
	5. Creativity and Intellectual Curiosity	**24**	**35**	**45**
	6. Interpersonal and Collaborative Skills	**25**	**35**	**45**
	7. Self Direction	**25**	**35**	**45**
	8. Accountability and Adaptability	**25**	**35**	**45**
	9. Social Responsibility	**25**	**35**	**45**

Science Process Skills		
SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
1. MAKING OBSERVATIONS AND ASKING QUESTIONS	S:SPS1:2:1.1 Make observations and explore materials using all of their senses (one sense at a time). S:SPS1:2:1.2 Record observations using language, concrete objects, and symbolic representations. S:SPS1:2:1.3 Ask questions about objects, organisms and events in their immediate environment. S:SPS1:2:1.4 Ask questions that lead to exploration and investigation as a result of working with materials and objects. S:SPS1:2:1.5 Sort and classify object materials and events based on one or more attributes; and explain the methods used for sorting.	S:SPS1:4:1.1 Extend the senses using simple tools. S:SPS1:4:1.2 Make and record observations for a given purpose. S:SPS1:4:1.3 Differentiate between observations and inferences. S:SPS1:4:1.4 Record observations using standard units of measurement. S:SPS1:4:1.5 Classify according to several attributes and describe or show the method for classification. S:SPS1:4:1.6 Compare methods of classifying based on the goal. S:SPS1:4:1.7 Ask questions about objects, organisms and events in their local environment. S:SPS1:4:1.8 Pose questions to investigate and practical problems to solve.
2. DESIGNING SCIENTIFIC INVESTIGATIONS	S:SPS1:2:2.1 Select tools and procedures, in a purposeful way, to explore objects and materials. S:SPS1:2:2.2 Suggest a plan and describe a sequence of events for conducting an exploration. S:SPS1:2:2.3 Predict how changing one part of an exploration will affect the outcome.	S:SPS1:4:2.1 Plan a step-by-step process to solve a practical problem or to carry out a "fair test" of a simple scientific question. S:SPS1:4:2.2 Select an activity and justify it as an effective means of collecting appropriate data.
3. CONDUCTING SCIENTIFIC INVESTIGATIONS	S:SPS1:2:3.1 Follow their own plan for conducting an investigation. S:SPS1:2:3.2 Follow a simple step-by-step procedure.	S:SPS1:4:3.1 Follow a set of procedures. S:SPS1:4:3.2 Plan and test ideas through guided experiments. S:SPS1:4:3.3 Identify and use appropriate tools.

Science Process Skills		
SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
4. REPRESENTING AND UNDERSTANDING RESULTS OF INVESTIGATIONS	S:SPS1:2:4.1 Represent and interpret information and observations in many ways (such as in tally, pictographs, bar graphs, tables). S:SPS1:2:4.2 Identify and describe patterns and relationships in observed objects and events.	S:SPS1:4:4.1 Compile and display data in a variety of formats. S:SPS1:4:4.2 Select an appropriate format to represent data or observations. S:SPS1:4:4.3 Identify and suggest possible explanations for patterns. S:SPS1:4:4.4 Analyze data and identify discrepancies.
5. EVALUATING SCIENTIFIC EXPLANATIONS	*None at this level.*	S:SPS1:4:5.1 Cite evidence or data to support conclusions. S:SPS1:4:5.2 Determine if an observation or measurement supports a given scientific explanation. S:SPS1:4:5.3 Draw a conclusion to answer an initial question, based on the evidence collected.
NECAP ASSESSMENT TARGETS FOR INQUIRY *MAY BE SUBJECT OF PERFORMANCE COMPONENT*		NECAP ASSESSMENT TARGETS S:ESS1:4:2.4 S:ESS1:4:5.2 S:ESS1:4:6.4 S:LS1:4:1.2 S:PS1:4:2.5 S:PS2:4:3.8 S:PS3:4:2.1 S:PS3:4:1.5 (For actual text: please see GSE's for Earth Space, Life, and Physical Science.)

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
1. NATURE OF SCIENCE (NOS)	S:SPS2:2:1.1 Recognize that information can be obtained merely by careful observation, but sometimes even more data can be collected by conducting scientific investigations. S:SPS2:2:1.2 Discover that when a scientific investigation is done the way it was done before, we expect to get a very similar result. S:SPS2:2:1.3 Explain that sometimes people aren't sure what will happen because they don't know all the factors that may have an effect on the outcome.	S:SPS2:4:1.1 Recognize that sometimes scientists have different explanations for the same set of observations which usually lead them to make more observations to resolve the differences. S:SPS2:4:1.2 Realize that results of similar scientific investigations seldom turn out exactly the same, but if the differences are large it's important to try to figure out why. S:SPS2:4:1.3 Know when comparisons might not be fair because some conditions are not kept the same. S:SPS2:4:1.4 Explain that scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments; and that investigations can focus on physical, biological, and social questions. S:SPS2:4:1.5 Realize that scientists' explanations about what happens in the world come partly from what they observe, and partly from what they think.
2. SYSTEMS AND ENERGY (SAE)	S:SPS2:2:2.1 Show how most things are made of parts. S:SPS2:2:2.2 Observe that when parts are put together, they can do things that they couldn't do by themselves. S:SPS2:2:2.3 Explain that something may not work if some of its parts are missing.	S:SPS2:4:2.1 Demonstrate that if something consists of many parts, the parts usually influence one another. S:SPS2:4:2.2 Provide examples that demonstrate that something may not work well (or at all) if a part of it is missing, broken, worn out, mismatched, or misconnected.

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
3. MODELS AND SCALE (MAS)	S:SPS2:2:3.1 Describe how a model of something is different from the real thing but can be used to learn something about the real thing. S:SPS2:2:3.2 Explain how one way to describe something is to say how it is like something else. S:SPS2:2:3.3 Provide examples to explain that things in nature and things people make have very different sizes, weights, ages and speeds.	S:SPS2:4:3.1 Know that seeing how a model works after changes are made to it may suggest how the real thing would work if the same changes were done to it. S:SPS2:4:3.2 Use geometric figures, number sequences, graphs, diagrams, and pictures as scientific models. S:SPS2:4:3.3 Recognize that most everything has limits on how big or small it can be.
4. PATTERNS OF CHANGE (POC)	S:SPS2:2:4.1 Discover that things change in some ways and stay the same in some ways. S:SPS2:2:4.2 Understand that people can keep track of some things by seeing where they come from and where they go. S:SPS2:2:4.3 Observe that things can change in different ways, such as in size, weight, color and movement.	S:SPS2:4:4.1 Observe that some small changes can be detected by taking measurements. S:SPS2:4:4.2 Understand that some changes are so slow or so fast that they are hard to see. S:SPS2:4:4.3 Demonstrate that some features of things may stay the same even when other features change (e.g., some patterns look the same when they are shifted over, turned, reflected, or seen from different directions).
5. FORM AND FUNCTION (FAF)	S:SPS2:2:5.1 Identify shape and use of objects. S:SPS2:2:5.2 Draw an object and the object in use.	S:SPS2:4:5.1 Discover the relationship between shape and use. S:SPS2:4:5.2 Explore methods, designs and problems of transporting liquids.

Science Process Skills		
SPS3– Personal, Social, and Technological Perspectives		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
1. COLLABORATION IN SCIENTIFIC ENDEAVORS	S:SPS3:2:1.1 Work with a partner to accomplish a specific task. S:SPS3:2:1.2 Take turns. S:SPS3:2:1.3 Ask questions of others about their work.	S:SPS3:4:1.1 Be able to complete an assigned task when given a specific role in a group. S:SPS3:4:1.2 Communicate ideas to others. S:SPS3:4:1.3 Give specific feedback about work of others.
2. COMMON ENVIRONMENTAL ISSUES, NATURAL RESOURCES MANAGEMENT AND CONSERVATION	S:SPS3:2:2.1 Use observation skills to describe the area around their homes and school.	S:SPS3:4:2.1 Demonstrate a basic conservation action such as recycling or a schoolyard habitat project. S:SPS3:4:2.2 Develop questions based upon their observations about the natural world and design a simple investigation. S:SPS3:4:2.3 Develop questions that help them learn about the environment; and design and conduct simple investigations. S:SPS3:4:2.4 Locate and collect information about the environment and environmental and natural resources topics. S:SPS3:4:2.5 Use reliable information to answer questions. S:SPS3:4:2.6 Organize information to search for relationships and patterns concerning the environment and environmental topics. S:SPS3:4:2.7 Identify and investigate issues in their local environments and communities.

Science Process Skills		
SPS3– Personal, Social, and Technological Perspectives		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
3. SCIENCE AND TECHNOLOGY, TECHNOLOGICAL DESIGN AND APPLICATION	S:SPS3:2:3.1 Demonstrate that all tools have a special purpose (e.g., to measure, to help in observations, to make things or to make things better). S:SPS3:2:3.2 Provide examples that highlight the importance of the planning phase of any project. S:SPS3:2:3.3 Identify multiple ways to solve a design problem. S:SPS3:2:3.4 Describe how most things are made up of multiple parts and explain that things may not work if some parts are missing. S:SPS3:2:3.5 Provide examples of how people throughout history have used legends and stories to explain how the world works.	S:SPS3:4:3.1 Describe the design process as a logical progression for transforming ideas into reality. S:SPS3:4:3.2 Describe how people have designed and used tools throughout history; and provide examples of how many of these tools, while improved, are still in use today. S:SPS3:4:3.3 Provide examples illustrating that throughout history, people of all ages and from all walks of life have made significant contributions to the fields of science and technology.

Science Process Skills		
SPS4– Science Skills for Information, Communication and Media Literacy (from *ICT Literacy Map for Science,* www.21stcenturyskills.org)		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
1. INFORMATION AND MEDIA LITERACY	S:SPS4:2:1.1 Have experience with a variety of media sources. S:SPS4:2:1.2 Use tools. S:SPS4:2:1.3 Use age-appropriate sources such as newspapers, books and websites.	S:SPS4:4:1.1 Access information from a variety of media sources (e.g., Internet, CD-ROM programs, print resources). S:SPS4:4:1.2 Use appropriate tools to measure and graph data. S:SPS4:4:1.3 Analyze and compare data from a variety of age-appropriate sources such as newspapers and websites.
2. COMMUNICATION SKILLS	S:SPS4:2:2.1 Communicate ideas and observations through a variety of tools and formats (e.g., oral, journal, drawing, projects, multimedia).	S:SPS4:4:2.1 Use a variety of tools and formats (oral presentations, journals, and multimedia presentations) to summarize and communicate the results of observations.
3. CRITICAL THINKING AND SYSTEMS THINKING	S:SPS4:2:3.1 Make observations and tell ideas about real-life issues. S:SPS4:2:3.2 Use pictures or other means to organize ideas. S:SPS4:2:3.3 Make a graph to represent data.	S:SPS4:4:3.1 Apply a variety of age-appropriate strategies to address real-life issues (e.g., identify factors that affect plants in a particular habitat). S:SPS4:4:3.2 Build a concept map (or other graphic organizer) to understand a complex problem. S:SPS4:4:3.3 Organize observations and data into tables, charts and graphs.
4. PROBLEM IDENTIFICATION, FORMULATION, AND SOLUTION	S:SPS4:2:4.1 Ask questions and take part in investigations. S:SPS4:2:4.2 Compile observations (one to one relationship) by making or using simple pictographs, tally charts or simple graphs. S:SPS4:2:4.3 Look for evidence to support ideas.	S:SPS4:4:4.1 Ask questions and plan investigations to find answers. S:SPS4:4:4.2 Compile data gathered through observations to record and present results using tally charts, tables and graphs. S:SPS4:4:4.3 Use evidence to construct explanations.
5. CREATIVITY AND INTELLECTUAL CURIOSITY	S:SPS4:2:5.1 Use computer software and various technologies as appropriate to display and communicate information and ideas.	S:SPS4:4:5.1 Use a variety of equipment and software packages to enter, process, display, and/or communicate information in different forms using text, tables, pictures, and sound (e.g., brainstorming software, collaboration software, telecommunications, presentation software, digital cameras, projectors).

Science Process Skills		
SPS4– Science Skills for Information, Communication and Media Literacy (from *ICT Literacy Map for Science,* www.21stcenturyskills.org)		
	By the end of Grade 2, all students will…	**By the end of Grade 4, all students will apply skills from previous grades and…**
6. INTERPERSONAL AND COLLABORATIVE SKILLS	S:SPS4:2:6.1 Plan and carry out simple activities with a group.	S:SPS4:4:6.1 Plan and conduct a scientific investigation in group settings. S:SPS4:4:6.2 Engage in group decision making activities. S:SPS4:4:6.3 Role-play different points of view on an issue.
7. SELF DIRECTION	S:SPS4:2:7.1 Keep a visual or written journal.	S:SPS4:4:7.1 Keep a journal record of observations, recognizing patterns, summarizing findings, and reflecting on the observations.
8. ACCOUNTABILITY AND ADAPTABILITY	S:SPS4:2:8.1 Take part in sharing information with another classroom or school as a group.	S:SPS4:4:8.1 Establish ongoing communication with students from other communities or countries to share and compare data.
9. SOCIAL RESPONSIBILITY	S:SPS4:2:9.1 Collaborate, as a group, with another classroom or school.	S:SPS4:4:9.1 Collaborate with other learners by letter, phone, or online.

Science Process Skills		
SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
1. MAKING OBSERVATIONS AND ASKING QUESTIONS	S:SPS1:6:1.1 Make observations and record measurements using a variety of tools and instruments. S:SPS1:6:1.2 Plan observations based on a given purpose. S:SPS1:6:1.3 Identify and investigate similarities and differences among observations and sets of observations. S:SPS1:6:1.4 Use appropriate units and precision of metric measurement when recording data. S:SPS1:6:1.5 Use a classification key, such as a dichotomous key, to identify and distinguish among members of a group or set. S:SPS1:6:1.6 Construct a simple classification key. S:SPS1:6:1.7 Compare methods of classification for a specific purpose. S:SPS1:6:1.8 Ask questions about relationships between and among observations. S:SPS1:6:1.9 Determine which observations will be helpful to a given investigation. S:SPS1:6:1.10 Distinguish between those questions that can be answered by science and those that cannot.	S:SPS1:8:1.1 Use appropriate tools to accurately collect and record both qualitative and quantitative data gathered through observations (e.g., temperature probes, electronic balances, spring scales, microscopes, stop watches). S:SPS1:8:1.2 Determine the degree of accuracy that can be obtained using a given instrument. S:SPS1:8:1.3 Investigate similarities and differences noted when making observations. S:SPS1:8:1.4 Construct and use a dichotomous key to classify a given set of objects or organisms. S:SPS1:8:1.5 Evaluate methods of classification for a specific purpose. S:SPS1:8:1.6 Rephrase questions so that they can be tested or investigated using scientific methodologies. S:SPS1:8:1.7 Ask questions about relationships between and among observable variables.

Science Process Skills		
SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
2. DESIGNING SCIENTIFIC INVESTIGATIONS	S:SPS1:6:2.1 Design and record a simple step-by-step procedure to follow in order to carry out a fair test of a scientific question. S:SPS1:6:2.2 Identify and utilize appropriate tools/technology for collecting data in designing investigations. S:SPS1:6:2.3 Incorporate components of good experimental design, such as controls and multiple trials, into investigations.	S:SPS1:8:2.1 Identify the manipulated, responding and controlled variables in an experiment. S:SPS1:8:2.2 Design a controlled experiment, identifying and controlling the major variables. S:SPS1:8:2.3 Identify flaws or omissions in the design of simple experiments.
3. CONDUCTING SCIENTIFIC INVESTIGATIONS	S:SPS1:6:3.1 Carry out simple student or teacher-developed procedures or experiments. S:SPS1:6:3.2 Use appropriate tools to collect and record data. S:SPS1:6:3.3 Follow the teacher's instructions in performing experiments, following all appropriate safety rules and procedures.	S:SPS1:8:3.1 Use appropriate laboratory techniques to carry out student- or teacher-developed procedures or experiments. S:SPS1:8:3.2 Use appropriate tools to gather data as part of an investigation (e.g., ruler, meter stick, thermometer, spring scale, graduated cylinder, calipers, balance, probes, microscopes). S:SPS1:8:3.3 Follow the teacher's instructions in performing experiments, following all appropriate safety rules and procedures.
4. REPRESENTING AND UNDERSTANDING RESULTS OF INVESTIGATIONS	S:SPS1:6:4.1 Use appropriate tools to organize, represent, analyze and explain data. S:SPS1:6:4.2 Make and record observations using a pre-determined format. S:SPS1:6:4.3 Compare and display data in a variety of student or computer generated formats (such as diagrams, flow charts, tables, bar graphs, line graphs, scatter plots, and histograms). S:SPS1:6:4.4 Identify patterns and relationships in data and formulate basic explanations. S:SPS1:6:4.5 Draw appropriate conclusions based on data collected.	S:SPS1:8:4.1 Use appropriate tools (including computer hardware and software) to collect, organize, represent, analyze and explain data. S:SPS1:8:4.2 Identify sources of error in experiments. S:SPS1:8:4.3 Draw appropriate conclusions regarding the scientific question under investigation, based on the data collected.

Science Process Skills		
SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
5. EVALUATING SCIENTIFIC EXPLANATIONS	S:SPS1:6:5.1 Determine if the results of an experiment support or fail to support the scientific idea tested. S:SPS1:6:5.2 Explain how a hypothesis is a direct extension of a scientific idea and therefore makes that idea "testable."	S:SPS1:8:5.1 Determine if the results of an experiment support or refute the scientific idea tested. S:SPS1:8:5.2 Evaluate whether the information and data collected allows an evaluation of the scientific idea under investigation. S:SPS1:8:5.3 Determine what additional information would be helpful in answering the scientific question.
NECAP ASSESSMENT TARGETS FOR INQUIRY *MAY BE SUBJECT OF PERFORMANCE COMPONENT*		NECAP ASSESSMENT TARGETS S:ESS1:8:2.2 S:ESS1:8:6.4 S:LS1:8:2.5 S:LS2:8:1.3 S:LS4:8:2.4 S:LS1:8:3.7 S:LS4:8:3.4 S:PS1:8:2.4 S:PS1:8:2.5 S:PS1:8:1.6 S:PS2:8:3.6 S:PS3:8:1.3 (For actual text: please see GSE's for Earth Space, Life, and Physical Science.)

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
1. NATURE OF SCIENCE (NOS)	S:SPS2:6:1.1 Explain that scientists do not pay much attention to claims about how something works unless they are backed up with evidence that can be confirmed with a logical argument. S:SPS2:6:1.2 Describe how results of similar and repeated investigations may vary and suggest possible explanations for variations. S:SPS2:6:1.3 Explain that sometimes similar investigations get different results because of unexpected differences in the things being investigated, the methods used, or the circumstances in which the investigation is carried out, and sometimes just because of uncertainties of observations. S:SPS2:6:1.4 Realize that if more than one variable changes at the same time in an experiment, the outcome of the experiment may not be clearly attributable to any one of the variables.	S:SPS2:8:1.1 Describe how scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence. S:SPS2:8:1.2 Realize that when similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, and this often requires more investigations. S:SPS2:8:1.3 Realize that knowledge, based on science, is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way. S:SPS2:8:1.4 Provide examples that show how some scientific knowledge is very old and yet is still applicable today. S:SPS2:8:1.5 Recognize that some matters cannot be examined usefully in a scientific way, such as those matters that by their nature cannot be tested objectively and those that are essentially matters of morality. S:SPS2:8:1.6 Give examples of how science can sometimes be used to inform ethical decisions by identifying the likely consequences of particular actions but cannot be used to establish that some action is either moral or immoral.

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
2. SYSTEMS AND ENERGY (SAE)	S:SPS2:6:2.1 Recognize that thinking about things as systems means looking for how every part relates to others. S:SPS2:6:2.2 Discover that collections of pieces (e.g., powders, marbles, sugar cubes or wooden blocks) may have properties that the individual pieces do not. S:SPS2:6:2.3 Estimate or predict the effect that making a change in one part of the system will have on other parts, and on the system as a whole. S:SPS2:6:2.4 Compare a variety of forms of energy, including heat, light, sound, mechanical, electrical, and chemical energy. S:SPS2:6:2.5 Demonstrate how energy can be transformed from one form to another (e.g., from electrical energy to heat, light or mechanical energy).	S:SPS2:8:2.1 Understand that any system is usually connected to other systems, both internally and externally; thus a system may be thought of as containing subsystems and as being a subsystem of a larger system. S:SPS2:8:2.2 Analyze how the output of one part of a system, which can include materials, energy or information, can become the input to other parts. S:SPS2:8:2.3 Realize that as the complexity of any system increases, gaining an understanding of it depends increasingly on summaries (such as averages and ranges) and on descriptions of typical examples of that system. S:SPS2:8:2.4 Explain that when energy is transformed or converted from one type to another, there is no net loss of energy. S:SPS2:8:2.5 Describe how objects and substances can store energy (e.g., a battery, food, gasoline).

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
3. MODELS AND SCALE (MAS)	S:SPS2:6:3.1 Understand that models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly; or that are too vast to be changed deliberately; or that are potentially dangerous. S:SPS2:6:3.2 Analyze how finding out the biggest and smallest values of something are often as revealing as knowing what the usual value is.	S:SPS2:8:3.1 Demonstrate how mathematical models can be displayed on a computer and then modified to see what happens. S:SPS2:8:3.2 Know that different models can be used to represent the same thing; what kind of model is used and how complex it should be depends on its purpose; and the usefulness of a model is one of the instances in which intuition and creativity come into play in science, mathematics and engineering. S:SPS2:8:3.3 Discover how properties of systems that depend on volume, such as capacity and weight change, change out of proportion to properties that depend on area, such as strength or surface processes. S:SPS2:8:3.4 Recognize that as the complexity of any system increases, gaining an understanding increasingly depends on summaries (such as averages and ranges) and on descriptions of typical examples of that system.

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
4. PATTERNS OF CHANGE (POC)	S:SPS2:6:4.1 Understand that things change in steady, repetitive, or irregular ways, or sometimes in more than one way at the same time; often the best way to tell which kinds of change are happening is to make a table or graph of measurements. S:SPS2:6:4.2 Discover how a system may stay the same because nothing is happening or because things are happening that exactly balance each other out.	S:SPS2:8:4.1 Analyze how physical and biological systems tend to change until they become stable and then stay that way unless their surroundings change. S:SPS2:8:4.2 Recognize how many systems contain feedback mechanisms that serve to keep changes within specified limits. S:SPS2:8:4.3 Realize that symbolic equations can be used to summarize how the quantity of something changes over time or in response to other changes. S:SPS2:8:4.4 Explain how symmetry (or the lack of it) may determine properties of many objects, from molecules and crystals to organisms and designed structures. S:SPS2:8:4.5 Realize that cycles, such as the seasons or body temperature, can be described by their cycle length or frequency, what their highest and lowest values are, and when those values occur; different cycles range from many thousand years down to less than a billionth of a second.
5. FORM AND FUNCTION (FAF)	S:SPS2:6:5.1 Describe the structure and function of organs. S:SPS2:6:5.2 Diagram and label the structure of the primary components of representative organs in plants and animals. S:SPS2:6:5.3 Investigate the relationship between various landforms and wind currents.	S:SPS2:8:5.1 Describe the relationship between structure and function of organ systems in plants and animals. S:SPS2:8:5.2 Describe the structure and function of various organ systems (i.e., digestion, respiration, circulation, nervous, protection and support) and how these systems contribute to homeostasis of the organism. S:SPS2:8:5.3 Compare the structure and function of organ systems in one organism to the structure and function in another organism.

Science Process Skills		
SPS3– Personal, Social, and Technological Perspectives		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
1. COLLABORATION IN SCIENTIFIC ENDEAVORS	S:SPS3:6:1.1 Work effectively within a cooperative group setting, accepting and executing assigned roles and responsibilities. S:SPS3:6:1.2 Work collectively within a group toward a common goal. S:SPS3:6:1.3 Demonstrate respect of one another's abilities and contributions to the group.	S:SPS3:8:1.1 Work effectively within a cooperative group setting, accepting and executing assigned roles and responsibilities. S:SPS3:8:1.2 Work collectively within a group toward a common goal. S:SPS3:8:1.3 Demonstrate respect of one another's abilities and contributions to the group. S:SPS3:8:1.4 Demonstrate an understanding of the ethics involved in scientific inquiry.
2. COMMON ENVIRONMENTAL ISSUES, NATURAL RESOURCES MANAGEMENT AND CONSERVATION	S:SPS3:6:2.1 Develop, focus and explain questions about the environment and do environmental investigations. S:SPS3:6:2.2 Design environmental investigations to answer particular questions. S:SPS3:6:2.3 Explore evidence that human-caused changes have consequences for the immediate environment as well as for other places and future times. S:SPS3:6:2.4 Explore how humans shape and control the environment while creating knowledge and developing new technologies. S:SPS3:6:2.5 Investigate environmental and resource management issues at scales that range from local to national to global.	S:SPS3:8:2.1 Locate and collect reliable information about the environment and environmental topics using a variety of methods and sources. S:SPS3:8:2.2 Judge the weaknesses and strengths of the information they are using. S:SPS3:8:2.3 Explore the uses and limitations of models. S:SPS3:8:2.4 Synthesize observations and findings into coherent explanations about natural resources and the environment.

Science Process Skills		
SPS3– Personal, Social, and Technological Perspectives		
	By the end of Grade 6, all students will apply skills from previous grades and…	**By the end of Grade 8, all students will apply skills from previous grades and…**
3. SCIENCE AND TECHNOLOGY, TECHNOLOGICAL DESIGN AND APPLICATION	S:SPS3:6:3.1 Identify problems/issues that can be addressed by design technology. S:SPS3:6:3.2 Identify and describe the procedure for designing a product, including identifying a need, researching, brainstorming, selecting, developing a prototype, testing and evaluating. S:SPS3:6:3.3 Evaluate technological designs using established criteria.	S:SPS3:8:3.1 Design a product or solution to a problem. S:SPS3:8:3.2 Build a product that has been designed in class. S:SPS3:8:3.3 Evaluate student-designed products according to established criteria and recommend improvements or modifications.

Science Process Skills	
SPS4– Science Skills for Information, Communication and Media Literacy (from *ICT Literacy Map for Science,* www.21stcenturyskills.org)	
	By the end of Grade 8, all students will apply skills from previous grades and…
1. INFORMATION AND MEDIA LITERACY	S:SPS4:8:1.1 Use a variety of information access tools to locate, gather, and organize potential sources of scientific information to answer questions. S:SPS4:8:1.2 Collect real-time observations and data, synthesizing and building upon existing information (e.g., online databases, NOAA, EPA, USGS) to solve problems. S:SPS4:8:1.3 Use appropriate tools to analyze and synthesize information (e.g., diagrams, flow charts, frequency tables, bar graphs, line graphs, stem-and-leaf plots) to draw conclusions and implications based on investigations of an issue or question.
2. COMMUNICATION SKILLS	S:SPS4:8:2.1 Use a wide range of tools and a variety of oral, written, and graphic formats to share information and results from observations and investigations.
3. CRITICAL THINKING AND SYSTEMS THINKING	S:SPS4:8:3.1 Execute steps of scientific inquiry to engage in the problem-solving and decision making processes. S:SPS4:8:3.2 Apply new and unusual applications of existing knowledge to new and different situations. S:SPS4:8:3.3 Make sketches, graphs, and diagrams to explain ideas and to demonstrate the interconnections between systems.
4. PROBLEM IDENTIFICATION, FORMULATION, AND SOLUTION	S:SPS4:8:4.1 Formulate a scientific question about phenomena, a problem, or an issue and using a broad range of tools and techniques; and plan and conduct an inquiry to address the question. S:SPS4:8:4.2 Use evidence collected from observations or other sources and use them to create models and explanations.
5. CREATIVITY AND INTELLECTUAL CURIOSITY	S:SPS4:8:5.1 Use a variety of media tools to make oral and written presentations, which include written notes and descriptions, drawings, photos, and charts to communicate the procedures and results of an investigation.
6. INTERPERSONAL AND COLLABORATIVE SKILLS	S:SPS4:8:6.1 Work in diverse pairs/teams to answer questions, solve problems and make decisions. S:SPS4:8:6.2 Plan and develop team science projects. S:SPS4:8:6.3 Articulate understanding of content through personal interaction and sharing with peers.
7. SELF DIRECTION	S:SPS4:8:7.1 Keep a journal of observations and investigations, and periodically evaluate entries to assess progress toward achieving the understanding of key ideas.
8. ACCOUNTABILITY AND ADAPTABILITY	S:SPS4:8:8.1 Develop and execute a plan to collect and record accurate and complete data from various sources to solve a problem or answer a question; and gather and critically analyze data from a variety of sources. S:SPS4:8:8.2 Participate in science competitions, where students are responsible for creating a product or participating in an event.
9. SOCIAL RESPONSIBILITY	S:SPS4:8:9.1 Collaborate with a network of learners by phone, video, virtual classroom platform. S:SPS4:8:9.2 Participate in simulation or role-playing activities in which students grapple with the ethics of complex issues.

Science Process Skills		
SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
1. MAKING OBSERVATIONS AND ASKING QUESTIONS	S:SPS1:11:1.1 Ask questions about relationships among variables that can be observed directly as well as those that cannot. S:SPS1:11:1.2 Use complex classification criteria and keys to identify items/organisms. S:SPS1:11:1.3 Evaluate complex methods of classification for a specific purpose. S:SPS1:11:1.4 Identify limitations of a given classification system and identify alternative ways of classifying to accommodate anomalies.	S:SPS1:12:1.1 Define and delimit problems to facilitate investigation. S:SPS1:12:1.2 Make and record measurements to the correct number of significant figures based on the precision of the instrument used. S:SPS1:12:1.3 Make measurements and observations about a variety of events and phenomena, including those that occur during very small and very large time frames. S:SPS1:12:1.4 Ask questions about relationships between and among observable variables as well as theoretical entities. S:SPS1:12:1.5 Use, evaluate and apply complex classification schemes based on an understanding of scientific concepts, laws and principles. S:SPS1:12:1.6 Describe and apply classification systems and nomenclatures used in the sciences.
2. DESIGNING SCIENTIFIC INVESTIGATIONS	S:SPS1:11:2.1 Apply scientific theories and laws to new situations to generate hypotheses. S:SPS1:11:2.2 State a hypothesis and prediction based on available evidence and background information.	S:SPS1:12:2.1 Identify the theoretical basis of an investigation and develop a prediction and a hypothesis that are consistent with the theoretical basis. S:SPS1:12:2.2 Evaluate and select appropriate instruments for collecting data and evidence in an investigation. S:SPS1:12:2.3 Develop appropriate sampling procedures for a given investigation.

Science Process Skills		
SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
3. CONDUCTING SCIENTIFIC INVESTIGATIONS	S:SPS1:11:3.1 Select and use apparatus and material safely. S:SPS1:11:3.2 Use instruments effectively and accurately for collecting data. S:SPS1:11:3.3 Compile and organize data, using appropriate units.	S:SPS1:12:3.1 Carry out procedures controlling major variables and adapting or extending procedures where required. S:SPS1:12:3.2 Implement appropriate sampling procedures. S:SPS1:12:3.3 Identify and explain sources of error and uncertainty in measurement and express results in a form that acknowledges the degree of uncertainty.
4. REPRESENTING AND UNDERSTANDING RESULTS OF INVESTIGATIONS	S:SPS1:11:4.1 Compile and display data, evidence and information by hand and computer, in a variety of formats, including diagrams, flow charts, tables, graphs and scatter plots.	S:SPS1:12:4.1 Interpret patterns and trends in data, and infer or calculate linear and non-linear relationships among variables. S:SPS1:12:4.2 Compare theoretical and empirical values and account for discrepancies. S:SPS1:12:4.3 Evaluate the relevance, reliability and adequacy of data and data collection methods.
5. EVALUATING SCIENTIFIC EXPLANATIONS	S:SPS1:11:5.1 Explain how data support or refute the hypothesis or prediction. S:SPS1:11:5.2 Provide a statement that addresses and answers the question investigated in light of the evidence generated in the investigation.	S:SPS1:12:5.1 Explain how two different scientific explanations for the same phenomenon can be evaluated using the predictive value of the explanations. S:SPS1:12:5.2 Apply and assess alternative theoretical models.
NECAP ASSESSMENT TARGETS FOR INQUIRY *MAY BE SUBJECT OF PERFORMANCE COMPONENT*	NECAP ASSESSMENT TARGETS S:ESS1:11:4.1 S:ESS1:11:3.2 S:LS1:11:2.8 S:LS2:11:1.5 S:LS3:11:3.9 S:LS3:11:2.6 S:LS4:11:2.6 S:PS1:11:2.6 S:PS2:11:3.10 S:PS3:11:1.8 (For actual text: please see GSE's for Earth Space, Life, and Physical Science.)	

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
1. NATURE OF SCIENCE (NOS)	S:SPS2:11:1.1 Explore new phenomena through investigations conducted for different reasons, or to check on previous results. S:SPS2:11:1.2 Test how well a theory predicts a phenomena. S:SPS2:11:1.3 Recognize that sometimes scientists can control conditions in order to focus on the effect of a single variable; when that is not possible for practical or ethical reasons, they try to observe as wide a range of natural occurrences as possible to be able to discern patterns. S:SPS2:11:1.4 Show how hypotheses are widely used in science for choosing what data to pay attention to and what additional data to seek, and for guiding the interpretation of the data (both new and previously available). S:SPS2:11:1.5 Understand that in the long run, theories are judged by how they fit with other theories, the range of observations they explain, how well they explain observations, and how effective they are in predicting new findings. S:SPS2:11:1.6 Show how the usefulness of a model can be tested by comparing its predictions to actual observations in the real world; but a close match does not mean that the model is the only "true" model or the one that would work. S:SPS2:11:1.7 Realize that in science, the testing, revising, and occasional discarding of theories, new and old, never ends; this ongoing process leads to an increasingly better understanding of how things work in the world but not to absolute truth.	S:SPS2:12:1.1 Recognize that there are different traditions in science about what is investigated and how; but they all have in common certain beliefs about the value of evidence, logic and good arguments. S:SPS2:12:1.2 Understand that no matter how well one theory fits observations, a new theory might fit them better, or might fit a wider range of observations. S:SPS2:12:1.3 Explain how in the short run, new ideas that do not mesh well with mainstream ideas in science often encounter vigorous criticism. S:SPS2:12:1.4 Know that from time to time, major shifts occur in the scientific view of how the world works; more often, however, the changes that take place in the body of scientific knowledge are small modifications of prior knowledge (change and continuity are persistent features of science). S:SPS2:12:1.5 Recognize that evidence for the value of testing, revising and discarding theories is given by the improving ability of scientists to offer reliable explanations and make accurate predictions.

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
2. SYSTEMS AND ENERGY (SAE)	S:SPS2:11:2.1 Realize that systems may be so closely related that there is no way to draw boundaries that separate all parts of one from all parts of the others. S:SPS2:11:2.2 Give examples to show that a system usually has some properties that are different from those of its parts, but appear because of the interaction of those parts. S:SPS2:11:2.3 Demonstrate that even in some very simple systems, it may not always be possible to predict accurately the result of changing some part or connection.	S:SPS2:12:2.1 Use evidence and logic to explain that as the number of parts in a system grows in size, the number of possible interactions increases much more rapidly, roughly with the square of the number of parts. S:SPS2:12:2.2 Know that understanding how things work and designing solutions to problems of almost any kind can be facilitated by systems analysis; in defining a system, it is important to specify its boundaries and subsystems, indicate its relation to other systems, and identify what its input and output are expected to be.
3. MODELS AND SCALE (MAS)	S:SPS2:11:3.1 Understand that the basic idea of mathematical modeling is to find a mathematical relationship that behaves in the same way as the objects or processes under investigation; a mathematical model may give insight about how something really works or may fit observations very well without any intuitive meaning.	S:SPS2:12:3.1 Recognize that computers have greatly improved the power and use of mathematical models by performing computations that are very long, very complicated, or repetitive; therefore, computers can show the consequences of applying complex rules or of changing the rules. The graphic capabilities of computers make them useful in the design and testing of devices and structures and in the simulation of complicated processes.

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
4. PATTERNS OF CHANGE (POC)	S:SPS2:11:4.1 Recognize that things can change in detail, but remain the same in general (e.g., the players change but the team remains, the cells are replaced but the organism remains); sometimes counterbalancing changes are necessary for a thing to retain its essential constancy in the presence of changing conditions. S:SPS2:11:4.2 Describe how graphs and equations are useful (and often equivalent) ways for depicting and analyzing patterns of change. S:SPS2:11:4.3 Give examples of how a system in equilibrium may return to the same state of equilibrium if the disturbances it experiences are small; but large disturbances may cause it to escape that equilibrium and eventually settle into some other state of equilibrium. S:SPS2:11:4.4 Describe how in evolutionary change, the present arises from the materials and forms of the past, more or less gradually, and in ways that can be explained.	S:SPS2:12:4.1 Give examples of how in many physical, biological and social systems, changes in one direction tend to produce opposing (but somewhat delayed) influences, leading to repetitive cycles of behavior. S:SPS2:12:4.2 Realize that most systems above the molecular level involve so many parts and forces and are so sensitive to tiny differences in conditions that their precise behavior is unpredictable, even if all the rules for change are known. Predictable or not, the precise future of a system is not completely determined by its present state and circumstances but also on the fundamentally uncertain outcomes of events on the atomic scale.

Science Process Skills		
SPS2– Unifying Concepts of Science		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
5. FORM AND FUNCTION (FAF)	S:SPS2:11:5.1 Explore how the movement of ocean floor plates under continental plates or two continental plates moving against each other can deform the earth's surface. S:SPS2:11:5.2 Provide data and evidence on how folding in crustal plates can cause mountain ranges. S:SPS2:11:5.3 Understand that an atom's electron configuration determines how the atom can interact with other atoms. S:SPS2:11:5.4 Provide examples of how configuration of atoms in a molecule determines a molecule's properties. S:SPS2:11:5.5 Discover how the shape of large molecules affects the interaction with other molecules. S:SPS2:11:5.6 Demonstrate that a variety of biological, chemical and physical phenomena can be explained by changes in the arrangement and motion of atoms and molecules.	*Same as Grade 11*

Science Process Skills		
SPS3– Personal, Social, and Technological Perspectives		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
1. COLLABORATION IN SCIENTIFIC ENDEAVORS	S:SPS3:11:1.1 Collaborate with existing research efforts. S:SPS3:11:1.2 Identify global researchers in a field of interest.	*Same as grade 11*
2. COMMON ENVIRONMENTAL ISSUES, NATURAL RESOURCES MANAGEMENT AND CONSERVATION	S:SPS3:11:2.1 Develop, modify, clarify and explain questions that guide environmental investigations of various types. S:SPS3:11:2.2 Design investigations to answer particular questions about the environment. S:SPS3:11:2.3 Locate and collect reliable information for environmental investigations of many types. S:SPS3:11:2.4 Apply basic logic and reasoning skills to evaluate completeness and reliability in a variety of information sources. S:SPS3:11:2.5 Organize and display information in ways appropriate to different types of environmental investigations and purposes. S:SPS3:11:2.6 Create, use and evaluate models to understand environmental phenomena. S:SPS3:11:2.7 Use to evidence and logic in developing proposed explanations that address their initial questions and hypotheses. S:SPS3:11:2.8 Analyze global, social, cultural, political, economic and environmental linkages. S:SPS3:11:2.9 Evaluate presentations of environmental issues for accuracy.	*Same as grade 11*

Science Process Skills		
SPS3– Personal, Social, and Technological Perspectives		
	By the end of Grade 11, all students will apply skills from previous grades and…	**By the end of Grade 12, advanced students will apply skills from previous grades and…**
3. SCIENCE AND TECHNOLOGY, TECHNOLOGICAL DESIGN AND APPLICATION	S:SPS3:11:3.1 Analyze environmental issues such as water quality, air quality, hazardous waste, and depletion of natural resources. S:SPS3:11:3.2 Evaluate status of a local community system (transportation, water, communication, food resources or electrical) in partnership with local officials. S:SPS3:11:3.3 Analyze technical writing, graphs, charts, and diagrams.	*Same as grade 11*

Science Process Skills	
SPS4– Science Skills for Information, Communication and Media Literacy (from *ICT Literacy Map for Science,* www.21stcenturyskills.org)	
	By the end of Grade 11, all students will apply skills from previous grades and…
1. INFORMATION AND MEDIA LITERACY	S:SPS4:12:1.1 Select and analyze information from various sources (including electronic resources, print resources, community resources) and personally collected data to answer questions being investigated. S:SPS4:12:1.2 Collect and use qualitative and quantitative data and information, seek evidence and sources of information to identify flaws such as errors and bias, and explain how the evidence supports or refutes an initial hypothesis. S:SPS4:12:1.3 Analyze data and information gathered to clarify problems or issues identifying costs and benefits from a social, cultural, and/or environmental perspective; predict the consequences of action or inaction; and propose possible solutions.
2. COMMUNICATION SKILLS	S:SPS4:12:2.1 Select and use appropriate scientific vocabulary to orally share and communicate scientific ideas, plans, results, and conclusions resulting from investigations. S:SPS4:12:2.2 Create written reports and journals to share and communicate scientific ideas, plans, results, and conclusions resulting from observations and investigations. S:SPS4:12:2.3 Create a multimedia presentation incorporating numeric symbolic and/or graphic modes of representation to share scientific ideas, plans, results, and conclusions.
3. CRITICAL THINKING AND SYSTEMS THINKING	S:SPS4:12:3.1 Pursue scientific inquiry such as observation, measurement, hypothesis formation and analysis, and value "habits of mind" such as persistence, accuracy, and collaboration. S:SPS4:12:3.2 Generate solutions to scientific questions and challenges through developing, modeling and revising investigations. S:SPS4:12:3.3 Apply scientific knowledge and skills to make reasoned decisions about the use of science and scientific innovations.
4. PROBLEM IDENTIFICATION, FORMULATION, AND SOLUTION	S:SPS4:12:4.1 Formulate scientific questions about an issue and define experimental procedures for finding answers. S:SPS4:12:4.2 Plan and conduct practical tests to solve problems or answer a question, collect and analyze data using appropriate instruments and techniques safely and accurately. S:SPS4:12:4.3 Develop models and explanations to fit evidence obtained through investigations.

Science Process Skills	
SPS4– Science Skills for Information, Communication and Media Literacy (from *ICT Literacy Map for Science,* www.21stcenturyskills.org)	
	By the end of Grade 11, all students will apply skills from previous grades and…
5. CREATIVITY AND INTELLECTUAL CURIOSITY	S:SPS4:12:5.1 Prepare multimedia presentations to share results of investigations, demonstrating a clear sense of audience and purpose. S:SPS4:12:5.2 Use electronic networks to share information. S:SPS4:12:5.3 Model solutions to a range of problems in science and technology using computer simulation software.
6. INTERPERSONAL AND COLLABORATIVE SKILLS	S:SPS4:12:6.1 Create a culminating team project that demonstrates content knowledge and conceptual understanding and shows connections between science content and real-world settings. S:SPS4:12:6.2 Collect, synthesize, and report information from a variety of points of view.
7. SELF DIRECTION	S:SPS4:12:7.1 Use key ideas of science to document and explain through an investigation the relationship between science and concepts. S:SPS4:12:7.2 Self-assess progress toward a predetermined outcome and decide what needs to be done to meet the goal.
8. ACCOUNTABILITY AND ADAPTABILITY	S:SPS4:12:8.1 Identify the reputable and appropriate communities of learners to whom research findings should be reported, compare data, and adapt as needed. S:SPS4:12:8.2 Use science learned to create a personal action plan on a community issue.
9. SOCIAL RESPONSIBILITY	S:SPS4:12:9.1 Collaborate with interested learners using appropriate web resources and publication media such as journals (print and electronic).

Earth Space Science Overview

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs	Page K-4	Page 5-8	Page 9-12
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.	1. Atmosphere, Climate, and Weather	**47**	**52**	**59**
	2. Composition and Features	**47**	**52**	**59**
	3. Fossils	**48**	**52**	**60**
	4. Observation Of The Earth From Space	**48**	**53**	**60**
	5. Processes and Rates Of Change	**48**	**53**	**61**
	6. Rock Cycle	**48**	**53**	**61**
	7. Water	**48**	**54**	**61**
ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.	1. Earth, Sun And Moon	**49**	**55**	**62**
	2. Energy	**49**	**55**	**62**
	3. Solar System	**49**	**56**	**62**
	4. View From Earth	**49**	**56**	**62**
ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.	1. Size And Scale	**50**	**57**	**63**
	2. Stars And Galaxies	**50**	**57**	**63**
	3. Universe	**50**	**57**	**64**
ESS4– The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	1. Design Technology	**51**	**58**	**65**
	2. Tools	**51**	**58**	**65**
	3. Local And Global Environmental Issues	**51**	**58**	**65**
	4. Career and Technical Education	**51**	**58**	**65**

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	K-2	**3-4**
1. ATMOSPHERE, CLIMATE, AND WEATHER	S:ESS1:2:1.1 Recognize that weather conditions change frequently, and that weather patterns change over the seasons. S:ESS1:2:1.2 Describe and compare weather using observations and measurements of local weather conditions.	S:ESS1:4:1.1 Explain how water exists in the atmosphere in different forms and describe how it changes from one form to another through various processes such as freezing, condensation, precipitation and evaporation. S:ESS1:4:1.2 Explain that air surrounds the Earth, it takes up space, and it moves around as wind. S:ESS1:4:1.3 Based on data collected from daily weather observations, describe weather changes or weather patterns. [ESS1(K-**4**)POC-**5**] S:ESS1:4:1.4 Explain how the use of scientific tools helps to extend senses and gather data about weather (i.e., weather/wind vane– direction; wind sock– wind intensity; anemometer– speed; thermometer– temperature; meter sticks/rulers– snow depth; rain gauges– rain amount in inches). [ESS1(K-**4**)NOS-**3**]
2. COMPOSITION AND FEATURES	S:ESS1:2:2.1 Recognize that solid rocks, soils, and water in its liquid and solid states can be found on the Earth's surface. S:ESS1:2:2.2 Use observable properties, such as color and texture, to classify and organize rocks and minerals. S:ESS1:2:2.3 Recognize that Earth materials have a variety of properties, including size, shape, color and texture.	S:ESS1:4:2.1 Describe Earth materials such as gases found in the atmosphere, rocks, soils, and water in its liquid and solid states. S:ESS1:4:2.2 Describe rock as being composed of different combinations of minerals. S:ESS1:4:2.3 Given information about Earth materials, explain how their characteristics lend themselves to specific uses. [ESS1(K-**4**)FAF-**6**] S:ESS1:4:2.4 Given certain Earth materials (soils, rocks, or minerals) use physical properties to sort, classify, and/or describe them. [ESS1(K-**4**)INQ-**1**]

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	K-2	**3-4**
3. FOSSILS	*None at this grade span.*	S:ESS1:4:3.1 Recognize and explain that fossils offer evidence of plants, animals and the nature of environments that existed long ago.
4. OBSERVATION OF THE EARTH FROM SPACE	*None at this grade span.*	S:ESS1:4:4.1 Recognize features of the Earth as viewed by astronauts in orbit and as transmitted by scientific instruments on satellites and spacecraft.
5. PROCESSES AND RATES OF CHANGE	S:ESS1:2:5.1 Recognize that some changes are too slow or too fast to be easily observed.	S:ESS1:4:5.1 Identify and describe processes that affect the features of the Earth's surface, including weathering, erosion, deposition of sediment. S:ESS1:4:5.2 Explain how wind, water, or ice shape and reshape the Earth's surface. [ESS1(K-**4**)INQ+SAE-**4**]
6. ROCK CYCLE	S:ESS1:2:6.1 Explain that large rocks can be broken down into smaller rocks. S:ESS1:2:6.2 Describe rocks and soils in terms of their physical properties.	S:ESS1:4:6.1 Explain that smaller rocks come from the breaking and weathering of larger rocks and bedrock. S:ESS1:4:6.2 Distinguish between the three categories of rocks (metamorphic, igneous and sedimentary) and describe the processes that create them. S:ESS1:4:6.3 Identify minerals by their physical properties, such as color, texture and cleavage, and describe simple tests used in the identification process. S:ESS1:4:6.4 Use results from an experiment to draw conclusions about how water interacts with earth materials (e.g., percolation, erosion, frost heaves). [ESS1(K-**4**)INQ-**2**]
7. WATER	S:ESS1:2:7.1 Recognize that water can be a liquid or a solid; and explain that it can be made to change from one state to the other, but the amount (mass) of water always remains the same in either state.	S:ESS1:4:7.1 Recognize and describe the Earth's surface as mostly covered by water. S:ESS1:4:7.2 Explain that most of Earth's water is salt water, which is found in the oceans, and that fresh water is found in rivers, lakes, underground sources, and glaciers.

Earth Space Science		
ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.		
	K-2	**3-4**
1. EARTH, SUN, AND MOON	S:ESS2:2:1.1 Recognize the basic patterns of the Sun, including its appearance during the daytime, and how its position in the sky changes through the seasons. S:ESS2:2:1.2 Recognize the basic patterns of the Moon, including its appearance sometimes at night and sometimes during the day; and how it appears to change shape through the month.	S:ESS2:4:1.1 Explain that night and day are caused by the Earth's rotation on its axis; and that the Earth rotates approximately once, every 24 hours. S:ESS2:4:1.2 Describe the Sun as a star.
2. ENERGY	S:ESS2:2:2.1 Recognize that the light and heat the Sun provides to the Earth is necessary for life.	S:ESS2:4:2.1 Recognize that the Sun provides the light and heat necessary to maintain the temperature of the Earth.
3. SOLAR SYSTEM	*None at this grade span.*	S:ESS2:4:3.1 Recognize that the Moon orbits the Earth. S:ESS2:4:3.2 Recognize that the Earth is one of a number of planets that orbit the Sun.
4. VIEW FROM EARTH	S:ESS2:2:4.1 Recognize that the Sun, Moon and stars all appear to move slowly across the sky. S:ESS2:2:4.2 Recognize that as the position of the Sun changes in relation to the Earth it creates shadows of varying length and direction. S:ESS2:2:4.3 Explain that people should not look directly at the Sun because it is dangerous and may cause injury to the eyes.	S:ESS2:4:4.1 Recognize that although star patterns seen in the sky appear to move slowly each night from east to west they actually remain the same, and explain why different stars can be seen during different seasons. S:ESS2:4:4.2 Explain why the planets look like stars, and why, over a period of time, they appear to wander among the constellations.

Earth Space Science		
ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.		
	K-2	**3-4**
1. SIZE AND SCALE	*None at this grade span.*	S:ESS3:4:1.1 Recognize that astronomical objects in space are massive in size and are separated from one another by vast distances. S:ESS3:4:1.2 Explain that telescopes magnify the size of distant objects and significantly increase the number of these objects that can be viewed from Earth.
2. STARS AND GALAXIES	S:ESS3:2:2.1 Recognize there are too many stars to count, and that they are unequal in their brightness.	S:ESS3:4:2.1 Recognize and describe the stars, like the Sun, as spherical in nature. S:ESS3:4:2.2 Recognize that stars come in different colors, and that the Sun is a yellow star.
3. UNIVERSE	*None at this grade span.*	*None at this grade span.*

Earth Space Science		
ESS4– The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	K-2	**3-4**
1. DESIGN TECHNOLOGY	*None at this grade span.*	S:ESS4:4:1.1 Recognize that man uses various mechanical devices to record changes in the weather and the Earth.
2. TOOLS	S:ESS4:2:2.1 Recognize, and with assistance, safely demonstrate the use of tools to gather data and extend the senses, such as thermometers, hand lenses and balances.	S:ESS4:4:2.1 Demonstrate the use of simple instruments to collect weather data, including thermometers, windsocks, meter sticks, and rain gauges.
3. LOCAL AND GLOBAL ENVIRONMENTAL ISSUES	S:ESS4:2:3.1 Differentiate between natural and man-made materials. S:ESS4:2:3.2 Identify environments that are natural, such as a forest, meadow, or mountains and those that have been built or modified by people, including cities, roads, farms, and houses. S:ESS4:2:3.3 Describe actions that can help the environment, such as recycling and proper disposal of waste materials.	S:ESS4:4:3.1 Distinguish between and provide examples of materials that can be recycled/reused and those that cannot. S:ESS4:4:3.2 Provide examples of technology that have changed the environment and explain whether the effect had a positive or negative impact. S:ESS4:4:3.3 Explain how to dispose of waste so that it does not harm the environment. S:ESS4:4:3.4 Recognize there are pros and cons to using different types of energy, such as solar energy and fossil fuels, and compare the differences.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:ESS4:2:4.1 Recognize that some jobs/careers require knowledge and use of Earth science content and/or skills.	S:ESS4:4:4.1 Identify some jobs/careers that require knowledge and use of Earth science content and/or skills.

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	5-6	**7-8**
1. ATMOSPHERE, CLIMATE, AND WEATHER	S:ESS1:6:1.1 Describe and make predictions about local and regional weather conditions using observation and data collection methods. S:ESS1:6:1.2 Identify weather patterns by tracking weather related events, such as hurricanes. S:ESS1:6:1.3 Explain the composition and structure of the Earth's atmosphere. S:ESS1:6:1.4 Describe weather in terms of temperature, wind speed and direction, precipitation, and cloud cover. S:ESS1:6:1.5 Describe how clouds affect weather and climate, including precipitation, reflecting light from the sun, and retaining heat energy emitted from the Earth's surface.	S:ESS1:8:1.1 Identify and describe the processes of the water cycle and explain their effects on climatic patterns. S:ESS1:8:1.2 Identify and describe the impact certain factors have on the Earth's climate, including changes in the oceans' temperature, changes in the composition of the atmosphere, and geological shifts due to events such as volcanic eruptions and glacial movements.
2. COMPOSITION AND FEATURES	S:ESS1:6:2.1 Differentiate between renewable and non-renewable resources. S:ESS1:6:2.2 Describe and define the different landforms on the Earth's surface, such as coastlines, rivers, mountains, deltas, canyons, etc. S:ESS1:6:2.3 Identify and distinguish between various landforms using a map and/or digital images.	S:ESS1:8:2.1 Describe the layers of the Earth, including the core, mantle, lithosphere, hydrosphere, and atmosphere. S:ESS1:8:2.2 Use geological evidence provided to support the idea that Earth's crust/lithosphere is composed of plates that move. [ESS1(5-**8**)INQ+POC-**1**]
3. FOSSILS	S:ESS1:6:3.1 Recognize that fossils offer important evidence relating to changes in life forms and environmental conditions over geologic time. S:ESS1:6:3.2 Identify connections between fossil evidence and geological events, such as changes in atmospheric composition, movement of tectonic plates, and asteroid/comet impact; and develop a means of sequencing this evidence.	S:ESS1:8:3.1 Explain how fossils found in sedimentary rock can be used to support the theories of Earth's evolution over geologic time; and describe how the folding, breaking, and uplifting of the layers affects the evidence.

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	5-6	**7-8**
4. OBSERVATION OF THE EARTH FROM SPACE	S:ESS1:6:4.1 Recognize that images taken of the Earth from space can show its features and any changes in those features that appear over time. S:ESS1:6:4.2 Explain that satellites can be used to view and track storms and Earth events, such as hurricanes and wild fires.	S:ESS1:8:4.1 Describe how catastrophic changes that have taken place on the Earth's surface can be revealed by satellite images.
5. PROCESSES AND RATES OF CHANGE	S:ESS1:6:5.1 Recognize that things change in steady, repetitive, or irregular ways, or sometimes in more than one way at the same time. S:ESS1:6:5.2 Explain how some changes to the Earth's surface happen abruptly, as a result of landslides, earthquakes and volcanic eruptions; while other changes happen very slowly as a result of weathering, erosions and deposition of sediment caused by waves, wind, water and ice. S:ESS1:6:5.3 Recognize that vibrations in materials set up wavelike disturbances that spread away from the source, as with earthquakes.	S:ESS1:8:5.1 Explain that the Earth's crust is divided into plates which move at extremely slow rates in response to movements in the mantle. S:ESS1:8:5.2 Explain how Earth events, abruptly and over time, can bring about changes on Earth's surface (e.g., landforms, ocean floor, rock features, climate). [ESS1(5-**8**)POC-**3**] S:ESS1:8:5.3 Explain the role of differential heating or convection in ocean currents, winds, weather and weather patterns, atmosphere, or climate. [ESS1(5-**8**)SAE+POC-**4**]
6. ROCK CYCLE	S:ESS1:6:6.1 Explain how soil is formed from combinations of weathered rock and decomposed plant and animal remains, and that it contains living organisms. S:ESS1:6:6.2 Identify the components of soil and other factors, such as bacteria, fungi and worms, which influence its texture, fertility, and resistance to erosion. S:ESS1:6.6.3 Describe the properties of soil, such as color, texture, capacity to retain water, and its ability to support plant life.	S:ESS1:8:6.1 Describe the processes of the rock cycle. S:ESS1:8:6.2 Explain that sedimentary, igneous, and metamorphic rocks contain evidence of the minerals, temperatures, and forces that created them. S:ESS1:8:6.3 Explain how sediments of sand and smaller particles, which may contain the remains of organisms, are gradually buried and cemented together by dissolved minerals to form solid rock. S:ESS1:8:6.4 Using data about a rock's physical characteristics, make and support an inference about the rock's history and connection to the rock cycle. [ESS1(5-**8**)SAE+POC-**5**]

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	5-6	**7-8**
7. WATER	S:ESS1:6:7.1 Explain the properties that make water an essential component of the Earth's system, including solvency and its ability to maintain a liquid state at most temperatures. S:ESS1:6:7.2 Explain that water quality has a direct effect on Earth's life forms.	S:ESS1:8:7.1 Describe how water flows into and through a watershed, falling on the land, collecting in rivers and lakes, soil, and porous layers of rock, until much of it flows back into the ocean. S:ESS1:8:7.2 Identify the physical and chemical properties that make water an essential component of the Earth's system. S:ESS1:8:7.3 Explain the processes that cause cycling of water into and out of the atmosphere and their connections to our planet's weather patterns. [ESS1(5-**8**)SAE-**2**]

Earth Space Science		
ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.		
	5-6	**7-8**
1. EARTH, SUN, AND MOON	S:ESS2:6:1.1 Recognize and describe how the regular and predictable motions of the Earth and Moon explain certain Earth phenomena, such as day and night, the seasons, the year, shadows and the tides. S:ESS2:6:1.2 Recognize that of all the known planets, Earth appears to be somewhat unique; and describe the conditions that exist on Earth that allow it to support life.	S:ESS2:8:1.1 Identify the characteristics of the Sun and its position in the universe. S:ESS2:8:1.2 Recognize and describe how the regular and predictable motions of the Earth and Moon account for phenomena, such as the phases of the Moon and eclipses. S:ESS2:8:1.3 Recognize the relationships between the tides and the phases of the moon; and use tide charts and NOAA information to describe them. S:ESS2:8:1.4 Explain the temporal or positional relationships between or among the Earth, Sun and Moon (e.g., night/day, seasons, year, tide). [ESS2(5-**8**)SAE+POC-**8**]
2. ENERGY	S:ESS2:6:2.1 Recognize how the tilt of the Earth's axis and the Earth's revolution around the Sun affect seasons and weather patterns. S:ESS2:6:2.2 Identify and describe seasonal, daylight and weather patterns as they relate to energy.	S:ESS2:8:2.1 Describe the Sun as the principle energy source for phenomena on the Earth's surface.

Earth Space Science		
ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.		
	5-6	**7-8**
3. SOLAR SYSTEM	*Districts may choose to work on End of Grade 8 standards in grades 5-8.*	S:ESS2:8:3.1 Identify the characteristics and movement patterns of the planets in our Solar System and differentiate between them. S:ESS2:8:3.2 Explain the effects of gravitational force on the planets and their moons. S:ESS2:8:3.3 Explain why Earth and our Solar System appear to be somewhat unique, while acknowledging recent evidence that suggests similar systems exist in the universe. S:ESS2:8:3.4 Compare and contrast planets based on data provided about size, composition, location, orbital movement, atmosphere, or surface features (includes moons). [ESS2(5-**8**)MAS-**6**] S:ESS2:8:3.5 Explain how gravitational force affects objects in the Solar System (e.g., moons, tides, orbits, satellites). [ESS2(5-**8**)SAE+POC-**8**]
4. VIEW FROM EARTH	S:ESS2:6:4.1 Explain the historical perspective of planetary exploration and man's achievements in space, beginning with Russia's Sputnik mission in 1957. S:ESS2:6:4.2 Describe man's perception of the constellations throughout history; and explain how he has used them to his advantage, including navigational purposes and to explain historical events.	S:ESS2:8:4.1 Explain how technological advances have allowed scientists to re-evaluate or extend existing ideas about the Solar System. [ESS2(5-**8**)NOS-7]

Earth Space Science		
ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.		
	5-6	**7-8**
1. SIZE AND SCALE	*Districts may choose to work on End of Grade 8 standards in grades 5-8.*	S:ESS3:8:1.1 Define an astronomical unit as the distance from the Earth to the Sun. S:ESS3:8:1.2 Explain that special units of measure, such as light years and astronomical units, are used to calculate distances in space.
2. STARS AND GALAXIES	*Districts may choose to work on End of Grade 8 standards in grades 5-8.*	S:ESS3:8:2.1 Describe objects such as asteroids, comets and meteors in terms of their characteristics and movement patterns.
3. UNIVERSE	*Districts may choose to work on End of Grade 8 standards in grades 5-8.*	S:ESS3:8:3.1 Describe the universe as being comprised of billions of galaxies, each containing many billions of stars; and explain that there are vast distances separating these galaxies and stars from one another and from the Earth.

Earth Space Science		
ESS4–The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	5-6	**7-8**
1. DESIGN TECHNOLOGY	S:ESS4:6:1.1 Understand that technology is used to design tools that improve our ability to measure and observe the world.	S:ESS4:8:1.1 Describe ways in which technology has increased our understanding of the world in which we live. S:ESS4:8:1.2 Recognize the importance of technology as it relates to science, for purposes such as: access to space and other remote locations, sample collection and treatment, measurement, data collection, and storage, computation, and communication of information.
2. TOOLS	S:ESS4:6:2.1 Recognize that satellites and Doppler radar can be used to observe or predict the weather. S:ESS4:6:2.2 Employ knowledge of basic weather symbols to read and interpret weather and topographic maps. S:ESS4:6:2.3 Read and interpret data from barometers, sling psychrometers and anemometers.	S:ESS4:8:2.1 Calculate temperature in degrees Celsius. S:ESS4:8:2.2 Perform calculations using metric measurements. S:ESS4:8:2.3 Describe how man uses land-based light telescopes, radio telescopes, satellites, manned exploration, probes and robots to collect data.
3. LOCAL AND GLOBAL ENVIRONMENTAL ISSUES	S:ESS4:6:3.1 Provide examples of products that man has developed which allow humans to do things that they could not do otherwise; and identify the natural materials used to produce these products. S:ESS4:6:3.2 Identify the most appropriate materials for a given design task with requirements for specific properties, such as weight, strength, hardness, and flexibility. S:ESS4:6:3.3 Provide examples of how to reduce waste through conservation, recycling, and reuse.	S:ESS4:8:3.1 Provide examples of how creative thinking and economic need has shaped the way people use natural materials, such as the use of metal ores, petroleum, and fresh water. S:ESS4:8:3.2 Explain how to test natural materials to measure and compare their properties. S:ESS4:8:3.3 Explain how technologies can reduce the environmental impact of natural disasters. S:ESS4:8:3.4 Identify the potential impact of converting forested land to uses such as farms, homes, factories, or tourist attractions.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:ESS4:6:4.1 Understand that some form of science is used in most jobs/careers and that some jobs/careers specifically require knowledge of Earth science.	S:ESS4:8:4.1 Understand that some scientific jobs/careers involve the application of Earth Space science content knowledge and experience in specific ways that meet the goals of the job.

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	9-11	**11-12 (Advanced)**
1. ATMOSPHERE, CLIMATE, AND WEATHER	S:ESS1:11:1.1 Explain how winds and ocean currents are created on the Earth's surface. S:ESS1:11:1.2 Explain how heat and energy transfer in and out of the atmosphere; and provide examples of how it is related to weather and climate. S:ESS1:11:1.3 Describe how Earth's atmospheric composition has changed from the formation of the Earth through current time. S:ESS1:11:1.4 Explain how Earth's features can affect wind and weather patterns by causing air to rise and increasing precipitation.	S:ESS1:12:1.1 Identify and describe the layers of the atmosphere. S:ESS1:12:1.2 Understand the effects of solar influences, such as flares and sunspots, on atmospheric conditions.
2. COMPOSITION AND FEATURES	S:ESS1:11:2.1 Recognize that elements exist in fixed amounts and describe how they move through the solid Earth, oceans, atmosphere, and living things as part of geochemical cycles, such as the water, carbon and nitrogen cycles. S:ESS1:11:2.2 Describe the conditions that enable the Earth to support life, such as the availability of water, the gravitational force, the electromagnetic field and the intensity of radiation from the Sun. S:ESS1:11:2.3 Explain the theory of plate tectonics. S:ESS1:11:2.4 Describe the movement of crustal plates and explain how the effects have altered the Earth's features.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	9-11	**11-12 (Advanced)**
3. FOSSILS AND GEOLOGIC TIME	S:ESS1:11:3.1 Identify and describe the methods used to measure geologic time, such as fossil identification, radioactive dating, and rock sequences. S:ESS1:11:3.2 Relate how geologic time is determined using various dating methods (e.g., radioactive decay, rock sequences, fossil records). [ESS1(9-**11**)INQ+POC+MAS-**4**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*
4. OBSERVATION OF THE EARTH FROM SPACE	S:ESS1:11:4.1 Provided with geologic data (including movement of plates) on a given locale, predict the likelihood for an earth event (e.g. volcanoes mountain ranges, islands, earthquakes, tides, tsunamis). [ESS1(9-**11**)INQ+POC-**1**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*

Earth Space Science		
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.		
	9-11	**11-12 (Advanced)**
5. PROCESSES AND RATES OF CHANGE	S:ESS1:11:5.1 Explain that the Earth is composed of interactive layers, which have distinct compositions, physical properties and processes. S:ESS1:11:5.2 Relate plate movement to earthquakes and volcanic activity, and explain how it results in tectonic uplift and mountain building. S:ESS1:11:5.3 Identify and describe the major external and internal sources of energy on Earth. S:ESS1:11:5.4 Provide supporting geologic/geographic evidence that supports the validity of the theory of plate tectonics. [ESS1(9-**11**)NOS-**2**] S:ESS1:11:5.5 Trace the development of the theory of plate tectonics. [ESS1(9-**11**)NOS-**2**] S:ESS1:11:5.6 Explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading). [ESS1(9-**11**)SAE+POC-**3**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*
6. ROCK CYCLE	S:ESS1:11:6.1 Explain that throughout the rock cycle, the total amount of the material remains the same.	S:ESS1:12:6.1 Describe the processes that transform one type of rock into another, such as lithification, metamorphosis, and weathering on a chemical level. S:ESS1:12:6.2 Describe the various types of igneous, sedimentary, and metamorphic rocks found on Earth.
7. WATER	S:ESS1:11:7.1 Explain that water quality can be affected positively or negatively by outside sources	*Same as Grade 11*

Earth Space Science		
ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.		
	9-11	**11-12 (Advanced)**
1. EARTH, SUN, AND MOON	S:ESS2:11:1.1 Explain how the Earth, Moon and Sun were formed.	S:ESS2:12:1.1 Understand how the Nebular Hypothesis, fusion, and the process of differentiation contributes to the structure and organization of the universe.
2. ENERGY	S:ESS2:11:2.1 Identify the Earth's major external source of energy as solar energy. S:ESS2:11:2.2 Explain how the inclination of incoming solar radiation can impact the amount of energy Earth receives on any given surface area. S:ESS2:11:2.3 Explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading). [ESS1(9-**11**)SAE+POC-**3**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*
3. SOLAR SYSTEM	S:ESS2:11:3.1 Explain how gravitational force influenced the formations of the planets and their moons; and describe how these objects move in patterns under its continued influence. S:ESS2:11.3.2 Explain how the Solar System formed from a giant cloud of gas and debris about 5 billion years ago.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*
4. VIEW FROM EARTH	*Students should have regular access and use of data gathered by space based instruments.*	*Students should have regular access and use of data gathered by space based instruments.*

Earth Space Science		
ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.		
	9-11	**11-12 (Advanced)**
1. SIZE AND SCALE	S:ESS3:11:1.1 Recognize electromagnetic waves can be used to locate objects in the universe, and track their movement. S:ESS3:11:1.2 Define a light year.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*
2. STARS AND GALAXIES	S:ESS3:11:2.1 Identify and describe the characteristics common to most stars in the universe. S:ESS3:11:2.2 Describe the ongoing processes involved in star formation, their life cycles and their destruction. S:ESS3:11:2.3 Explain the relationships between or among the energy produced from nuclear reactions, the origin of elements, and the life cycles of stars. [ESS3(9-**11**)POC+SAE-**8**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*

Earth Space Science		
ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.		
	9-11	**11-12 (Advanced)**
3. UNIVERSE	S:ESS3:11:3.1 Explain that current scientific evidence supports the Big Bang Theory as a probable explanation of the origin of the universe, and describe the theory. S:ESS3:11:3.2 Explain the evidence that suggests the universe is expanding. S:ESS3:11:3.3 Provide scientific evidence that supports or refutes the "Big Bang" theory of how the universe was formed. [ESS3(9-**11**)NOS-**6**] S:ESS3:11:3.4 Based on the nature of electromagnetic waves, explain the movement and location of objects in the universe or their composition (e.g., red shift, blue shift, line spectra). [ESS3(9-**11**)SAE-**7**] S:ESS3:11:3.5 Explain how scientific theories about the structure of the universe have been advanced through the use of sophisticated technology (e.g., space probes and visual, radio and x-ray telescopes). [ESS3(9-**11**)NOS-**5**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*

Earth Space Science		
ESS4– The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	9-11	**11-12 (Advanced)**
1. DESIGN TECHNOLOGY	S:ESS4:11:1.1 Describe ways in which technology has increased our understanding of the universe. S:ESS4:11:1.2 Understand that technology is designed with a particular function in mind; and principles of Earth Space science are useful in creating technology for the Earth space sciences.	S:ESS4:12:1.1 Recognize the importance of technology as it relates to science, for purposes such as: access to space and other remote locations, sample collection and treatment, measurement, data collection, and storage, computation, and communication of information.
2. TOOLS	S:ESS4:11:2.1 Describe the use and benefits of land-based light telescopes, radio telescopes, spectrophotometers, satellites, manned exploration, probes, and robots to the study of Earth Space Science. S:ESS4:11:2.2 Explain how scientists study the Earth using computer-generated models and observations from both land-based sites and satellites; and describe the value of using these tools in unison.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*
3. LOCAL AND GLOBAL ENVIRONMENTAL ISSUES	S:ESS4:11:3.1 Differentiate between and provide examples of renewable and nonrenewable sources of energy; and explain the advantages and limitations of each. S:ESS4:11:3.2 Describe the means for transforming a natural material, such as iron ore, into useful products during different historical periods, such as the Stone Age, Iron Age, Renaissance, the Industrial Period and the current Age of Information. S:ESS4:11.3.3 Explain how the use of technologies at a local level, such as burning of fossil fuels for transportation or power generation, may contribute to global environmental problems.	S:ESS4:12:3.1 Explain the environmental effects of using both renewable and nonrenewable resources; and provide examples of how man is addressing these effects on the environment. S:ESS4:12:3.2 Provide examples of how man's use of Earth materials has changed over time; and use those examples to explain how the relationship between science and technology has gradually grown closer in the past century. S:ESS4:12:3.3 Research and evaluate a current environmental issue within the State of New Hampshire, such as a dispute regarding the conversion of a natural environment to human use; and construct a defense that supports environmental protection.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:ESS4:11:4.1 Explain the kinds of applications of knowledge and skills necessary for jobs/careers specific to Earth or space sciences.	S:ESS4:12:4.1 Understand the various scientific fields that use scientific content and skills; and distinguish between professional and skilled science jobs/careers in Earth or space sciences.

Life Science Overview

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs	Page K-4	Page 5-8	Page 9-12
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, and species).	1. Classification	**67**	**74**	**83**
	2. Living Things And Organization	**67**	**74**	**84**
	3. Reproduction	**68**	**75**	**85**
LS2– Energy flows and matter recycles through an ecosystem.	1. Environment	**69**	**76**	**86**
	2. Flow Of Energy	**69**	**76**	**87**
	3. Recycling Of Materials	**69**	**77**	**87**
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).	1. Change	**70**	**78**	**88**
	2. Evolution	**70**	**78**	**89**
	3. Natural Selection	**70**	**79**	**90**
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.	1. Behavior	**71**	**80**	**91**
	2. Disease	**71**	**80**	**92**
	3. Human Identity	**72**	**81**	**93**
LS5– The growth of scientific knowledge in Life Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	1. Design Technology	**73**	**82**	**94**
	2. Tools	**73**	**82**	**94**
	3. Social Issues (Local And Global) Medical Technology and Biotechnology	**73**	**82**	**94**
	4. Career Technical Education Connections	**73**	**82**	**94**

Life Science		
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).		
	K-2	**3-4**
1. CLASSIFICATION	S:LS1:2:1.1 Differentiate between living and nonliving things; and categorize objects in each group using the significant observable characteristics they share, such as color, shape and size. S:LS1:2:1.2 Recognize plants and animals as living things and describe how they are alike and different.	S:LS1:4:1.1 Recognize and identify the various ways in which living things can be grouped. S:LS1:4:1.2 Sort/classify different living things using similar and different characteristics; and describe why organisms belong to each group or cite evidence about how they are alike or not alike. [LS1(K-**4**)INQ+POC-**1**]
2. LIVING THINGS AND ORGANIZATION	S:LS1:2:2.1 Recognize that plants and animals have features that help them survive in different environments.	S:LS1:4:2.1 Recognize that living organisms have certain structures and systems that perform specific functions, facilitating survival, growth and reproduction. S:LS1:4.2.2 Identify and describe the function of the plant structures responsible for food production, water transport, support, reproduction, growth and protection. S:LS1:4:2.3 Identify and explain how the physical structures of an organism (plants or animals) allow it to survive in its habitat/environment (e.g., roots for water; nose to smell fire). [LS1(K-**4**)FAF-**4**] S:LS1:4:2.4 Identify the basic needs of plants and animals in order to stay alive (i.e., water, air, food, space). [LS1(K-**4**)SAE-**2**]

Life Science		
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).		
	K-2	**3-4**
3. REPRODUCTION	S:LS1:2:3.1 Recognize that parents and offspring of many species closely resemble one another; and describe the similarities in appearance of given plant and animal families. S:LS1:2:3.2 Recognize that living things have a life cycle, during which they are born, grow, and die.	S:LS1:4:3.1 Distinguish between plant and animal characteristics that are inherited, such as eye color in humans and the shape of leaves in plants, and those that are affected by their environment, such as grass turning brown due to lack of water. S:LS1:4:3.2 Recognize that living organisms have life cycles, which include birth, growth and development, reproduction, and death; and explain how these life cycles vary for different organisms. S:LS1:4:3.3 Describe the reproductive process of plants, explaining some plants grow from seed, while others grow from the parts of other plants. S:LS1:4-3.4 Predict, sequence, or compare the life stages of organisms (plants and animals): e.g., put images of life stages of an organism in order, predict the next stage in sequence, and compare two organisms. [LS1(K-**4**)POC–**3**]

Life Science		
LS2– Energy flows and matter recycles through an ecosystem.		
	K-2	**3-4**
1. ENVIRONMENT	S:LS2:2:1.1 Recognize that living things can be found almost anyplace in the world; and that specific types of environments are required to support the many different species of plant and animal life. S:LS2:2:1.2 Recognize that animals, including humans, interact with their surroundings using their senses; and that different senses provide different kinds of information. S:LS2:2:1.3 Recognize that some plants and animals go through changes in appearance when the seasons change.	S:LS2:4:1.1 Describe how the nature of an organism's environment, such as the availability of a food source, the quantity and variety of other species present, and the physical characteristics of the environment affect the organism's patterns of behavior. S:LS2:4:1.2 Describe the interaction of living organisms with nonliving things.
2. FLOW OF ENERGY	S:LS2:2:2.1 Identify the resources plants and animals need for growth and energy, and describe how their habitat provides these basic needs.	S:LS2:4:2.1 Recognize that the transfer of energy through food is necessary for all living organisms and describe the organization of food webs. S:LS2:4:2.2 Recognize that energy is needed for all organisms to stay alive and grow or identify where a plant or animal gets its energy. [LS2(K-**4**)SAE-**5**]
3. RECYCLING OF MATERIALS	*Districts may choose to work on End of Grade 8 expectations in the 5-8 grade span.*	S:LS2:4:3.1 Recognize that plants and animals interact with one another in various ways besides providing food, such as seed dispersal or pollination. S:LS2:4:3.2 Describe ways plants and animals depend on each other (e.g., shelter, nesting, food). [LS2(K-**4**)SAE-**6**]

Life Science		
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).		
	K-2	**3-4**
1. CHANGE	S:LS3:2:1.1 Recognize that some living things, which lived on Earth long ago, are now extinct, such as dinosaurs, mammoths, giant tree ferns, and horsetail trees.	S:LS3:4:1.1 Provide examples of how environmental changes can cause different effects on different organisms. S:LS3:4:1.2 Provide examples of how an organism's inherited characteristics can adapt and change over time in response to changes in the environment. S:LS3:4:1.3 Using information (data or scenario), explain how changes in the environment can cause organisms to respond (e.g., survive there and reproduce, move away, die). [LS3(K-4)SAE-7]
2. EVIDENCE OF EVOLUTION	S:LS3:2:2.1 Recognize that some plants and animals, which are alive today, are similar to living things which have become extinct, such as elephants and mammoths.	S:LS3:4:2.1 Compare information about fossils to living organisms and other fossils to determine any similarities and differences.
3. NATURAL SELECTION	S:LS3:2:3.1 Recognize and describe the similarities and differences in both behavior and appearance of plants and animals. S:LS3:2:3.2 Recognize that there are different species of living things in various places around the world.	S:LS3:4:3.1 Recognize that individuals of the same species differ in their characteristics; and explain that sometimes these differences give individuals an advantage in survival and reproduction. S:LS3:4:3.2 Recognize that for any particular environment, some kinds of animals and plants survive well, some less well, and some cannot survive at all.

Life Science		
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.		
	K-2	**3-4**
1. BEHAVIOR	S:LS4:2:1.1 Recognize and describe how living things respond when exposed to helpful and harmful situations. S:LS4:2:1.2 Recognize that humans learn from each other in many different ways, such as listening and speaking, watching and imitating. S:LS4:2:1.3 Recognize that humans can gather different kinds of information about an object by adjusting their proximity to it. S:LS4:2:1.4 Recognize that some of the things humans can do, such as playing games, reading, and writing, must be learned.	S:LS4:4:1.1 Recognize that an individual organism's behavior is affected by internal cues, such as hunger and thirst; and describe how an organism uses its senses to understand and respond to these cues. S:LS4:4:1.2 Recognize that an individual organism's behavior is influenced by external cues, such as seasonal change; and describe how an organism might react, such as migrating or hibernating. S:LS4:4:1.3 Recognize behaviors that may be unsafe or unhealthy for themselves and others.
2. DISEASE	S:LS4:2:2.1 Recognize that proper nutrition, exercise and rest are all important factors in maintaining good health. S:LS4:2:2.2 Recognize that humans can spread germs that cause disease. S:LS4:2.2.3 Identify and describe the basic personal hygiene habits for maintaining good health, such as washing one's hands with soap and water and brushing one's teeth. S:LS4:2:2.4 Recognize symptoms, such as fever, rashes, coughing and congestion for common illnesses.	S:LS4:4:2.1 Explain how the amount of rest and the types of food, exercise and recreation humans choose can influence and affect their well-being. S:LS4:4:2.2 Recognize that vitamins and minerals are needed in small amounts and are essential to maintain proper health. S:LS4:4:2.3 Explain how proper food preparation and appropriate food handling practices can maintain the safety and quality of food.

Life Science		
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.		
	K-2	**3-4**
3. HUMAN IDENTITY	S:LS4:2:3.1 Recognize similarities and individual differences among people, and that children closely resemble their parents. S:LS4:2:3.2 Identify the sense organs, including eyes, ears, nose mouth, and skin; and describe how each can warn an individual about danger. S:LS4:2:3.3 Recognize that two parents, both a father and mother, are required for human reproduction. S:LS4:2:3.4 Recognize and describe the human life cycle from birth to old age. S:LS4:2:3.5 Recognize that humans need food, water, air, waste removal and a particular range of temperatures in their environment, just as other animals do.	S:LS4:4:3.1 Identify what the physical structures of humans do (e.g., sense organs– eyes, ears, skin, etc.) or compare physical structures of humans to similar structures of animals. [LS4(K-**4**)FAF-**8**] S:LS4:4:3.2 Distinguish between characteristics of humans that are inherited from parents (i.e., hair color, height, skin color, eye color) and others that are learned (e.g., riding a bike, singing a song, playing a game, reading). [LS4(K-**4**)POC-**9**] S:LS4:4:3.3 Recognize the nutritional value of different foods and distinguish between healthy and unhealthy food choices using data gathered from food labels and dietary guidelines, such as the food pyramid.

Life Science		
LS5– The growth of scientific knowledge in Life Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	K-2	**3-4**
1. DESIGN TECHNOLOGY	S:LS5:2:1.1 Recognize that new products can be made out of natural materials, such as paper from trees and cloth from various plants and animals.	S:LS5:4:1.1 Recognize that man uses various mechanical devices to record and describe living organisms.
2. TOOLS	S:LS5:2:2.1 Recognize that some tools, such as magnifiers, balances and thermometers, have special uses and can help gather information and extend the senses.	S:LS5:4:2.1 Demonstrate the use of appropriate tools and simple equipment, such as thermometers, magnifiers and microscopes to gather data and extend the senses. S:LS5:4:2.2 Identify and describe the purpose of tools used by health care professionals, such as X-rays and stethoscopes.
3. SOCIAL ISSUES (LOCAL AND GLOBAL) MEDICAL TECHNOLOGY BIOTECHNOLOGY	S:LS5:2:3.1 Recognize that technology is used in medicine to prevent and cure diseases through vaccinations and medications. S:LS5:2:3.2 Provide examples from personal experience that illustrate how medicine helps humans recover from illness.	S:LS5:4:3.1 Recognize that medical technology provides information about a body's condition, such as determining blood pressure, and recognizing the need to repair, replace and support the affected body parts. S:LS5:4:3.2 Recognize that biotechnology refers to the different ways humans modify the living environment to meet their needs, including growing food, genetic engineering and using living organisms such as yeast to prepare foods.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:LS5:2:4.1 Recognize that some jobs/careers require knowledge and use of life science content and/or skills.	S:LS5:4:4.1 Identify some jobs/careers that require knowledge and use of life science content and/or skills.

Life Science		
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).		
	5-6	**7-8**
1. CLASSIFICATION	S:LS1:6:1.1 Identify ways in which living things can be grouped and organized, such as taxonomic groups of plants, animals and fungi. S:LS1:6:1.2 Categorize organisms into kingdoms that are currently recognized, according to shared characteristics.	S:LS1:8:1.1 Recognize that similarities among organisms are found in anatomical features and patterns of development; and explain how these can be used to infer the degree of relatedness among organisms. S:LS1:8:1.2 Describe or compare how different organisms have mechanisms that work in a coordinated way to obtain energy, grow, move, respond, provide defense, enable reproduction, or maintain internal balance (e.g., cells, tissues, organs and systems). [LS1(5-**8**)SAE+FAF-**2**]
2. LIVING THINGS AND ORGANIZATION	S:LS1:6:2.1 Recognize that all living things are composed of cells, and explain that while many organisms are single celled, such as yeast, others, including humans, are multicellular. S:LS1:6:2.2 Explain that the way in which cells function is similar in all organisms. S:LS1:6:2.3 Recognize that cells use energy obtain from food, to conduct the functions necessary to sustain life, such as cell growth. S:LS1:6:2.4 Recognize and describe the hierarchical organization of living systems, including cells, tissues, organs, organ systems, whole organisms, and ecosystems. S:LS1:6:2.5 Explain that multicellular organisms have specialized cells, tissues, organs and organ systems that perform certain necessary functions, including digestion, respiration, reproduction, circulation, excretion, movement, control and coordination and protection from disease. S:LS1:6:2.6 Recognize that the human cells found in tissues and organs are similar to those of other animals, but somewhat different from cells found in plants.	S:LS1:8:2.1 Identify the functions of the human body's systems, including digestion, respiration, reproduction, circulation, excretion, movement, control and coordination and protection from disease; and describe how they interact with one another. S:LS1:8:2.2 Define a population and describe the factors that can affect it. S:LS1:8:2.3 Explain why it is beneficial for an organism to be able to regulate its internal environment while living in a constantly changing external environment. S:LS1:8:2.4 Explain relationships between or among the structure and function of the cells, tissues, organs, and organ systems in an organism. [LS1(5-**8**)FAF-**4**] S:LS1:8:2.5 Using data and observations about the biodiversity of an ecosystem, make predictions or draw conclusions about how the diversity contributes to the stability of the ecosystem. [LS1(5-**8**)INQ+SAE-**1**]

Life Science		
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).		
	5-6	**7-8**
3. REPRODUCTION	S:LS1:6:3.1 Explain that cells repeatedly divide to make more cells for growth and repair. S:LS1:6:3.2 Explain that the same genetic information is copied in each cell of a new organism. S:LS1:6:3.3 Explain that all living things reproduce in order to continue their species.	S:LS1:8:3.1 Differentiate between asexual and sexual reproduction, and explain that in some kinds of organisms, all the genes come from one parent, while in organisms requiring two sexes to reproduce, typically half the genes come from each parent. S:LS1:8:3.2 Explain that a species of sexually reproducing organisms is comprised of all the organisms that can mate to produce fertile offspring. S:LS1:8:3.3 Explain that in sexual reproduction, a single specialized cell from a female merges with a specialized cell from a male in a process called fertilization. S:LS1:8:3.4 Explain that the fertilized egg cell, carrying genetic information from each parent, multiplies to form the complete organism. S:LS1:8:3.5 Explain how the basic tissues of an embryo form. S:LS1:8:3.6 Compare and contrast sexual reproduction with asexual reproduction. [LS1(5-**8**)POC-**3**] S:LS1:8:3.7 Using data provided, select evidence that supports the concept that genetic information is passed on from both parents to offspring. [LS4(5-**8**)INQ+POC-**11**]

Life Science		
LS2– Energy flows and matter recycles through an ecosystem.		
	5-6	**7-8**
1. ENVIRONMENT	S:LS2:6:1.1 Identify and describe the factors that influence the number and kinds of organisms an ecosystem can support, including the resources that are available, the differences in temperature, the composition of the soil, any disease, the threat of predators, and competition from other organisms. S:LS2:6:1.2 Explain that most microorganisms do not cause disease and that many are beneficial to the environment.	S:LS2:8:1.1 Explain how changes in environmental conditions can affect the survival of individual organisms and an entire species. S:LS2:8:1.2 Explain that in all environments, organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter, and that in any particular environment the growth and survival of organisms depend on the physical conditions. S:LS2:8:1.3 Using data and observations, predict outcomes when abiotic/biotic factors are changed in an ecosystem. [LS2(5-**8**)INQ+SAE-**5**]
2. FLOW OF ENERGY	S:LS2:6:2.1 Describe how energy is transferred in an ecosystem through food webs; and explain the roles and relationships between producers, consumers and decomposers. S:LS2:6:2.2 Recognize that one of the most general distinctions among organisms is between plants, which use sunlight to make their own food, and animals, which consume energy-rich foods. S:LS2:6:2.3 Describe the process of photosynthesis and explain that plants can use the food they make immediately or store it for later use. S:LS2:6:2.4 Recognize that energy, in the form of heat, is usually a byproduct when one form of energy is converted to another, such as when living organisms transform stored energy to motion.	S:LS2:8:2.1 Explain how food provides energy and materials for growth and repair of body parts. S:LS2:8:2.2 Given a scenario, trace the flow of energy through an ecosystem, beginning with the sun, through organisms in the food web, and into the environment (includes photosynthesis and respiration). [LS2(5-**8**)SAE-**6**]

Life Science		
LS2– Energy flows and matter recycles through an ecosystem.		
	5-6	**7-8**
3. RECYCLING OF MATERIALS	S:LS2:6:3.1 Define a population as all individuals of a species that exist together at a given place and time; and explain that all populations living together in a community, along with the physical factors with which they interact, compose an ecosystem. S:LS2:6:3.2 Using food webs, identify and describe the ways in which organisms interact and depend on one another in an ecosystem. S:LS2:6:3.3 Explain how insects and various other organisms depend on dead plant and animal matter for food; and describe how this process contributes to the system.	S:LS2:8:3.1 Identify autotrophs as producers who may use photosynthesis, and describe this as the basis of the food web. S:LS2:8:3.2 Explain the process of respiration and differentiate between it and photosynthesis. S:LS2:8:3.3 Know that all organisms, including humans, are part of, and depend on, two main interconnected global food webs: one which includes microscopic ocean plants, and the other which includes land plants. S:LS2:8:3.4 Describe how matter is recycled within ecosystems and explain that the total amount of matter remains the same, though its form and location change. S:LS2:8:3.5 Identify carbon, hydrogen, oxygen, nitrogen and phosphorus as common elements of living matter. S:LS2:8:3.6 Given an ecosystem, trace how matter cycles among and between organisms and the physical environment (includes water, oxygen, food web, decomposition and recycling, but not carbon cycle nor nitrogen cycle). [LS2(5-**8**)SAE-**7**]

Life Science		
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).		
	5-6	**7-8**
1. CHANGE	S:LS3:6:1.1 Provide examples of how all organisms, including humans, impact their environment; and explain how some changes can be detrimental to other organisms. S:LS3:6:1.2 Explain how changes in environmental conditions can affect the survival of individual organisms and the entire species.	S:LS3:8:1.1 Describe the type of impact certain environmental changes, including deforestation, invasive species, increased erosion, and pollution containing toxic substances, could have on local environments.
2. EVIDENCE OF EVOLUTION	S:LS3:6:2.1 Describe the fundamental concepts related to biological evolution, such as biological adaptations and the diversity of species.	S:LS3:8:2.1 Describe how the fossil record provides geologic evidence verifying the existence of now extinct life forms, and explains how this evidence provides documented proof of their appearance, diversification and extinction. S:LS3:8:2.2 Explain the concept of extinction and describes its importance in biological evolution. S:LS3:8:2.3 Use a model, classification system, or dichotomous key to illustrate, compare, or interpret possible relationships among groups of organisms (e.g., internal and external structures, anatomical features). [LS3(5-**8**)MAS+FAF-**8**]

Life Science		
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).		
	5-6	**7-8**
3. NATURAL SELECTION	S:LS3:6:3.1 Recognize that there are genetic variations among individuals in groups of organisms and provide examples of how these variations affect the survival of an organism. S:LS3:6:3.2 Recognize that only organisms that are able to reproduce can pass on their genetic information to the next generation.	S:LS3:8:3.1 Recognize that hereditary information is contained in genes, which are located in the chromosomes of each cell; and explain that inherited traits can be determined by either one or many genes, and that a single gene can influence more than one trait, such as eye and hair color. S:LS3:8:3.2 Recognize that in any given environment the growth and survival of organisms depend on the physical conditions that exist; and explain that in all environments, organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter. S:LS3:8:3.3 Explain how individual organisms with certain traits are more likely than others to survive and have offspring. S:LS3:8:3.4 Recognize that humans are able to control some characteristics of plants and animals through selective breeding; and explain how this results in small differences between the parents and offspring, which can accumulate in successive generations so that decedents are very different from their ancestors. S:LS3:8:3.5 Cite examples supporting the concept that certain traits of organisms may provide a survival advantage in a specific environment and therefore, an increased likelihood to produce offspring. [LS3(5-**8**)POC-**9**]

Life Science		
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.		
	5-6	**7-8**
1. BEHAVIOR	S:LS4:6:1.1 Recognize that learning requires more than just storage and retrieval of information and that prior knowledge needs to be tapped in order to make sense out of new experiences or information. S:LS4:6:1.2 Explain that people can learn about others from direct experience, from the media, and from listening to others talk about their life and work. S:LS4:6:1.3 Provide examples of how humans make judgments about new situations based on memories of past experiences.	S:LS4:8:1.1 Recognize that unlike human beings, behavior in insects and many other species is determined almost entirely by biological inheritance. S:LS4:8:1.2 Explain that organism's behavioral response is a reaction to internal or and environmental stimuli, and that these responses may be determined by heredity or from past experience. S:LS4:8:1.3 Explain how all behavior is affected by both inheritance and experience.
2. DISEASE	S:LS4:6:2.1 Explain that the human body has ways to defend itself against disease-causing organisms and describe how defenders, including tears, saliva, the skin, some blood cells and stomach secretions support the defense process. S:LS4:6:2.2 Recognize that there are some diseases that human beings can only get once; and explain how many diseases can be prevented by vaccination. S:LS4:6:2.3 Explain how vaccines induce the body to build immunity to a disease without actually causing the disease itself. S:LS4:6:2.4 Recognize a healthy body cannot fight all germs that invade it; and explain how some germs interfere with the body's defenses.	S:LS4:8:2.1 Recognize that disease in organisms can be caused by intrinsic failures of the system or infection from other organisms. S:LS4:8:2.2 Describe how viruses, bacteria, fungi, and parasites may affect the human body and provide examples of how they can interfere with normal body function. S:LS4:8:2.3 Describe the function of white blood cells and explain how they support the body's defense system. S:LS4:8:2.4 Use data and observations to support the concept that environmental or biological factors affect human body systems (biotic and abiotic). [LS4(5-**8**)INQ-**10**]

Life Science		
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.		
	5-6	**7-8**
3. HUMAN IDENTITY	S:LS4:6:3.1 Recognize that the length and quality of human life are influenced by many factors, including sanitation, diet, medical care, gender, genes, environmental conditions, and personal health behaviors.	S:LS4:8:3.1 Compare patterns of human development with those of other vertebrates. S:LS4:8:3.2 Recognize that an organism can be described in terms of a combination of traits; and differentiate between inherited traits and those that result from interactions with the environment. S:LS4:8:3.3 Describe the major changes that occur over time in human development from single cell through embryonic development to new born (i.e., group of cells during the first trimester, organs form during the second, organs mature during the third). [LS4(5-**8**)POC-**12**] S:LS4:8:3.4 Using data provided, select evidence that supports the concept that genetic information is passed on from both parents to offspring. [LS4(5-**8**)INQ+POC-**11**]

Life Science		
LS5– The growth of scientific knowledge in Life Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	5-6	**7-8**
1. DESIGN TECHNOLOGY	S:LS5:6:1.1 Recognize that an agricultural system is designed to maximize the use of all the elements in the system, including using plants for food, oxygen, for the filtration of air and water, and for making compost.	S:LS5:8:1.1 Explain how technology has influenced the course of history, and provide examples such as those that relate to agriculture, sanitation and medicine. S:LS5:8:1.2 Provide examples of ways technology is used to protect the environment, such as using bacteria to clean water.
2. TOOLS	S:LS5:6:2.1 Demonstrate the appropriate use of tools, such as thermometers, probes, microscopes and computers to gather, analyze and interpret data in the life sciences.	S:LS5:8:2.1 Recognize and provide examples of how technology has enhanced the study of life sciences, as in the development of advanced diagnosing equipment improving medicine.
3. SOCIAL ISSUES (LOCAL AND GLOBAL) MEDICAL TECHNOLOGY BIOTECHNOLOGY	S:LS5:6:3.1 Provide examples of early health care technology that helped to extend the life expectancy of humans, such as the discovery of penicillin and sterilization of surgical instruments. S:LS5:6:3.2 Differentiate between vaccines, which help prevent diseases from developing and spreading, and medicines, which relieve symptoms or cure diseases. S:LS5:6:3.3 Recognize that the quality of personal health can be influenced by society and technology. S:LS5:6:3.4 Identify and describe some of the processes and systems used to grow food in New Hampshire, including irrigation, pest control and harvesting.	S:LS5:8:3.1 Explain the necessity of and purpose for the proper disposal of medical products. S:LS5:8:3.2 Give examples of how increased understanding of biology has led to improvements in biotechnology, such as scientific methods for increasing the yield or the pest-resistance of important food crops. S:LS5:8:3.3 Describes ways biotechnology helps humans, including improved health and medicine.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:LS5:6:4.1 Understand that some form of science is used in most jobs/careers and that some jobs/careers specifically require knowledge of life science.	S:LS5:8:4.1 Understand that some scientific jobs/careers involve the application of life science content knowledge and experience in specific ways that meet the goals of the job.

Life Science		
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).		
	9-11	**11-12 (Advanced)**
1. CLASSIFICATION	S:LS1:11:1.1 Describe how organisms are classified into a hierarchy of groups and subgroups, which are based on similarities that reflect their evolutionary relationships. S:LS1:11:1.2 Explain that organisms that possess similar DNA code are more closely related than those in which DNA varies greatly. S:LS1:11:1.3 Identify plants and animals according to binomial nomenclature. S:LS1:11:1.4 Differentiate between prokaryotic and eukaryotic cells according to general structure and degrees of complexity.	S:LS1:12:1.1 Differentiate between prokaryotic and eukaryotic cells at the biochemical level, using cell wall composition, DNA structure, and other biochemical pathways.

Life Science		
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).		
	9-11	**11-12 (Advanced)**
2. LIVING THINGS AND ORGANIZATION	S:LS1:11:2.1 Identify the structures of different types of cell parts/organelles and explain the functions they perform. S:LS1:11:2.2 Recognize how cell functions are regulated through changes in the activity of the functions performed by proteins, and through the selective expression of individual genes; and explain how this regulation allows cells to respond to their environment and to control and coordinate cell growth and division. S:LS1:11:2.3 Recognize how an organism's organization and complexity accommodate its need for obtaining, transforming, transporting, releasing, and eliminating the matter and energy used to sustain it. S:LS1:11:2.4 Explain how the processes of photosynthesis and cellular respiration are interrelated and contribute to biogeochemical cycles. S:LS1:11:2.5 Describe the structures of proteins and their role in cell function. S:LS1:11:2.6 Describe the chemical reactions involved in cell functions using examples from the nervous, immune and endocrine systems in multicellular animals. S:LS1:11:2.7 Recognize that because all matter tends toward more disorganized states, living systems need a continuous input of energy to maintain their chemical and physical organizations. S:LS1:11:2.8 Use data and observation to make connections between, to explain, or to justify how specific cell organelles produce/regulate what the cell needs or what a unicellular or multi-cellular organism needs for survival (e.g., protein synthesis, DNA transport, nerve cells). [LS1(9-**11**)INQ+SAE+FAF-**1**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses* S:LS1:12:2.1 Compare the processes of mitosis and meiosis, including disruptions to the cycles, such as disease or cancer. S:LS1:12:2.2 Explain the process of cell differentiation, using stem cells as an example.

Life Science		
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).		
	9-11	**11-12 (Advanced)**
3. REPRODUCTION	S:LS1:11:3.1 Describe the chemical and structural properties of DNA and explain its role in identifying the characteristics of an organism. S:LS1:11:3.2 Recognize that new heritable characteristics can only result from new combinations of existing genes or from mutations of genes in an organism's sex cells; and explain why other changes in an organism cannot be passed on. S:LS1:11:3.3 Describe the alternation of generations, life cycles with haploid and diploid phases in living organisms, such as bacteria, plants and animals. S:LS1:11:3.4 Explain or justify with evidence how the alteration of the DNA sequence may produce new gene combinations that make little difference, enhance capabilities, or can be harmful to the organism (e.g., selective breeding, genetic engineering, mutations). [LS1(9-**11**)FAF+POC-**2**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses* S:LS1:12:3.1 Compare and contrast the alternation of generations' life cycles; and understand the variations of the haploid and diploid phases that produce diplontic, haplontic, and isomorphic alternation of generations in living organisms.

Life Science		
LS2– Energy flows and matter recycles through an ecosystem.		
	9-11	**11-12 (Advanced)**
1. ENVIRONMENT	S:LS2:11:1.1 Explain how the amount of life an environment can sustain is restricted by the availability of matter and energy, and the ability of the ecosystem to recycle materials. S:LS2:11:1.2 Describe how the interrelationships and interdependencies among organisms generate stable ecosystems that fluctuate around a state of rough equilibrium for hundreds or thousands of years. S:LS2:11:1.3 Identify the factors in an ecosystem that can affect its carrying capacity. S:LS2:11:1.4 Analyze and describe how environmental disturbances, such as climate changes, natural events, human activity and the introduction of invasive species, can affect the flow of energy or matter in an ecosystem. S:LS2:11:1.5 Using data from a specific ecosystem, explain relationships or make predictions about how environmental disturbance (human impact or natural events) affects the flow of energy or cycling of matter in an ecosystem. [LS2(9-**11**)INQ+SAE-**3**] S:LS2:11:1.6 Explain or evaluate potential bias in how evidence is interpreted in reports concerning a particular environmental factor that impacts the biology of humans. [LS2(9-**11**)NOS-**5**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*

Life Science		
LS2– Energy flows and matter recycles through an ecosystem.		
	9-11	**11-12 (Advanced)**
2. FLOW OF ENERGY AND RECYCLING OF MATERIALS	S:LS2:11:2.1 Use examples from local ecosystems to describe the relationships among organisms at the different trophic levels.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*
3. RECYCLING OF MATERIALS	S:LS2:11:3.1 Explain that as matter and energy flow through different levels of organization in living systems and between living systems and the environment, elements, such as carbon and nitrogen, are recombined in different ways. S:LS2:11:3.2 Trace the cycling of matter (e.g., carbon cycle) and the flow of energy in a living system from its source through its transformation in cellular, biochemical processes (e.g., photosynthesis, cellular respiration, fermentation). [LS2(9-**11**)POC+SAE-**4**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses*

Life Science		
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).		
	9-11	**11-12 (Advanced)**
1. CHANGE	S:LS3:11:1.1 Identify ways humans can impact and alter the stability of ecosystems, such as habitat destruction, pollution, and consumption of resources; and describe the potentially irreversible effects these changes can cause. S:LS3:11:1.2 Identify ways of detecting, and limiting or reversing environmental damage. S:LS3:11:1.3 Analyze the aspects of environmental protection, such as ecosystem protection, habitat management, species conservation and environmental agencies and regulations; and evaluate and justify the need for public policy in guiding the use and management of the environment.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Life Science		
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).		
	9-11	**11-12 (Advanced)**
2. EVIDENCE OF EVOLUTION	S:LS3:11:2.1 Explain the currently accepted theory for the development of life on Earth, including the history of its origin and the evolutionary process. S:LS3:11:2.2 Recognize that the abilities and behaviors an organism has, and likelihood of its survival strongly depend on its heritable characteristics, which can be biochemical and anatomical. S:LS3:11:2.3 Explain the contributions of Darwin, Malthus, Wallace and Russell to the advancement of life science. S:LS3:11:2.4 Explain evolution in terms of how the Earth's present-day life forms evolved from earlier, distinctly different species as a consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuing selection. S:LS3:11:2.5 Explain how evidence from technological advances supports or refutes the genetic relationships among groups of organisms (e.g., DNA analysis, protein analysis). [LS3(9-**11**)NOS-**6**] S:LS3:11:2.6 Given information about living or extinct organisms, cite evidence to explain the frequency of inherited characteristics of organisms in a population; or explain the evolution of varied structures (with defined functions) that affected the organisms' survival in a specific environment (e.g., giraffe, wind pollination of flowers). [LS3(9-**11**)INQ+FAF+POC-**8**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Life Science		
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).		
	9-11	**11-12 (Advanced)**
3. NATURAL SELECTION	S:LS3:11:3.1 Explain the concept of natural selection. S:LS3:11:3.2 Explain the diversity and unity of past and present life forms on Earth using currently accepted theories. S:LS3:11:3.3 Recognize how a species' chance of survival increases with each variation of an organism within the species; and explain how, in the event of a major global change, the greater the diversity of species on Earth, the greater the chance for survival of life. S:LS3:11:3.4 Analyze present day data and research in areas, including antibiotic resistance in bacteria, changes in viral genomes, such as bird flu, and DNA sequencing; and relate it to the concepts of natural selection. S:LS3:11:3.5 Identify and describe ways genes may be changed and combined to create genetic variation within a species. S:LS3:11:3.6 Explain that gene mutations and new combinations may have a variety of effects on the organism, including positive and negative ones, or none at all. S:LS3:11:3.7 Explain the concepts of Mendelian genetics. S:LS3:11:3.8 Use pedigree charts and Punnet Squares to determine patterns of inheritance. S:LS3:11:3.9 Given a scenario, provide evidence that demonstrates how sexual reproduction results in a great variety of possible gene combinations and contributes to natural selection (e.g., Darwin's finches, isolation of a species, Tay Sach's disease). [LS3(9-**11**)INQ+POC-7]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.* S:LS3:12:3.1 Understand the types of mutations that cause changes in DNA and cause the appearance of new alleles, such as frameshift and point mutations, and the chromosomal mutations of insertion, deletion, translocation, and duplication.

Life Science		
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.		
	9-11	**11-12 (Advanced)**
1. BEHAVIOR	S:LS4:11:1.1 Recognize that the immune system, endocrine system, and nervous system can affect the homeostasis of an organism. S:LS4:11:1.2 Describe how the functions of all the human body systems are interrelated at a chemical level and how they maintain homeostasis.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Life Science		
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.		
	9-11	**11-12 (Advanced)**
2. DISEASE	S:LS4:11:2.1 Explain that disease in organisms can be caused by intrinsic failures of the system or infection by other organisms, and describe as well as provide examples of how some diseases are caused by: the breakdown in cellular function, congenital conditions, genetic disorders, malnutrition, and emotional health, including stress. S:LS4:11:2.2 Explain that vaccines were developed to reduce or eliminate diseases; and provide examples of how these medical advances have proven to be successful. S:LS4:11:2.3 Describe and provide examples of how new medical techniques, efficient health care delivery systems, improved sanitation, and a more complete understanding of the nature of disease provides today's humans a better chance of staying healthier than their forebears. S:LS4:11:2.4 Describe how some drugs mimic or block the molecules involved in transmitting nerve or hormone signals and explain how this disturbs the normal operations of the brain and body. S:LS4:11:2.5 Explain that gene mutation in a cell can result in uncontrolled division, which is called cancer; and describe how exposure of cells to certain chemicals and radiation increase mutation, and thus the chance for cancer. S:LS4:11:2.6 Use evidence to make and support conclusions about the ways that humans or other organisms are affected by environmental factors or heredity (e.g., pathogens, diseases, medical advances, pollution, mutations). [LS4(9-**11**)INQ+NOS-**9**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Life Science		
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.		
	9-11	**11-12 (Advanced)**
3. HUMAN IDENTITY	S:LS4:11:3.1 Describe how the length and quality of human life are influenced by many factors, including sanitation, diet, medical care, gender, genes, and environmental conditions and personal health behaviors. S:LS4:11:3.2 Explain how the immune system functions to prevent and fight disease. S:LS4:11:3.3 Explain how the immune system, endocrine system, or nervous system works and draw conclusions about how systems interact to maintain homeostasis in the human body. [LS4(9-**11**)SAE+FAF-**10**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Life Science		
LS5– The growth of scientific knowledge in Life Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	9-11	**11-12 (Advanced)**
1. DESIGN TECHNOLOGY	S:LS5:11:1.1 Describe ways in which technology has increased our understanding of the life sciences. S:LS5:11:1.2 Understand that technology is designed with a particular function in mind, and principles of life science are useful in creating technology for the life sciences.	S:LS5:12:1.1 Recognize the importance of technology as it relates to science, for purposes such as: access to information about living systems, medical diagnosis, sample collection and treatment, measurement, data collection, and storage, computation, and communication of information.
2. TOOLS	S:LS5:11:2.1 Describe the use and benefits of equipment such as light microscopes, transmission electron microscopes, scanning electron microscopes, spectrophotometers, probes, and robotics to the study of the life sciences.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*
3. SOCIAL ISSUES (LOCAL AND GLOBAL) MEDICAL TECHNOLOGY BIOTECHNOLOGY	S:LS5:11:3.1 Describe ways technology can support and improve our understanding of environmental issues. S:LS5:11:3.2 Describe aspects of the medical system available to help people in New Hampshire, including: prevention programs, vaccines and pharmaceuticals, hospitals and rehabilitation facilities. S:LS5:11:3.3 Recognize that biotechnology is used in many areas, such as agriculture, pharmaceuticals, the environment, and genetic engineering; and understand that it requires extensive knowledge of the systems being changed. S:LS5:11:3.4 Explain how advances in agriculture made using biotechnology have directly affected the food production over the past 100 years; and that this change has profoundly affected societies all over the globe, making larger populations and urban centers a possibility.	S:LS5:12:3.1 Explain how genetic engineering is used to modify the DNA structure of an organism; and describe how this process is used to research and develop medically useful products, such as insulin. S:LS5:12:3.2 Summarize arguments on both sides of a medical research controversy, such as stem cell research, cloning, or zootransplanation. S:LS5:12:3.3 Analyze and evaluate a biotechnology system in New Hampshire that focuses on a specific goal, such as pharmaceutical development; and describe all elements of the system, identifying the costs and the benefits.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:LS5:11:4.1 Explain the kinds of applications of knowledge and skills necessary for jobs/careers specific to the life sciences.	S:LS5:12:4.1 Understand the various scientific fields that use scientific content and skills; and distinguish between professional and skilled science jobs/careers in the life sciences.

Physical Science Overview

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs	Page K-4	Page 5-8	Page 9-12
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).	1. Composition	**96**	**101**	**107**
	2. Properties	**96**	**102**	**108**
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.	1. Change	**97**	**103**	**109**
	2. Conservation	**97**	**103**	**110**
	3. Energy	**98**	**104**	**111-112**
PS3– The motion of an object is affected by force.	1. Forces	**99**	**105**	**113**
	2. Motion	**99**	**105**	**114**
PS4– The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	1. Design Technology	**100**	**106**	**115**
	2. Tools	**100**	**106**	**115**
	3. Social Issues (Local and Global) Energy, Power, and Transportation Manufacturing	**100**	**106**	**115**
	4. Career Technical Education Connections	**100**	**106**	**115**

Physical Science		
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).		
	K-2	**3-4**
1. COMPOSITION	S:PS1:2:1.1 Recognize that objects can be composed of different types of materials, such as wood, metal, and paper. S:PS1:2:1.2 Recognize that objects can be made of one or more materials.	S:PS1:4:1.1 Explain that materials may be composed of parts that are too small to be seen without magnification. S:PS1:4:1.2 Use measures of weight (data) to demonstrate that the whole equals the sum of its parts. [PS1(K-**4**)SAE-**3**]
2. PROPERTIES	S:PS1:2:2.1 Identify the observable properties of different objects, such as color, size, shape, weight and texture.	S:PS1:4:2.1 Recognize that substances can be classified by observable properties. S:PS1:4:2.2 Explain that some materials can exist in different states; and describe the distinct physical properties of each state of matter. S:PS1:4:2.3 Explain how some materials, such as water, can change from one state to another by heating or cooling. S:PS1:4:2.4 Make a prediction about what might happen to the state of common materials when heated or cooled; or categorize materials as solid, liquid, or gas. [PS1(K-**4**)POC-**2**] S:PS1:4:2.5 Collect and organize data about physical properties in order to classify objects or draw conclusions about objects and their characteristic properties (e.g., temperature, color, size, shape, weight, texture, flexibility). [PS1(K-**4**)INQ-**1**]

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	K-2	**3-4**
1. CHANGE	S:PS2:2:1.1 Describe how the properties of certain materials can change when specific actions are applied to them, such as freezing, mixing, heating, cutting, dissolving and bending. S:PS2:2:1.2 Recognize that not all materials react the same way when an action is applied to them.	S:PS2:4:1.1 Recognize that energy has the ability to create change.
2. CONSERVATION	*None at this grade span.*	*None at this grade span.*

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	K-2	**3-4**
3. ENERGY	S:PS2:2:3.1 Recognize that sound is produced by vibrating objects and that the pitch of the sound can be varied by changing the rate of vibration. S:PS2:2:3.2 Explain that the Sun provides the Earth with heat and light. S:PS2:2:3.3 Describe that heat can be produced in a variety of ways, such as burning, rubbing, and mixing substances together. S:PS2:2:3.4 Recognize that energy comes from different sources, such as electricity and water, and is utilized in many common objects.	S:PS2:4:3.1 Identify the various forms of energy, such as electrical, light, heat, sound. S:PS2:4:3.2 Recognize that electricity in circuits can produce light, heat, sound, and magnetic effects. S:PS2:4:3.3 Identify and describe the organization of a simple circuit. S:PS2:4:3.4 Differentiate between objects and materials that conduct electricity and those that are insulators of electricity. S:PS2:4:3.5 Explain that light travels in a straight line until it strikes an object; and describe how it can be reflected by a mirror, bent by a lens, or absorbed by the object. S:PS2:4:3.6 Given a specific example or illustration (e.g., simple closed circuit, rubbing hands together) predict the observable effects of energy (i.e., the bulb lights, a bell rings, hands warm up). A test item may ask, "What will happen when…?" [PS2(K-**4**)SAE-**4**] S:PS2:4:3.7 Use observations of light in relation to other objects/substances to describe the properties of light (i.e., can be reflected, refracted, or absorbed). [PS2(K-**4**)SAE-**5**] S:PS2:4:3.8 Experiment, observe, or predict how heat might move from one object to another. [PS2(K-**4**) INQ+SAE-**6**]

Physical Science		
PS3– The motion of an object is affected by force.		
	K-2	**3-4**
1. FORCES	S:PS3:2:1.1 Describe the properties of magnetism and demonstrate how magnets can be used to move some things without touching them. S:PS3:2:1.2 Describe and demonstrate that things close to the Earth drop to the ground unless something supports them.	S:PS3:4:1.1 Recognize that magnets attract certain kinds of other materials; and classify objects by those magnets will attract and those they will not. S:PS3:4:1.2 Recognize that magnets attract and repel each other. S:PS3:4:1.3 Explain that electrically charged material pulls on all other materials and can attract or repel other charged materials. S:PS3:4:1.4 Recognize that the Earth's gravitational force pulls any object toward it. S:PS3:4:1.5 Use observations of magnets in relation to other objects to describe the properties of magnetism (i.e., attract or repel certain objects or has no effect). [PS3(K-**4**)INQ+SAE-**8**]
2. MOTION	S:PS3:2:2.1 Describe the many different ways things can move, such as in a straight line, zigzag or circular motion, back and forth, and fast and slow. S:PS3:2:2.2 Describe and demonstrate how the position and motion of an object can be changed by applying force, such as pushing and pulling; and explain that the greater the force, the greater the change. S:PS3:2:2.3 Describe the position of an object by referencing its location in relation to another object or background.	S:PS3:4:2.1 Use data to predict how a change in force (greater/less) might affect the position, direction of motion, or speed of an object (e.g., ramps and balls). [PS3(K-**4**)INQ+SAE-**7**]

Physical Science		
PS4– The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	K-2	**3-4**
1. DESIGN TECHNOLOGY	S:PS4:2:1.1 Recognize that new objects can be made out of physical materials, such as cloth and paper.	S:PS4:4:1.1 Understand that materials are used in certain products based on their properties, such as strength and flexibility. S:PS4:4:1.2 Recognize that products are made using a combination of technologies, such as how an escalator uses both a pulley system and an electrical motor.
2. TOOLS	S:PS4:2:2.1 Identify tools and simple machines, such as a wheel, and explain how they work. S:PS4:2:2.2 Demonstrate how to use tools, such as rulers, scales, balances, magnifiers and thermometers to measure properties of objects, such as size, weight, temperature.	S:PS4:4:2.1 Demonstrate how to use tools, such as magnifiers, scales, balances, rulers, and thermometers to gather data and extend the senses. S:PS4:4:2.2 Describe how some tools can be used to modify natural materials by processes such as separating, shaping, and joining, to produce new materials.
3. SOCIAL ISSUES (LOCAL AND GLOBAL) ENERGY, POWER, AND TRANSPORTATION MANUFACTURING	S:PS4:2:3.1 Provide examples of how man uses energy in everyday life, such as providing light, warmth in winter, cooling in summer, TVs, computers, telephones, transportation, factories. S:PS4:2:3.2 Provide examples of items that are manufactured or produced.	S:PS4:4:3.1 Give examples of transportation systems used in New Hampshire, such as buses, trains, cars, and bicycles; and describe the sources of energy they use. S:PS4:4:3.2 Explain that manufactured products are designed to solve a problem or meet a need. S:PS4:4:3.3 Provide an example to illustrate that manufacturing involves changing natural materials into finished products; and explain that this results in the production of a large number of objects that look almost identical.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:PS4:2:4.1 Recognize that some jobs/careers require knowledge and use of physical science content and/or skills.	S:PS4:4:4.1 Identify some jobs/careers that require knowledge and use of physical science content and/or skills.

Physical Science		
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).		
	5-6	**7-8**
1. COMPOSITION	S:PS1:6:1.1 Recognize that all matter is composed of minute particles called atoms; and explain that all substances are composed of atoms, each arranged into different groupings. S:PS1:6:1.2 Identify elements as substances that contain only one kind of atom; and explain that elements do not break down by normal laboratory reactions, such as heating, exposure to electric current, and reaction to acid. S:PS1:6:1.3 Recognize that over one hundred elements exist, and identify the periodic table as a tool for organizing the information about them.	S:PS1:8:1.1 Explain that atoms often combine to form a molecule or formula unit (crystal). S:PS1:8:1.2 Recognize that elements can combine in a variety of ways to form compounds. S:PS1:8:1.3 Differentiate between an atom and an molecule. S:PS1:8:1.4 Differentiate between a mixture and a pure substance. S:PS1:8:1.5 Identify methods used to separate mixtures, such as boiling, filtering, chromatography and screening. S:PS1:8:1.6 Collect data or use data provided to infer or predict that the total amount of mass in a closed system stays the same, regardless of how substances interact (conservation of matter). [PS1(5-**8**)INQ+SAE-**3]** S:PS1:8:1.7 Given graphic or written information, classify matter as atom/molecule or element/compound (not the structure of an atom). [PS1(5-**8**)MAS-**5]**

Physical Science		
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).		
	5-6	**7-8**
2. PROPERTIES	S:PS1:6:2.1 Identify elements according to their common properties, such as highly reactive metals, less reactive metals, highly reactive non-metals and almost non-reactive gases. S:PS1:6:2.2 Identify substances by their physical and chemical properties, such as magnetism, conductivity, density, solubility, boiling and melting points. S:PS1:6:2.3 Differentiate between weight and mass. S:PS1:6:2.4 Identify energy as a property of many substances.	S:PS1:8:2.1 Differentiate between volume and mass and define density. S:PS1:8:2.2 Explain how different substances of equal volume usually have different weights. S:PS1:8:2.3 Identify a molecule as the smallest part of a substance that retains its properties. S:PS1:8:2.4 Investigate the relationships among mass, volume and density. [PS1(5-**8**)INQ-**1**] S:PS1:8:2.5 Given data about characteristic properties of matter (e.g., melting and boiling points, density, solubility), identify, compare, or classify different substances. [PS1(5-**8**)INQ+POC-**2**] S:PS1:8:2.6 Represent or explain the relationship between or among energy, molecular motion, temperature, and states of matter. [PS1(5-**8**)SAE+MAS-**4**]

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	5-6	**7-8**
1. CHANGE	S:PS2:6:1.1 Differentiate between a physical change, such as melting, and a chemical change, such as rusting.	S:PS2:8:1.1 Explain how substances react chemically with other substances to form new substances, known as compounds, and that in such recombinations, the properties of the new substances may be very different from those of the old. S:PS2:8:1.2 Identify factors that affect reaction rates, such as temperature, concentration and surface area; and explain that dissolving substances in liquids often accelerates reaction rates. S:PS2:8:1.3 Explain that oxidation involves combining oxygen with another substance, as in burning or rusting. S:PS2:8:1.4 Explain that states of matter depend on the arrangement of the molecules and their motion. S:PS2:8:1.5 Given a real-world example, show that within a system, energy transforms from one form to another (i.e., chemical, heat, electrical, gravitational, light, sound, mechanical). [PS2(5-**8**)SAE+POC-**6**]
2. CONSERVATION	S:PS2:6:2.1 Describe how mass remains constant in a closed system and provide examples relating to both physical and chemical change.	S:PS2:8:2.1 Explain the law of conservation of energy. S:PS2:8:2.2 Collect data or use data provided to infer or predict that the total amount of mass in a closed system stays the same, regardless of how substances interact (conservation of matter). [PS1(5-**8**)INQ+SAE-**3**]

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	5-6	**7-8**
3. ENERGY	S:PS2:6:3.1 Explain that the pitch of a sound is dependent on the frequency of the vibration producing it. S:PS2:6:3.2 Explain that sound vibrations move at different speeds, have different wavelengths; and establish wave-like disturbances that emanate from the source. S:PS2:6:3.3 Recognize that energy, in the form of heat, is usually a by-product when one form of energy is changed to another, such as when machines convert stored energy to motion. S:PS2:6:3.4 Explain that heat energy moves from warmer materials or regions to cooler ones through conduction, convection, and radiation. S:PS2:6:3.5 Explain how electrical circuits can be used to transfer energy in order to produce heat, light, sound, and chemical changes.	S:PS2:8:3.1 Differentiate between kinetic energy, which is the energy of motion and potential energy, which depends on relative position. S:PS2:8:3.2 Recognize the Sun is a major energy source for the Earth, and describes how it affects the planet's surface. S:PS2:8:3.3 Describe ways light can interact with matter, such as transmission (which includes refraction), absorption, and scattering (which includes reflection). S:PS2:8:3.4 Explain that the human eye can only detect wavelengths of electromagnetic radiation within a narrow range; and explain that the differences of wavelength within that range of visible light are perceived as differences in color. S:PS2:8:3.5 Recognize that most chemical and nuclear reactions involve a transfer of energy. S:PS2:8:3.6 Use data to draw conclusions about how heat can be transferred (convection, conduction, radiation). [PS2(5-**8**)INQ+SAE+POC-**7**]

Physical Science		
PS3– The motion of an object is affected by force.		
	5-6	**7-8**
1. FORCES	S:PS3:6:1.1 Recognize that just as electric currents can produce magnetic forces, magnets can cause electric currents. S:PS3:6:1.2 Explain that when a force is applied to an object, it reacts in one of three ways: the object either speeds up, slows down, or goes in a different direction. S:PS3:6:1.3 Describe the relationship between the strength of a force on an object and the resulting effect, such as the greater the force, the greater the change in motion.	S:PS3:8:1.1 Explain that the force of gravity gets stronger the closer one gets to an object and decreases the further away one gets from it. S:PS3:8:1.2 Recognize the general concepts related to gravitational force. S:PS3:8:1.3 Use data to determine or predict the overall (net) effect of multiple forces (e.g., friction, gravitational, magnetic) on the position, speed, and direction of motion of objects. [PS3(5-**8**)INQ+POC-**8**]
2. MOTION	S:PS3:6:2.1 Explain the how balanced and unbalanced forces are related to an object's motion. S:PS3:6:2.2 Explain that an object's motion can be tracked and measured over time and that the data can be used to describe its position.	S:PS3:8:2.1 Explain that an object in motion that is unaffected by a force will continue to move at a constant speed and in a straight line. S:PS3:8:2.2 Explain how the motion of an object can be described by its position, direction of motion, and speed; and illustrate how that motion can be measured and represented graphically.

Physical Science		
PS4– The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	5-6	**7-8**
1. DESIGN TECHNOLOGY	S:PS4:6:1.1 Understand that scientific principles are used in the design of technology.	S:PS4:8:1.1 Understand that design features, such as size shape, weight, and function, must be considered when designing new technology.
2. TOOLS	S:PS4:6:2.1 Recognize that manufacturing processes use a variety of tools and machines to separate, form, combine and condition natural and synthetic materials.	S:PS4:8:2.1 Demonstrate appropriate use of tools, such as rulers, calculators, balances, and graduated cylinders to measure and calculate volume and mass.
3. SOCIAL ISSUES (LOCAL AND GLOBAL) ENERGY, POWER, AND TRANSPORTATION MANUFACTURING	S:PS4:6:3.1 Explain how a battery changes chemical energy into electrical energy. S:PS4:6:3.2 Demonstrate how to produce a magnetic force with an electric current, such as an electromagnet, and how to produce an electric current with a magnet, such as a generator. S:PS4:6:3.3 Provide an example to show that manufacturing processes involve changing natural materials into finished products through a series of processes that involve physical and/or chemical changes.	S:PS4:8:3.1 Explain how humans use natural resources, such as flowing water and burning of coal, oil, or natural gas to generate electrical energy in power plants. S:PS4:8:3.2 Describe how natural resources, such as coal, oil and natural gas are tapped for use in power plants, and how alternative sources, such as solar, wind, water, nuclear are tapped for power; and compare the advantages and disadvantages of each source. S:PS4:8:3.3 Differentiate between durable goods, which are designed to operate for a long period of time, and non-durable goods, which are only intended to operate for a short period of time.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:PS4:6:4.1 Understand that some form of science is used in most jobs/careers and that some jobs/careers specifically require knowledge of physical science.	S:PS4:8:4.1 Understand that some scientific jobs/careers involve the application of physical science content knowledge and experience in specific ways that meet the goals of the job.

Physical Science		
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).		
	9-11	**11-12 (Advanced)**
1. COMPOSITION	S:PS1:11:1.1 Recognize and describe the structure of an atom and explain how the major components interact with one another. S:PS1:11:1.2 Recognize how elements are arranged in the periodic table; and explain how this arrangement illustrates the repeating patterns among elements with similar properties, such as the relationship between atomic number and atomic mass. S:PS1:11:1.3 Explain that neutrons and protons are made up of even smaller constituents. S:PS1:11:1.4 Define isotopes; recognize that most elements have two or more isotopes; and explain that although the number of neutrons has little affect on how the atom interacts with others, they do affect the mass and stability of the nucleus. S:PS1:11:1.5 Scientific thought about atoms has changed over time. Using information (narratives or models of atoms) provided, cite evidence that changed our understanding of the atom and the development of atomic theory. [PS1(9-**11**)MAS+NOS-**2**] S:PS1:11:1.6 Model and explain the structure of an atom or explain how an atom's electron configuration, particularly the outermost electron(s), determines how that atom can interact with other atoms. [PS1(9-**11**)MAS+FAF-**4**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.* S:PS1:12:1.1 Understand the basic building blocks of matter are quarks and leptons. S:PS1:12:1.2 Recognize the main ideas of string theory. S:PS1:12:1.3 Identify the sub-orbital shapes and geometric orientations of the orbitals electrons can occupy in atoms.

Physical Science		
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).		
	9-11	**11-12 (Advanced)**
2. PROPERTIES	S:PS1:11:2.1 Explain that the physical properties of a compound are determined by its molecular structure and the interactions among the molecules. S:PS1:11:2.2 Determine whether an atom is either electrically neutral or an ion by referring to its number of electrons. S:PS1:11:2.3 Explain how the chemical properties of an element are governed by the electron configuration of atoms, and describe how atoms interact with one another by transferring or sharing the outermost electrons. S:PS1:11:2.4 Explain that radioactive materials are unstable and undergo spontaneous nuclear reactions, which emit particles and/or wavelike radiation. S:PS1:11:2.5 Explain that states of matter rely on the arrangement and motion of molecules; and differentiate between the structures of solids, liquids, and gases. S:PS1:11:2.6 Use physical and chemical properties as determined through an investigation to identify a substance. [PS1(9-**11**)INQ-**1**] S:PS1:11:2.7 Explain how properties of elements and the location of elements on the periodic table are related. [PS1(9-**11**)POC-**3**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	9-11	**11-12 (Advanced)**
1. CHANGE	S:PS2:11:1.1 Recognize and explain that atoms may be bonded together into molecules or formula units (crystalline solids). S:PS2:11:1.2 Recognize that atoms interact with one another by transferring or sharing electrons that are furthest from the nucleus; and explain that the outer electrons govern the chemical properties of an element. S:PS2:11:1.3 Explain that compounds are formed through both ionic and covalent bonding. S:PS2:11:1.4 Recognize that the rates of chemical reactions can vary greatly; and identify the factors that influence these reaction rates, such as how often the reacting atoms and molecules encounter one another, the temperature, and the properties of the reacting species, including shape. S:PS2:11:1.5 Explain relationships between and among electric charges, magnetic fields, electromagnetic forces, and atomic particles. [PS2(9-**11**)SAE-**7**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.* S:PS2:12:1.1 Explain the complete mole concept and identify ways in which it can be used, such as to differentiate between actual and relative mass.

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	9-11	**11-12 (Advanced)**
2. CONSERVATION	S:PS2:11:2.1 Explain that chemical reactions either release or consume energy. S:PS2:11:2.2 Explain that chemical reactions can be accelerated by catalysts, such as enzymes. S:PS2:11:2.3 Recognize that a large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms. S:PS2:11:2.4 Identify the variety of structures that may be formed from the bonding of carbon atoms, and describe their roles in various chemical reactions, including those required for life processes. S:PS2:11:2.5 Demonstrate how transformations of energy produce some energy in the form of heat and therefore the efficiency of the system is reduced (chemical, biological, and physical systems). [PS2(9-**11**)POC+SAE-**5**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	9-11	**11-12 (Advanced)**
3. ENERGY	S:PS2:11:3.1 Explain that all energy can be considered to be either kinetic energy, potential energy, or energy contained by a field. S:PS2:11:3.2 Provide examples of how kinetic and potential energy can be transformed from one to the other. S:PS2:11:3.3 Describe how the energy associated with individual atoms and molecules can be used to identify the substances they comprise; and explain that each kind of atom or molecule can gain or lose energy only in particular discrete amounts, absorbing and emitting light only at wavelengths corresponding to these amounts. S:PS2:11:3.4 Explain the range of the electromagnetic spectrum as it relates to both wavelength and energy; and provide examples of practical applications of the different wavelengths in the spectrum. S:PS2:11:3.5 Recognize that the human eye can only see a narrow range of wavelengths within the electromagnetic spectrum; and explain how the variations of wavelength within that range of visible light are perceived as differences in color. S:PS2:11:3.6 Describe the relationship between heat and temperature, explaining that heat energy consists of the random motion and vibrations of atoms, molecules, and ions; and that the higher the temperature, the greater the atomic or molecular motion.	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.* S:PS2:12:3.1 Explain the concept of entropy. S:PS2:12:3.2 Understand that activation energy is required to make a chemical reaction proceed, whether or not it is exothermic or endothermic.

Physical Science		
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.		
	9-11	**11-12 (Advanced)**
	S:PS2:11:3.7 Explain that waves, such as light, seismic, sound waves, have energy and can transfer energy when they interact with matter. S:PS2:11:3.8 Explain that nuclear reactions convert a fraction of the mass of interacting particles into energy and release much greater amounts of energy than atomic interactions. S:PS2:11:3.9 Describe how electrons flow easily in some materials, such as metals, whereas in insulating materials, such as glass, they can hardly flow at all. S:PS2:11:3.10 Using information provided about chemical changes, draw conclusions about the energy flow in a given chemical reaction (e.g., exothermic reactions, endothermic reactions). [PS2(9-**11**)INQ+SAE-**6**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.*

Physical Science		
PS3– The motion of an object is affected by force.		
	9-11	**11-12 (Advanced)**
1. FORCES	S:PS3:11:1.1 Explain that magnetic forces are related to the action of electrons and can be thought of as different aspects of a single electromagnetic force; and describe how the interplay of these forces is the basis for electric motors, generators, radio, television, and many other modern technologies. S:PS3:11:1.2 Recognize that the strength of the electric force between two charged objects is proportional to the charges and, as with gravitation, is inversely proportional to the square of the distance between them. S:PS3:11:1.3 Recognize that the strength of the gravitational force between two masses is proportional to the masses and inversely proportional to the square of the distance between them. S:PS3:11:1.4 Compare the strength of nuclear, electromagnetic and gravitational forces; and explain that the strength of nuclear forces account for the great amounts of energy released from the nuclear reactions in atomic or hydrogen bombs, and in the Sun and other stars. S:PS3:11:1.5 Recognize that electromagnetic forces exist within and between atoms. S:PS3:11:1.6 Recognize that different kinds of materials respond to electric forces in various ways; and differentiate between insulators, semiconductors, conductors and superconductors. S:PS3:11:1.7 Describe the difference between materials that contain equal proportions of positive and negative charges and those that have a very small excess or deficit of negative charges. S:PS3:11:1.8 Given information (e.g., graphs, data, diagrams), use the relationships between or among force, mass, velocity, momentum, and acceleration to predict and explain the motion of objects. [PS3(9-**11**)INQ+POC-**8**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.* S:PS3:12:1.1 Understand the four fundamental forces found in nature: gravitation, electromagnetism, strong nuclear force, and weak nuclear force. S:PS3:12:1.2 Describe the gauge particles that are exchanged by each of the fundamental forces. S:PS3:12:1.3 Understand the basic principles of unified field theories.

Physical Science		
PS3– The motion of an object is affected by force.		
	9-11	**11-12 (Advanced)**
2. MOTION	S:PS3:11:2.1 Interpret and apply the laws of motion to determine the effects of forces on the motion of objects. S:PS3:11:2.2 Recognize that apparent changes in wavelength can provide information about changes in motion; explain that the observed wavelength of a wave depends upon the relative motion of the source and the observer; and relate these to the differences between shorter and longer wavelengths. S:PS3:11:2.3 Apply the concepts of inertia, motion, and momentum to predict and explain situations involving forces and motion, including stationary objects and collisions. [PS3(9-**11**)POC-**9**] S:PS3:11:2.4 Explain the effects on wavelength and frequency as electromagnetic waves interact with matter (e.g., light diffraction, blue sky). [PS3(9-**11**)SAE-**10**]	*Schools should include expectations and competencies from Advanced Science Courses and Science-related Career and Technical Education Courses.* S:PS3:12:2.1 Explain general concepts related to the theory of special relativity: time dilation, length contraction, and mass expansion. S:PS3:12:2.2 Understand the basic idea behind the theory of general relativity. S:PS3:12:2.3 Describe the predictions made by the theory of general relativity, and the evidence that supports it.

Physical Science		
PS4– The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	9-11	**11-12 (Advanced)**
1. DESIGN TECHNOLOGY	S:PS4:11:1.1 Recognize that the basic principles of energy, work and power are related to design technology.	S:PS4:12:1.1 Relate the transfer of energy through conduction, convection and radiation to design technologies.
2. TOOLS	S:PS4:11:2.1 Identify tools, such as thermostats and thermal sensors, and explain their use in environmental control systems.	S:PS4:12:2.1 Demonstrate the appropriate use of a variety of input devices, such as scanners, voice/sound recorders, and digital cameras.
3. SOCIAL ISSUES (LOCAL AND GLOBAL) ENERGY, POWER, AND TRANSPORTATION MANUFACTURING	S:PS4:11:3.1 Explain that power systems have a source of energy, a process, loads, and some have a feedback system. S:PS4:11:3.2 Demonstrate and explain how an engine converts chemical energy in the form of fuel, into mechanical energy in the form of motion. S:PS4:11:3.3 Calculate the efficiency of an engine, and explain why a perfectly efficient engine is impossible. S:PS4:11:3.4 Explain the relationship between energy and power. S:PS4:11:3.5 Explain the benefits of standardization of parts.	S:PS4:12:3.1 Compare two different energy systems that are used to produce large amounts of electrical power for New Hampshire residents, and describe the advantages and disadvantages of each system. S:PS4:12:3.2 Design a transportation system that meets most humans' need for reliable and affordable transportation, while having a minimal impact on the environment. S:PS4:12:3.3 Describe the various types of manufacturing systems, such as customized production, batch production, and continuous production, and explain that manufacturing results in two types of good, durable and non-durable goods. S:PS4:12:3.4 Understand that a manufacturing system includes design of the product and methods of obtaining raw materials, as well as actual production, marketing, sales, maintenance, servicing, repair, and final disposal of the remains of the product.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S:PS4:11:4.1 Explain the kinds of applications of knowledge and skills necessary for jobs/careers specific to the physical sciences.	S:PS4:12:4.1 Understand the various scientific fields that use scientific content and skills and distinguish between professional and skilled science jobs/careers in the physical sciences.

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Measurement Specifics for Science

(Adapted from NECAP Mathematics Assessment GLEs grades 3-8)

The following is a list of the measurement benchmarks and equivalences that ***can be used*** in mathematics problems across the science domains at each specific grade. In addition to measurement benchmarks identified below students should be expected to use the appropriate units when solving problems involving area, volume, surface area, conversions, and rates (e.g., miles per hour, price per pound, and pounds per square inch) in science.

Connection to the Mathematics GLEs is **M:G&M:2.7 (Uses units of measures appropriately and consistently, and makes conversions within systems when solving problems across the content strands.)**

Measures	By Grade 2	By Grade 4	End of Grade 8
Length	**Unit (accuracy):** Inch (to whole inch); Foot (to whole inch); Centimeter (to whole centimeter); Meter (to whole centimeter) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter	**Unit (accuracy):** Inch (to 1/4 inch); Foot; Centimeter (to 0.5 centimeter); Meter (to 0.5 centimeter); Yard; Mile (use in scale questions); Kilometer (use in scale questions) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter; 3 feet in 1 yard; 36 inches in 1 yard	**Units (accuracy):** Inch (to 1/16 inch); Foot; Centimeter (to 1/10 centimeter); Meter (to 1/100 meter); Yard; Mile (use in scale and rate questions); Kilometer (use in scale and rate questions) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter; 3 feet in 1 yard; 36 inches in 1 yard; 10 millimeters in 1 centimeter; 1000 millimeters in 1 meter
Time	**Unit (accuracy):** Hour (to 15 minute interval) **Equivalencies:** 60 minutes in 1 hour	**Unit (accuracy):** Hour (to 5 minute interval); Day; Year **Equivalencies:** 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year; 60 seconds in 1 minute; 60 minutes in 1 hour	**Unit (accuracy):** Hour (to 1 minute); Day; Year **Equivalencies:** 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year; 60 seconds in 1 minute; 60 minutes in 1 hour
Temperature	**Unit (accuracy):** Degree (to 1 degree)	**Unit (accuracy):** °C and °F (to 1 degree)	**Unit (accuracy):** °C and °F (to 1 degree)
Capacity		**Unit (accuracy):** Quart (to whole quart)	**Unit (accuracy):** Quarts (to 1 ounce); Gallon; Pint; Liter **Equivalencies:** 32 ounces in 1 quart; 4 quarts in 1 gallon; 2 pints in 1 quart; 1000 milliliters in 1 liter
Mass		**Unit (accuracy):** Kilogram (to whole kilogram); Gram (to whole gram)	**Unit (accuracy):** Kilogram; Gram (to 1/10 gram)
Weight		**Unit (accuracy):** Pound (to whole pound)	**Unit (accuracy):** Pound (to 1 ounce) **Equivalencies:** 16 ounces in 1 pound
Angles and Rotation			**Unit (accuracy):** Degree (to 2 degrees) **Equivalencies:** 360° in 1 circle; 90° in 1 right angle

New Hampshire Curriculum Framework

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The following sources were used in the development of the New Hampshire Framework for Science Literacy, NH Science GSEs, NECAP Assessment Targets, Broad Areas of Inquiry, and the NECAP Science Test Specifications.

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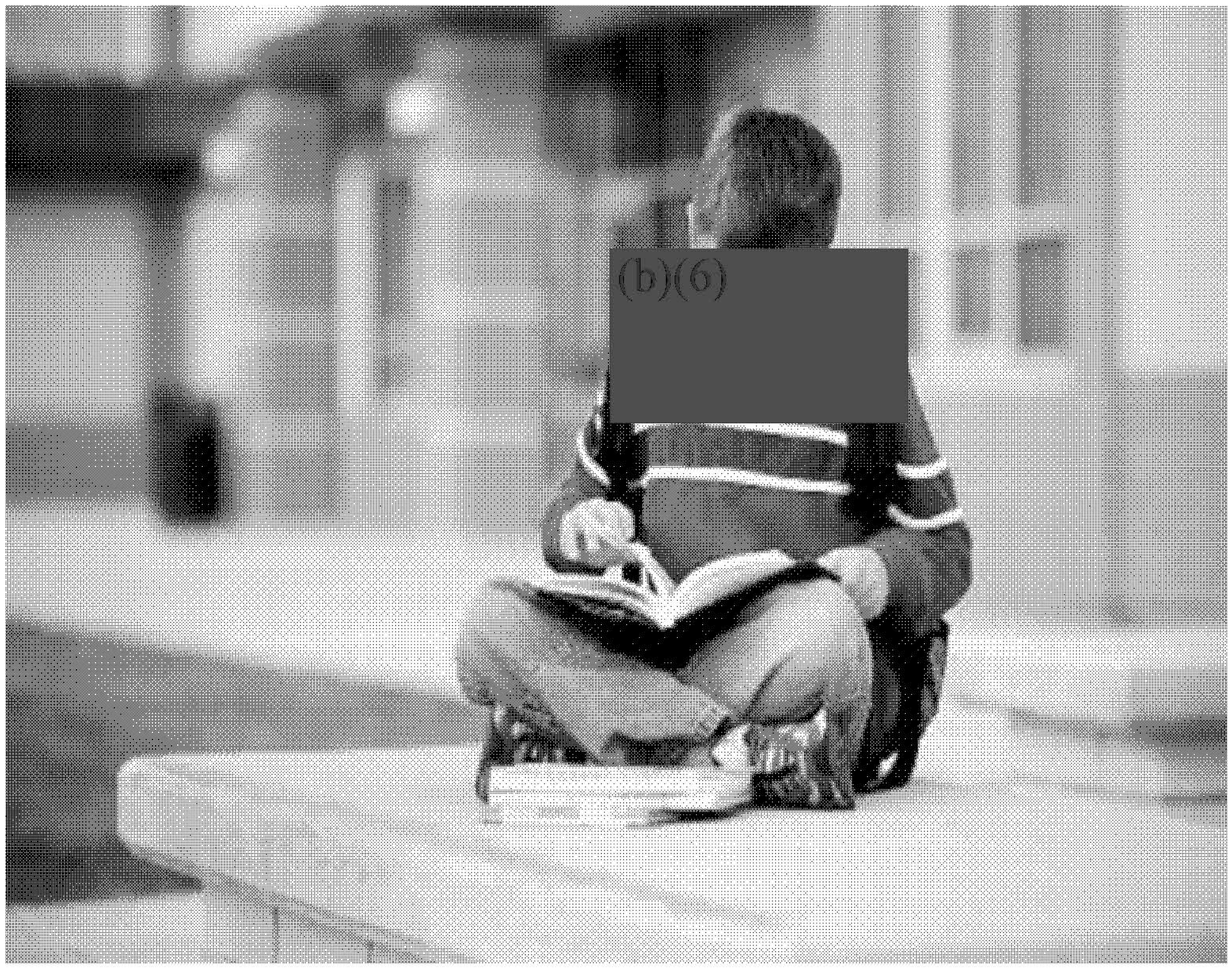
K-12 Reading
New Hampshire
Curriculum Framework



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New Hampshire Curriculum Framework Reading

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Introduction

The purpose of this framework is to serve (1) as the basis for the development of assessment instruments to be administered statewide and (2) as a guide for making local decisions about curriculum development and delivery, in accordance with RSA 193-C relative to the New Hampshire Educational Improvement and Assessment Program.

This framework establishes curriculum and expectations for English language arts. This is the accepted professional term for the subject area of reading and language arts as it is taught throughout the grades. "English" is more commonly used in high school; "language arts," in most elementary and middle/junior high schools. The English language arts consist of the interactive processes of reading, writing, speaking, listening, and viewing.

This framework will be used at the local level, in conjunction with assessment results, as a guide for making decisions about development of curriculum, delivery of instruction and utilization of classroom, school, and district assessments. Educators, school board members, and citizens are encouraged to work cooperatively to develop local educational improvement and assessment plans that build on and complement the state effort.

How this framework is organized

The *K-12 English Language Arts Curriculum Framework* is organized into Grade-Level Expectations (GLEs) and Grade-Span Expectations (GSEs). Both the GLEs and GSEs contain statements about what all New Hampshire students are expected to know and be able to do. The GLEs are delineated by grade level across grades K-8. The GSEs are organized by grade spans of 9-10 and 11-12. Both the GLEs and GSEs are built upon the *K-12 English Language Arts Curriculum Framework* (1995).

Both the GLEs and GSEs are organized into five content strands for Reading: Vocabulary, Initial Understanding of Literary Texts, Analysis and Interpretation of Literary Texts, Initial Understanding of Informational Texts and Analysis and Interpretation of Informational Texts. There are eight strands for Written and Oral Communication: Habit of Writing, Structures of Language, Writing in Response to Literary Text, Writing in Response to Informational Text, Narratives, Informational Writing, Writing Conventions and Oral Communication Strategies.

At the beginning of each strand is a purpose statement which places the strand in the context of the K-12 English Language Arts curriculum. Furthermore, each strand contains a number of big ideas referred to as stems. The stems articulate the main curricular focus across grades K-12.

There are two types of expectations throughout the document, those identified for state assessment purposes and those identified for local curriculum and assessment. The state assessment expectations appear in bold boxes; all other expectations are guidance for local curriculum and assessment.

K-12 Broad Goals for English-Language Arts

These goal statements establish general expectations of what New Hampshire students should know and be able to do in English language arts.

- Students will read fluently with understanding and appreciation.
- Students will write effectively for a variety of purposes and audiences.
- Students will speak purposefully and articulately.
- Students will listen and view attentively and critically.
- Students will understand, appreciate, interpret, and critically analyze classical and contemporary literature as well as works of nonfiction and informational texts.
- Students will use reading, writing, speaking, listening, and viewing to:
  gather and organize information;
  communicate effectively; and
  succeed in educational, occupational, civic, and social settings.

Reading

Purpose: The ability to read is essential for students to succeed as learners, both in school and throughout their lives, and to become contributing members of society. Students must be able to deal critically with a variety of complex texts including literary, informational, and practical. Good readers combine the inclination to read with the ability to use monitoring and discussion to develop understanding. They employ multiple strategies and processes to understand the written word. Throughout their formal instruction, students should read authentic materials including worthy examples of literature as well as texts that reinforce other content areas of the school's curriculum.

Writing

Purpose: Through writing students transmit information, construct and communicate good ideas. Good writers employ language successfully in a wide range of settings for academic, personal, occupational, and public uses. Frequent writing practice across a variety of situations and tasks and in all content areas enables students to refine and expand both their knowledge base and their thinking skills.

English Language Uses

Purpose: Students needs to learn how to use language to communicate in multiple ways and for multiple purposes. To this end, the language processes of reading, writing, speaking, listening, and viewing must become integral parts of their lives. By systematically employing these interactive processes, students are able to gather needed information and to prioritize and organize this material. The skillful use of these language processes provides students with the means of acquiring, constructing, and expressing knowledge in all school content areas and in the human experience. In order to be successful, students must become powerful users of language.

Introduction

The New England Common Assessment Program (NECAP) Reading GLEs have been developed as a means to identify the reading content knowledge and skills expected of all students, for large-scale assessment of reading in grades 3-8. GLEs and GSEs *are meant to capture the "big ideas" of reading that can be assessed, without narrowing the curriculum locally*. They *are not intended* to represent the full reading curriculum for instruction and assessment locally, at each grade. The set of GLEs/GSEs includes concepts and skills intended to be assessed on demand, in a large-scale assessment (indicated by "State") and other GLEs/GSEs (indicated by "Local") for Local assessment purposes only. All of the Reading GLEs/GSEs described in this document are expected to be assessed Locally, even if indicated for large-scale assessment. "Local GLEs" in reading include those concepts and skills not easily assessed in an on-demand setting (e.g., reading fluency, reading accuracy, self-correcting while reading, depth and breadth of reading, etc.). Grade Level/Span Expectations – at any grade – represent reading content knowledge and skills *introduced instructionally at least one to two years before* students are expected to demonstrate confidence in applying them independently in an on-demand assessment.

The NECAP GLEs/GSEs in this document can be interpreted as describing the grade level expectations for the end of the grade identified, or the beginning of the next grade. For example, grade 2 NECAP GLEs identify grade level expectations in reading for both the end of grade 2 and the beginning of grade 3, for assessment purposes.

When using the NECAP Reading Grade Level Expectations, the following are important to understand:

1. All of the concepts and skills identified at a given grade level are "fair game" for large-scale assessment purposes ***if indicated by "(State)."*** However, conjunctions used throughout this document have specific meaning. The use of the conjunction "or" means that a student can be assessed on all or just some of the elements of the GLE in a given year. The use of "and" between elements of a GLE means that the *intent* is to assess each element every year. In some situations, "or" is used when students have choices about how they will provide supporting evidence for their response.
   - (E.g., "R:LT:4:2.2: Describing main characters' physical characteristics or personality traits; or providing examples of thoughts, words, or actions that reveal characters' personality traits" means that students may be asked to describe main characters' physical characteristics OR to describe characters' personality traits, OR to provide any or all of the following – thoughts, words, OR actions -- to support their responses that reveal characters' personality traits.)

2. Each GLE includes three parts.
   - **A statement in bold,** called the "stem," is at the beginning of each GLE/GSE. Each "stem" is the same or similar across the grades for a given GLE/GSE, and is meant to communicate the main curriculum and instructional focus of the GLE/GSE across the grades.

- The unbolded text within a GLE/GSE indicates how the GLE/GSE is specified at a given grade level. There are often are several indicators for each stem. Each indicator is coded.
- Differences between adjacent grades are underlined. (Note: Sometimes nothing is underlined within a GLE/GSE. In these situations, differences in adjacent grades "assumes increasing text complexity" and is noted for those GLEs/GSEs.

3. Each GLE/GSE is coded for the content area, the grade level, the GLE/GSE "stem" number, and the specific indicator for that GLE/GSE stem. [E.g., "R:IT:5:2.3" means R (Reading) – IT (Informational Text) - 5 (grade 5) - 2 (2nd "stem") – 3 (the third specific indicator for the 5th GLE stem).]

Stem

Bold lines around a cell/box indicate a State addresses GLE/GSE.

Vocabulary Strategies (V:1)		
(R:V:1: Assumes a variety of text and increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:V:1: Students identify the meaning of unfamiliar vocabulary by…		
Grade K	**Grade 1**	**Grade 2**
R:V:K:1.1: Using strategies to unlock meaning (e.g., activating prior knowledge, using cues, using context clues, or asking questions) (Local)	R:V:1:1.1: Using strategies to unlock meaning (e.g., activating prior knowledge, using cues, using context clues, or asking questions during read-alouds or text reading) (Local)	R:V:2:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including common base words and suffixes, such as "thickest," "hopeful;" or context clues, including illustrations and diagrams; or prior knowledge) (State)

Specific indicator for assessment at this grade, followed by "(Local)" indicates that it will not be included for the large-scale assessment at this grade level. Specific indicator for assessment at this grade, followed by "(State)" indicates that it will be included on the state assessment at this grade level.

Differences between this grade and prior grade are underlined

The GLE/GSE stem identifies "the what" – meaning, "What is the big idea for instruction and assessment?"

The indicators following each stem identify "the how" – meaning, "How will students demonstrate what they know and can do?"

Overview of New Hampshire Grade Level and Grade Span Expectations (GLEs/GSEs) for Reading

Reading Content Clusters	Focus of GLE/GSE	GLE/GSE Number*	K-2 Page	3-5 Page	6-8 Page	9-12 Page
Early Reading Strategies (Grades K-2 only)	Phonemic Awareness and Phonological Knowledge	**ERS:1**	10	27	44	61
	Concepts of Print	**ERS:2**	11	28	45	62
Reading Fluency and Accuracy	Reading Fluency and Accuracy	**F&A:1**	12	29	46	63
Word Identification Skills and Strategies	Word Identification and Decoding Strategies	**WID:1**	13	30	47	64
Vocabulary	Vocabulary Strategies	**V:1**	14	31	48	65
	Breadth of Vocabulary	**V:2**	15	32	49	66
Literary Texts	Initial Understanding of Literary Texts	**LT:1**	16	33	50	67
	Analysis and Interpretation of Literary Text, Citing Evidence	**LT:2**	17	34	51	68
	Analysis and Interpretation of Literary Text, Citing Evidence	**LT:3**	18	35	52	69
	Generates a Personal Response	**LT:4**	19	36	53	70
Informational Texts	Initial Understanding of Informational Text (Expository and Practical Text across Content Areas)	**IT:1**	20	37	54	71
	Analysis and Interpretation of Informational Text (Expository and Practical Text across Content Areas) /Citing Evidence	**IT:2**	21	38	55	72
Reading Strategies	Strategies for Monitoring and Adjusting Reading	**RS:1**	22	39	56	73
	Reading Comprehension Strategies	**RS:2**	23	40	57	74
Breadth of Reading	Reading Widely and Extensively	**B:1**	24	41	58	75
	Participating in Literate Community	**B:2**	25	42	59	76
	Reading for Research Across Content Areas	**B:3**	26	43	60	77
Reading Appendices	A: *Suggested* Informational and Literary Texts		78			
	B: The Six Syllable Types		82			
	C: Reading Fluency Rates		82			
	D: Metacognition Strategies for Understanding Text		83			
	E: Glossary of Reading Terms		84			
	F: A Discussion of "Increasing Text Complexity"		90			

Early Reading Strategies (ERS:1) Phonemic Awareness and Phonological Knowledge		
R:ERS:K:1: Demonstrates phonemic awareness and applies phonological knowledge and skills by… **R:ERS:1:1: Demonstrates phonemic awareness and applies phonological knowledge and skills by…** **R:ERS:2:1: Demonstrates phonemic awareness by…**		
Grade K	**Grade 1**	**Grade 2**
R:ERS:K:1.1: Blending and segmenting syllables and onset-rimes (e.g., cup-cake, s-at) (Local) R:ERS:K:1.2: No GLE at this grade level R:ERS:K:1.3: Isolating phonemes in single syllable words (e.g., "Tell me the first sound in 'mop';" "tell me the last sound in 'mop) (Local) R:ERS:K:1.4: No GLE at this grade level R:ERS:K:1.5: Recognizing pairs of rhyming words (Local)	R:ERS:1:1.1: Blending and segmenting syllables and onset-rimes (e.g., cup-cake, s-at) (Local) R:ERS:1:1.2: Blending and segmenting phonemes in one syllable words (e.g., f-i-sh, r-u-n) (Local) R:ERS:1:1.3: Isolating phonemes in single syllable words (e.g., "Tell me the first sound in 'mop';" "Tell me the last sound in 'mop,'" "Tell me the middle sound in 'mop.'") (Local) R:ERS:1:1.4: Deleting phonemes in one-syllable words ("What is "crust" without the 'c'?") (Local) R:ERS:1:1.5: Producing pairs of rhyming words (Local) R:ERS:1:1.6: Counting syllables in 1 to 4-syllable words (Local)	R:ERS:2:1.1: Blending and segmenting phonemes in more complex one-syllable words (which may include combinations of blends and digraphs, as in th-i-ck, t-r-a-sh) (Local) R:ERS:2:1.2: Blending and segmenting phonemes in one syllable words (e.g., f-i-sh, r-u-n) (Local) R:ERS:2:1.3: Isolating phonemes in single syllable words (e.g., "Tell me the first sound in 'mop';" "Tell me the last sound in 'mop,'" "Tell me the middle sound in 'mop.'") (Local) R:ERS:2:1.4: Deleting phonemes in one-syllable words ("What is "crust" without the 'c'?") (Local) R:ERS:2:1.5: Producing pairs of rhyming words (Local) R:ERS:2:1.6: Counting syllables in 1 to 4-syllable words (Local)

Early Reading Strategies (ERS:2) Concepts of Print		
R:ERS:2: Demonstrates understanding of concepts of print during shared or individual reading by…		
Grade K	**Grade 1**	**Grade 2**
R:ERS:K:2.1: Distinguishing between printed letters and words (Local) R:ERS:K:2.2: Following text with finger-pointing (e.g., charts, simple books), demonstrating left-to right and top-to bottom directionality (Local) R:ERS:K:2.3: Identifying the first and last parts of a word (beginning/end of the word) (Local) R:ERS:K:2.4: Identifying key parts of a book: front and back, print, illustrations (Local) R:ERS:K:2.5: No GLE at this grade level R:ERS:K:2.6: No GLE at this grade level	R:ERS:1:2.1: No GLE at this grade level R:ERS:1:2.2: No GLE at this grade level R:ERS:1:2.3: No GLE at this grade level R:ERS:1:2.4: Identifying title, author, illustrator (Local) R:ERS:1:2.5: Identifying basic punctuation marks and their usage (e.g., question marks, periods, quotation marks) (Local) R:ERS:1:2.6: Demonstrating 1-1 matching of words spoken to words in print (Local)	R:ERS:2:2.1: No GLE at this grade level R:ERS:2:2.2: No GLE at this grade level R:ERS:2:2.3: No GLE at this grade level R:ERS:2:2.4: Identifying title, author, illustrator (Local) R:ERS:2:2.5: Identifying basic punctuation marks and their usage (e.g., question marks, periods, quotation marks) (Local) R:ERS:2:2.6: Demonstrating 1-1 matching of words spoken to words in print (Local)

Reading Fluency and Accuracy (F&A)		
(R:F&A: Assumes a variety of text and increasing text complexity across grade levels. See Appendix D for descriptions of increasing text complexity.)		
R:F&A: Reads grade-level appropriate material with…		
Grade K	**Grade 1**	**Grade 2**
R:F&A:K:1.1: No GLE at this grade level R:F&A:K:1.2: No GLE at this grade level R:F&A:K:1.3: No GLE at this grade level	R:F&A:1:1.1: **Accuracy**: reading material appropriate for the end of grade 1 with at least 90-94% accuracy (See Appendix F for sample titles) (Local) R:F&A:1:1.2: **Fluency**: reading previously – introduced or previously read grade-appropriate text with oral fluency rates of at least 50-80 words correct per minute (See Appendix C for suggested rates) (Local) R:F&A:1:1.3: **Fluency:** reading grade-appropriate text in a way that makes meaning clear, and demonstrates phrasing, expression, and attention to end punctuation (Local)	R:F&A:2:1.1: **Accuracy**: reading material appropriate for the end of grade 2 with at least 90-94% accuracy (See Appendix F for sample titles) (Local) R:F&A:2:1.2: **Fluency**: reading grade-appropriate text with oral fluency rates of at least 80-100 words correct per minute (See Appendix C for suggested rates) (Local) R:F&A:2:1.3: **Fluency**: reading grade-appropriate text in a way that makes meaning clear, demonstrating phrasing, expression, and with attention to punctuation (including commas and quotation marks) (Local)

Word Identification Skills and Strategies (WID)		
R:WID:K: Applies word identification and decoding strategies (leading to automaticity) by … **R:WID:1: Applies word identification and decoding strategies (leading to automaticity) by …** **R:WID:2: Applies word identification and decoding strategies by …**		
Grade K	**Grade 1**	**Grade 2**
R:WID:K:1.1: Demonstrating a basic understanding of how the letters of phonetically regular words (going from left to right), represent their sounds (Local) R:WID:K:1.2: No GLE at this grade level R:WID:K:1.3: No GLE at this grade level R:WID:K:1.4: Reading high frequency words, including names, environmental print, sight words (as appropriate to the child's personal and classroom experiences) (Local) R:WID:K:1.5: Recognizing and naming all upper and lower case letters (Local) R:WID:K:1.6: Identifying the primary sounds represented by most letters (sound-symbol correspondence) (Local)	R:WID:1:1.1: Sounding out regularly spelled (decodable) one-syllable or two-syllable words using letter-sound correspondence knowledge (Local) EXAMPLES (regularly spelled one and two syllable words): bat, kitten, classroom R:WID:1:1.2: Reading regularly spelled one or two-syllable words using knowledge of sounds and letter patterns (including common endings (s, ed, ly, ing) (Local) R:WID:1:1.3: Reading grade-level appropriate words (in connected text) (Local) R:WID:1:1.4: Reading grade- appropriate, high-frequency words (that include irregularly spelled words – said; contractions – I'm) (Local) R:WID:1:1.5: No GLE at this grade level R:WID:1:1.6: No GLE at this grade level	R:WID:2:1.1: Identifying regularly spelled multi syllabic words, by using knowledge of sounds, syllable types, or word patterns (including most common spellings for consonants and vowels, e.g., knot, catch, float, fight; or common suffixes (State) EXAMPLES: Students might be asked to match words to pictures or to match words to words with similar sounds (e.g., flower and shower) EXAMPLES (multi syllabic words): happiness, shower, sunshine R:WID:2:1.2: Reading regularly spelled one or two-syllable words using knowledge of sounds and letter patterns (Local) R:WID:2:1.3: Reading grade-level appropriate words (in connected text) with automaticity (Local) R:WID:2:1.4: Reading grade- appropriate, high-frequency words (including irregularly spelled words) (Local) R:WID:2:1.5: No GLE at this grade level R:WID:2:1.6: No GLE at this grade level

Vocabulary Strategies (V:1)		
(R:V:1: Assumes a variety of text and increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:V:1: Students identify the meaning of unfamiliar vocabulary by…		
Grade K	**Grade 1**	**Grade 2**
R:V:K:1.1: Using strategies to unlock meaning (e.g., activating prior knowledge, using cues, using context clues, or asking questions) (Local)	R:V:1:1.1: Using strategies to unlock meaning (e.g., activating prior knowledge, using cues, using context clues, or asking questions during read-alouds or text reading) (Local)	R:V:2:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including common base words and suffixes, such as "thickest," "hopeful;" or context clues, including illustrations and diagrams; or prior knowledge) (State)

Breadth of Vocabulary (V:2)		
R:V:2: Shows breadth of vocabulary knowledge, demonstrating understanding of word meanings or relationships by…		
Grade K	**Grade 1**	**Grade 2**
R:V:K:2.1: Identifying synonyms and antonyms (e.g., big/large; hot/ cold) to connect new words to known words (Local) EXAMPLE: What word means the same as ____? R:V:K:2.2: Demonstrating knowledge of basic concepts (i.e., common words that describe position in space and time, such as: over, between, after, behind) (Local) R:V:K:2.3: Organizing words by category (e.g., sorting pictures or objects into groups) (Local)	R:V:1:2.1: Identifying synonyms and antonyms to connect new words to known words (Local) R:V:1:2.2: Selecting appropriate words to use in context (Local) R:V:1:2.3: Describing words in terms of categories, (e.g., A mallard is a kind of duck.), functions (e.g., Scissors are used for cutting.), or features (e.g., A rectangle has four sides.) (Local)	R:V:2:2.1: Identifying synonyms or antonyms; or categorizing words (State) EXAMPLES (of categorizing): Given a T-chart with two "categories" of words listed (e.g., shapes and sizes), students would identify another word to add to the chart that describes shapes or sizes; or in a multiple choice item, select the best category title for the words listed R:V:2:2.2: Selecting appropriate words to use in context, including words specific to the content of the text (State) EXAMPLE: In a short passage about Native American homes, students might encounter the words longhouse and igloo, and then be asked to show that they know the difference between them. R:V:2:2.3: Subsumed under R:V:2:2.1

Initial Understanding of Literary Texts (LT:1)		
(R:LT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:K:1: Demonstrate initial understanding of elements of literary texts read aloud by… **R:LT:1:1: Demonstrate initial understanding of elements of literary texts (including text read aloud, reading independently, or in a guided manner) by…** **R:LT:2:1: Demonstrate initial understanding of elements of literary texts by…**		
Grade K	**Grade 1**	**Grade 2**
R:LT:K:1.1: Identifying characters in a story (Local) R:LT:K:1.2: Responding to simple questions about a book's content (e.g., "What did that hungry caterpillar eat?") (Local) EXAMPLES (of responses): drawing, reenacting parts of a story, etc. R:LT:K:1.3: Generating questions during read alouds (Local) R:LT:K:1.4: No GLE at this grade level R:LT:K:1.5: No GLE at this grade level	R:LT:1:1.1: Identifying characters or setting in a story (Local) R:LT:1:1.2a: Responding to simple questions about a book's content (e.g., "Where did Sylvester go?") R:LT:1:1.2b: Retelling the beginning, middle, and end of a story (Local) R:LT:1:1.3: Generating questions before, during, and after reading (Local) R:LT:1:1.4: Distinguishing between literary and informational texts (Local) R:LT:1:1.5: Identifying literary devices as appropriate to genre: rhyme, repeated language (e.g., "teeny- tiny")(Local) EXAMPLE: In *Brown Bear, Brown Bear*, what words are repeated in the story?	R:LT:2:1.1: Identifying or describing character(s), setting, problem, solution, or major events, as appropriate to text (State) R:LT:2:1.2a: Sequencing key events in order, as appropriate to text (Local) R:LT:2:1.2b: Retelling the key elements of a story (Local) R:LT:2:1.3: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information (Local) R:LT:2:1.4: Distinguishing among a variety of types of text (e.g., literary texts: poetry, plays, realistic fiction, fairy tales, fables, tall tales, or fantasy) (Local) R:LT:2:1.5: Identifying literary devices as appropriate to genre: rhyme, repeated language or dialogue (e.g., "When I was young in the mountains…") (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:2)		
(R:LT:2: Assume increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:K:2: Analyze and interpret elements of literary texts READ ALOUD, citing evidence where appropriate by… **R:LT:1:2: Analyze and interpret elements of literary texts read aloud or read independently, citing evidence where appropriate by…** **R:LT:2:2: Analyze and interpret elements of literary texts, citing evidence where appropriate by…**		
Grade K	**Grade 1**	**Grade 2**
R:LT:K:2.1: Making predictions about what might happen next (Local) R:LT:K:2.2: Identifying characteristics of main characters (Local) R:LT:K:2.3: No GLE at this grade level R:LT:K:2.4: No GLE at this grade level R:LT:K:2.5: No GLE at this grade level R:LT:K:2.6: No GLE at this grade level R:LT:K:2.7: No GLE at this grade level	R:LT:1:2.1: Making predictions about what might happen next, and telling why the prediction was made (Local) R:LT:1:2.2: Identifying physical characteristics, personality traits, or possible motives of main characters (Local) R:LT:1:2.3: Making basic inferences about the text (Local) EXAMPLE: "Why did the wolf want to blow down each pig's house?" R:LT:1:2.4: No GLE at this grade level R:LT:1:2.5: No GLE at this grade level R:LT:1:2.6: No GLE at this grade level R:LT:1:2.7: No GLE at this grade level	R:LT:2:2.1: Making logical predictions (State) EXAMPLE: What might happen next? R:LT:2:2.2: Identifying relevant physical characteristics or personality traits of main characters (State) R:LT:2:2.3: Making basic inferences about problem or solution (State) EXAMPLES: "What helped Luke to solve his problem in the story?" "What was Jane's problem?" R:LT:2:2.4: No GLE at this grade level R:LT:2:2.5: Identifying the author's basic message (Local) R:LT:2:2.6: Identifying possible motives of main characters (Local) EXAMPLE: "Why did the wolf want to blow the house down?" R:LT:2:2.7: Recognizing explicitly stated causes or effects (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:3)		
(R:LT:3: Assume increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:3: Analyze and interpret author's craft, citing evidence where appropriate by …		
Grade K	**Grade 1**	**Grade 2**
R:LT:K:3.1: No GLE at this grade level	R:LT:1:3.1: No GLE at this grade level	R:LT:2:3.1: No GLE at this grade level

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:4)		
R:LT:K:4: Generates a personal response to what is read aloud through a variety of means by… **R:LT:1:4: Generates a personal response to what is read aloud or read independently through a variety of means by…** **R:LT:2:4: Generates a personal response to what is read through a variety of means by…**		
Grade K	**Grade 1**	**Grade 2**
R:LT:K:4.1: Comparing stories or other texts to personal experience, prior knowledge, which might include other texts (Local) R:LT:K:4.2: No GLE at this grade level	R:LT:1:4.1: Comparing stories or other texts to personal experience, prior knowledge or to other texts (Local) R:LT:1:4.2: No GLE at this grade level	R:LT:2:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other texts (Local) R:LT:2:4.2: No GLE at this grade level

Initial Understanding of Informational Texts (IT:1)		
(R:IT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:K:1: Demonstrate initial understanding of informational texts read aloud (expository and practical texts) by… **R:IT:1:1: Demonstrate initial understanding of informational texts (expository and practical texts) by…** **R:IT:2:1: Demonstrate initial understanding of informational texts (expository and practical texts) by…**		
Grade K	**Grade 1**	**Grade 2**
R:IT:K:1.1: Obtaining information, using text features (e.g., title and illustrations) (Local) EXAMPLE: "From the picture on the cover, what do we think this book will tell us?" R:IT:K:1.2: Using explicitly stated information to answer questions (Local) EXAMPLE: "So, what did we learn about what owls eat?" R:IT:K:1.3: No GLE at this grade level R:IT:K:1.4: Generating questions during read alouds (Local) R:IT:K:1.5: No GLE at this grade level	R:IT:1:1.1: Obtaining information, using text features (e.g., title and illustration) (Local) EXAMPLE: "From the title, what do we think this book will tell us?" R:IT:1:1.2: Using explicitly stated information to answer questions (Local) EXAMPLE: "Where do penguins live?" R:IT:1:1.3: No GLE at this grade level R:IT:1:1.4: Generating questions before, during, and after reading (Local) R:IT:1:1.5: Distinguishing between literary and informational texts (Local)	R:IT:2:1.1: Obtaining information, from text features (e.g., simple table of contents, glossary, charts, graphs, diagrams, or illustrations) (State) EXAMPLE: "On what page would you find information about snakes?" R:IT:2:1.2: Using explicitly stated information to answer questions (State) EXAMPLE: "According to this report, what do dolphins eat?" R:IT:2:1.3: Locating and recording information to show understanding, when given an organizational format (e.g., T-chart or Venn diagram) (Local) R:IT:2:1.4: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information (Local) R:IT:2:1.5: Distinguishing among a variety of types of text (e.g., **reference:** beginning dictionaries, glossaries, children's magazines, content trade books, children's newspapers; and **practical/functional/ texts:** procedures/instructions, announcements, book orders, invitations) (Local)

Analysis and Interpretation of Informational Texts/Citing Evidence (IT:2)		
(R:IT:2: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:K:2: Analyze and interpret informational text read-aloud,, citing evidence as appropriate by… **R:IT:1:2: Analyze and interpret informational text read aloud <u>or</u> <u>independently</u>, citing evidence as appropriate by…** **R:IT:2:2: Analyze and interpret informational text, citing evidence as appropriate by…**		
Grade K	**Grade 1**	**Grade 2**
R:IT:K:2.1: Telling what was learned (Local) EXAMPLE: "Draw a picture of something you've learned from this story about dogs." R:IT:K:2.2: No GLE at this grade level R:IT:K:2.3: Making basic inferences (Local) EXAMPLE: "From what we just read, what kinds of foods will help you stay healthy?" R:IT:K:2.4: No GLE at this grade level R:IT:K:2.5: is addressed in R:IT:K:2.3 (Local)	R:IT:1:2.1: Telling what was learned (Local) EXAMPLE: "What do penguins eat? Show me where you found that information?" R:IT:1:2.2: <u>Identifying the topic of the text or explaining the title</u> (Local) EXAMPLE: "What is this about?" R:IT:1:2.3: Making basic inferences or <u>drawing basic conclusions</u> (Local) EXAMPLE: "From what we just read, why do you think firefighters wear special uniforms?" Explain your reasons. R:IT:1:2.4: <u>Identifying facts presented in text</u> (Local) R:IT:1:2.5: is addressed in R:IT:1:2.3 (Local)	R:IT:2:2.1: <u>Connecting information *within* a text</u> (State) EXAMPLE: Combining or comparing facts and details presented – "What food is eaten by both kinds of fish?" R:IT:2:2.2: <u>Recognizing generalizations about text (e.g., identifying appropriate titles or main/central ideas)</u> (State) R:IT:2:2.3: Making basic inferences or drawing basic conclusions (State) EXAMPLE: "Based on this report, do turtles make good pets?" R:IT:2:2.4: Identifying facts presented in text (Local) R:IT:2:2.5: <u>Making inferences about causes or effects, when signal words are present</u> (State) EXAMPLE: "The sun came out. *Then* the puddle dried up. What made the puddle dry up?"

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:1)		
(R:RS:1: Assume increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:K:1: Demonstrates ability to monitor comprehension and strategy use for different types of texts … **R:RS:1:1: Demonstrates ability to monitor comprehension and strategy use for different types of texts …** **R:RS:2:1: Demonstrates ability to monitor comprehension for different types of texts and purposes by…**		
Grade K	**Grade 1**	**Grade 2**
R:RS:K:1.1: Noticing when simple sentences fail to make sense (while listening to a read aloud or reading a simple text) (Local) R:RS:K:1.2: Using pictures, syntax or repetitive language patterns to help predict upcoming words (Local)	R:RS:1:1.1: Monitoring own reading for meaning and self-correcting when attempt to identify or predict words does not fit with cues provided by the print or the context (e.g., syntax/ language structure, semantics/ meaning, picture) (Local) R:RS:1:1.2: Subsumed in R:RS:1:1.1	R:RS:2:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting upcoming text, monitoring, adjusting and confirming, through use of print, syntax/ language structure, semantics/ meaning, or other context cues [e.g., pictures], etc.) (Local) R:RS:1:1.2: Subsumed in R:RS:2:1.1

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:2)		
(R:RS:2: Assume increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:2: Uses comprehension strategies (with flexibility and as needed)…		
Grade K	**Grade 1**	**Grade 2**
R:RS:K:2.1: Using strategies while listening to literary or informational text. (Local) EXAMPLES of reading comprehension strategies might include: using prior knowledge; predicting and making simple text-bases inferences; generating clarifying questions; constructing sensory images (e.g., making pictures in one's mind); or making connections (text to self, text to text, and text to world (See also Appendix D)	R:RS:1:2.1: Using strategies while reading or listening to literary and informational text. (Local) EXAMPLES of reading comprehension strategies might include: using prior knowledge; predicting and making simple text- based inferences; generating clarifying questions; constructing sensory images (e.g., making pictures in one's mind); or making connections (text to self, text to text, and text to world (See also Appendix D)	R:RS:2:2.1: Using strategies while reading or listening to literary and informational text. (Local) EXAMPLES of reading comprehension strategies might include: using prior knowledge; predicting and making text- based inferences; determining importance; generating literal and clarifying questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); or locating and using text features (e.g. headings, parts of the book) (See also Appendix D)

Breadth of Reading: Reading Extensively* and In Depth (B:1)		
R:B:1: Demonstrates the habit of reading widely and extensively* by…		
Grade K	**Grade 1**	**Grade 2**
R:B:K:1.1: No GLE at this grade level R:B:K:1.2: No GLE at this grade level R:B:K:1.3: No GLE at this grade level	R:B:1:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:1:1.2: Reading from a wide range of genres/ kinds of text and a variety of authors (e.g., literary, informational, and practical texts) (Local) (See Appendix A) R:B:1:1.3: No GLE at this grade level	R:B:2:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:2:1.2: Reading from a wide range of genres/ kinds of text and a variety of authors (e.g., literary, informational, and practical texts) (Local (See Appendix A) R:B:2:1.3: No GLE at this grade level

Breadth of Reading: Reading Extensively* and In Depth (B:2)		
***Materials should be at the student's instructional <u>and</u> independent reading levels. The specific number of books should be viewed flexibly and is less important than the extensiveness, duration/ time, and frequency of reading.**		
R:B:2: Demonstrates participation in a literate community by…		
Grade K	**Grade 1**	**Grade 2**
R:B:K:2.1: Self-selecting reading materials aligned with reading ability and personal interests (Local) R:B:K:2.2: Participating in discussions about text, ideas, and student "writing" by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:1:2.1: Self-selecting reading materials aligned with reading ability and personal interests (Local) R:B:1:2.2: Participating in discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:2:2.1: Self-selecting reading materials aligned with reading ability and personal interests (Local) R:B:2:2.2: Participating in discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)

Breadth of Reading: Reading for Research Across Content Areas (B:3)		
***Research materials should be at the student's instructional and independent reading levels, including print and non-print texts.**		
R:B:3: Research* by reading multiple sources (including print and non-print texts) to report information by…		
Grade K	**Grade 1**	**Grade 2**
R:B:K:3.1: No GLE at this grade level	R:B:1:3.1: No GLE at this grade level	R:B:2:3.1: No GLE at this grade level
R:B:K:3.2: No GLE at this grade level	R:B:1:3.2: No GLE at this grade level	R:B:2:3.2: No GLE at this grade level
R:B:K:3.3: No GLE at this grade level	R:B:1:3.3: No GLE at this grade level	R:B:2:3.3: No GLE at this grade level
R:B:K:3.4: No GLE at this grade level	R:B:1:3.4: No GLE at this grade level	R:B:2:3.4: No GLE at this grade level

Early Reading Strategies (ERS:1) Phonemic Awareness and Phonological Knowledge		
R:ERS:1: Demonstrates phonemic awareness and applies phonological knowledge and skills by…		
Grade 3	**Grade 4**	**Grade 5**
No GLE at this grade level	No GLE at this grade level	No GLE at this grade level

Early Reading Strategies (ERS:2) Concepts of Print		
R:ERS:2: Demonstrates understanding of concepts of print during shared or individual reading by…		
Grade 3	**Grade 4**	**Grade 5**
No GLE at this grade level	No GLE at this grade level	No GLE at this grade level

Reading Fluency and Accuracy (F&A)		
(R:F&A: Assumes a variety of text and increasing text complexity across grade levels. See Appendix D for descriptions of increasing text complexity.)		
R:F&A: Reads grade-level appropriate material with…		
Grade 3	**Grade 4**	**Grade 5**
R:F&A:3:1.1: **Accuracy**: reading material appropriate for grade 3 with at least 90-94% accuracy (See Appendix F for sample titles.) (Local) R:F&A:3:1.2: **Fluency**: reading with oral fluency rates of at least 90- 120 words correct per minute (See Appendix C for suggested rates.) (Local) R:F&A:3:1.3: **Fluency**: reading familiar text with phrasing and expression, and with attention to text features, such as punctuation, italics, and dialogue (Local)	R:F&A:4:1.1: **Accuracy**: reading material appropriate for grade 4 with 90-94% accuracy (See Appendix F for sample titles.) (Local) R:F&A:4:1.2: **Fluency**: reading with oral fluency rates of at least 115-140 words correct per minute (Students' rates of reading will and should vary in response to text difficulty, purpose of reading, and other factors.) (See Appendix C for suggested rates.) (Local) R:F&A:4:1.3: **Fluency**: reading familiar text with phrasing and expression, and with attention to text features, such as punctuation, italics, and dialogue (Local)	R:F&A:5:1.1: **Accuracy:** reading material appropriate for grade 5 with 90-94% accuracy (See Appendix F for sample titles.) (Local) R:F&A:5:1.2: **Fluency:** reading with appropriate silent and oral reading fluency rates as determined by text demands and purpose for reading (See Appendix C for suggested rates.) (Local) R:F&A:5:1.3: **Fluency:** reading familiar text with phrasing and expression, and with attention to text features, such as punctuation, italics, and dialogue (Local)

Word Identification Skills and Strategies (WID)		
R:WID: Applies word identification/ decoding strategies by …		
Grade 3	**Grade 4**	**Grade 5**
R:WID:3:1.1: Identifying multi-syllabic words, by using knowledge of sounds, syllable types, or word patterns (including prefixes, suffixes, or variant spellings for consonants or vowels, e.g., bought) (State) EXAMPLES: Students might be asked to match words to words with similar sounds, such as which word rhymes with the word in the box or which word has the same vowel sound as the word in the box? EXAMPLES (multi-syllabic words): pretending, discussion R:WID:3:1.2: Reading regularly spelled multi-syllabic words by using knowledge of sounds, syllable types, or word patterns (Local) R:WID:3:1.3: Reading grade-level appropriate words (in connected text) with automaticity (Local) R:WID:3:1.4: Reading grade-appropriate, high-frequency words (including irregularly spelled words) (Local) R:WID:3:1.5: No GLE at this grade level R:WID:3:1.6: No GLE at this grade level	R:WID:4:1.1: Identifying multi-syllabic words by using knowledge of sounds, six syllable types*/syllable division, or word patterns (including prefixes, and suffixes) (Local) (*See Appendix B for the six syllable types.) R:WID:4:1.2: Reading regularly spelled multi-syllabic words by using knowledge of sounds, syllable types, or word patterns (Local) R:WID:4:1.3: Reading grade-level appropriate words (in connected text) with automaticity (Local) R:WID:4:1.4: Reading grade-appropriate words (including irregularly spelled words) (Local) R:WID:4:1.5: No GLE at this grade level R:WID:4:1.6: No GLE at this grade level	R:WID:5:1.1: Identifying multi-syllabic words by using knowledge of sounds, six syllable types*/ syllable division, and word patterns (including prefixes, and suffixes) (Local) (See Appendix B for the six syllable types.) R:WID:5:1.2: Reading multi-syllabic words, by using knowledge of sounds, syllable types, or word patterns (Local) R:WID:5:1.3: Reading grade-level appropriate words (in connected text) with automaticity (Local) R:WID:5:1.4: Reading grade-appropriate words (Local) R:WID:5:1.5: No GLE at this grade level R:WID:5:1.6: No GLE at this grade level

Vocabulary Strategies (V:1)		
(R:V:1: Assumes a variety of text and increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:V:1: Students identify the meaning of unfamiliar vocabulary by…		
Grade 3	**Grade 4**	**Grade 5**
R:V:3:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes and base words, such as "un-covered;" or context clues; or other resources, such as dictionaries, glossaries; or prior knowledge) (State)	R:V:4:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes and base words; or context clues; or other resources, such as dictionaries, glossaries; or prior knowledge) (State)	R:V:5:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes and base words; or context clues; or other resources, such as dictionaries, glossaries; or prior knowledge) (State)

Breadth of Vocabulary (V:2)		
R:V:2: Shows breadth of vocabulary knowledge through demonstrating understanding of word meanings and relationships by …		
Grade 3	**Grade 4**	**Grade 5**
R:V:3:2.1: Identifying synonyms, antonyms, or homonyms/ homophones; or categorizing words (State) R:V:3:2.2: Selecting appropriate words to use in context, including content specific vocabulary (e.g., predator/prey), or words with multiple meanings) (State) EXAMPLE (multiple meanings): Students identify the intended meaning of words found in text – "The word 'fall' can mean a time of the year or losing your step. What words from the passage help you to know what 'fall' means in this story?" EXAMPLE (multiple meanings): "The word 'fall' has many different meanings. Which sentence below uses the word "fall" to mean a time of the year?" OR "Which sentence below uses 'fall' with the same meaning as it is used in the poem?" R:V:3:2.3: Subsumed under R:V:3:2.1	R:V:4:2.1: Identifying synonyms, antonyms, homonyms/ homophones, or shades of meaning (State) EXAMPLE (of shades of meaning): cold, freezing R:V:4:2.2: Selecting appropriate words to use in context, including content specific vocabulary, words with multiple meanings, or precise vocabulary (State) EXAMPLE (precise vocabulary): "In this passage, the bear could best be described as acting: (A) excited (B) playful (C) harmful (D) curious" R:V:4:2.3: No GLE at this grade level	R:V:5:2.1: Identifying synonyms, antonyms, homonyms/ homophones, or shades of meaning (State) EXAMPLE (of shades of meaning): tired, exhausted R:V:5:2.2: Selecting appropriate words or explaining the use of words in context, including, content specific vocabulary, words with multiple meanings, or precise vocabulary (State) EXAMPLE (multiple meanings): Students explain the intended meanings of words found in text – "Based on the way 'spring' is used in this passage, would having a 'spring' be necessary for survival? Explain how you know." R:V:5:2.3: No GLE at this grade level

Initial Understanding of Literary Texts (LT:1)		
(R:LT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:1: Demonstrate initial understanding of elements of literary texts by…		
Grade 3	**Grade 4**	**Grade 5**
R:LT:3:1.1: Identifying or describing character(s), setting, problem/solution, major events, or plot, as appropriate to text (State) R:LT:3:1.2: Paraphrasing or summarizing key ideas/plot, with events sequenced, as appropriate to text (State) R:LT:3:1.3: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information (Local) R:LT:3:1.4: Identifying the characteristics of a variety of types of text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, tall tales, or realistic fiction) (Local) R:LT:3:1.5: Identifying literary devices as appropriate to genre: rhyme, alliteration, dialogue, or description (Local)	R:LT:4:1.1: Identifying or describing character(s), setting, problem/ solution, major events, or plot, as appropriate to text; or identifying any significant changes in character(s) over time (State) R:LT:4:1.2 Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (State) R:LT:4:1.3: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information (Local) R:LT:4:1.4: Identifying the characteristics of a variety of types of text (e.g., **literary text:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction) (Local) R:LT:4:1.5: Identifying literary devices as appropriate to genre: rhyme, alliteration, simile, description, or dialogue (Local)	R:LT:5:1.1: Identifying or describing character(s), setting, problem/ solution, major events, or plot, as appropriate to text; or identifying any significant changes in character(s) over time (State) R:LT:5:1.2: Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (State) R:LT:5:1.3: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information (Local) R:LT:5:1.4: Identifying the characteristics of a variety of types of text (e.g., **literary texts**: poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries) (Local) R:LT:5:1.5: Identifying literary devices as appropriate to genre: rhyme, alliteration, simile, dialogue, imagery, or simple metaphors (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:2)		
(R:LT:2: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:2: Analyze and interpret elements of literary texts, citing evidence where appropriate by…		
Grade 3	**Grade 4**	**Grade 5**
R:LT:3:2.1 Making logical predictions (State)	R:LT:4:2.1: Making logical predictions (State)	R:LT:5:2.1: Making logical predictions (State) EXAMPLE: "Which event is most likely to happen next?"
R:LT:3:2.2: Describing main characters' physical characteristics or personality traits; or providing examples of thoughts, words or actions that reveal characters' personality traits (State)	R:LT:4:2.2: Describing main characters' physical characteristics or personality traits; or providing examples of thoughts, words, or actions that reveal characters' personality traits (State)	R:LT:5:2.2: Describing characters' physical characteristics, personality traits, or interactions; or providing examples of thoughts, words, or actions that reveal characters' personality traits or their changes over time (State)
R:LT:3:2.3: Making basic inferences about problem, conflict, or solution (e.g., cause-effect relationships) (State) EXAMPLE: "How might the story have been different if…?"	R:LT:4:2.3: Making inferences about problem, conflict, or solution (State) EXAMPLE: "What influenced the father's decision to let his son try the climb?"	R:LT:5:2.3: Making inferences about problem, conflict, solution, or the relationship among elements (plot, character, setting) within text (e.g., how the setting affects a character or plot development) (State)
R:LT:3:2.4: Identifying who is telling the story (Local)	R:LT:4:2.4: Identifying who is telling the story (State)	R:LT:5:2.4: Identifying the narrator (State)
R:LT:3:2.5: Identifying the author's basic message (State) EXAMPLE: "In this story, Jon learned an important lesson about what to do when lost in the woods. What lesson did Jon learn?"	R:LT:4:2.5: Identifying author's message or theme (State) EXAMPLE: "What was the author trying to say about friendship in this story?" (e.g., friendship begins with accepting differences)	R:LT:5:2.5: Identifying author's message or theme (implied or stated, as in a fable) (State)
R:LT:3:2.6: Identifying possible motives of characters (Local)	R:LT:4:2.6: Identifying causes or effects, including possible motives of characters (Local)	R:LT:5:2.6: Identifying causes or effects, including possible motives of characters (Local)
R:LT:3:2.7: Recognizing explicitly stated causes or effects (Local)	R:LT:4:2.7: is subsumed under R:LT:4:2.6	R:LT:5:2.7: No GLE at this grade level

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:3)		
(R:LT:3: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:3: Analyze and interpret author's craft, citing evidence where appropriate by …		
Grade 3	**Grade 4**	**Grade 5**
R:LT:3:3.1: Recognizing the use of literary elements and devices ((i.e., imagery, exaggeration) to interpret intended meanings (Local)	R:LT:4:3.1: Demonstrating knowledge of use of literary elements and devices (i.e., imagery, exaggeration) to interpret intended meanings (Local)	R:LT:5:3.1: Demonstrating knowledge of use of literary elements and devices (i.e., imagery, exaggeration) to analyze literary works (State)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:4)		
R:LT:4: Generates a personal response to what is read through a variety of means by…		
Grade 3	**Grade 4**	**Grade 5**
R:LT:3:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:3:4.2: No GLE at this grade level	R:LT:4:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:4:4.2: No GLE at this grade level	R:LT:5:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:5:4.2: Providing relevant details to support the conclusions made (Local)

Initial Understanding of Informational Texts (IT:1)		
(R:IT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:1: Demonstrate initial understanding of informational texts (expository and practical texts) by…		
Grade 3	**Grade 4**	**Grade 5**
R:IT:3:1.1: Obtaining information, from text features (e.g., table of contents, glossary, basic transition words, bold or italicized text, headings, graphic organizers, charts, graphs, or illustrations) (State) EXAMPLES: "What words does the author want you to notice on this page?" "What is the last step of the directions?"	R:IT:4:1.1a: Obtaining information from text features (e.g., table of contents, glossary, index, transition words/phrases, bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations) (State)	R:IT:5:1.1a: Obtaining information from text features (e.g., table of contents, glossary, index, transition words /phrases, bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations) (State)
R:IT:3:1.2: Using information from the text to answer questions related to explicitly stated main/central ideas or details (State)	R:IT:4:1.1b: Obtaining information from text features (e.g., maps, diagrams, tables, captions, timelines) (Local)	R:IT:5:1.1b: Obtaining information from text features (e.g., maps, diagrams, tables, captions, timelines, citations) (Local)
R:IT:3:1.3: Organizing information to show understanding (e.g., representing main/central ideas or details within text through charting or mapping) (State) EXAMPLE: Given a chart (with headings filled in), students are asked to provide examples from the text to show physical characteristics of two different places or things	R:IT:4:1.2: Using information from the text to answer questions related to explicitly stated main/central ideas or key details (State)	R:IT:5:1.2: Using information from the text to answer questions related to main/central ideas or key details (State)
R:IT:3:1.4: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information. (Local)	R:IT:4:1.3: Organizing information to show understanding (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, or summarizing) (State)	R:IT:5:1.3: Organizing information to show understanding (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, summarizing, or comparing/contrasting) (State)
R:IT:3:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference:** dictionaries, glossaries, children's magazines, content trade books, textbooks, children's newspapers; and **practical/functional texts:** book orders, procedures, instructions, announcements, invitations) (Local)	R:IT:4:1.4: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information. (Local)	R:IT:5:1.4: Generating questions before, during, and after reading to enhance recall, expand understanding and/or gain new information. (Local)
	R:IT:4:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference:** dictionaries, glossaries, encyclopedias, children's magazines, content trade books, textbooks, student newspapers; and **practical/functional texts:** procedures, instructions, book orders, announcements, invitations) (Local)	R:IT:5:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference:** dictionaries, glossaries, reports, encyclopedias, children's magazines, content trade books, textbooks, student newspapers, Internet websites, biographies; and **practical/functional texts:** procedures, instructions, book orders, announcements, invitations, recipes, menus (Local)

Analysis and Interpretation of Informational Texts/Citing Evidence (IT:2)		
(R:IT:2: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:2: Analyze and interpret informational text, citing evidence as appropriate by…		
Grade 3	**Grade 4**	**Grade 5**
R:IT:3:2.1: Connecting information *within* a text (State) EXAMPLE: Combining, comparing, or using information found in both the written text and in a caption in a text	R:IT:4:2.1: Connecting information *within* a text or *across* texts (State)	R:IT:5:2.1: Connecting information *within* a text or *across* texts (State)
R:IT:3:2.2: Recognizing generalizations about text (e.g., identifying appropriate titles, assertions, or controlling ideas) (State)	R:IT:4:2.2: Synthesizing information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas) (State)	R:IT:5:2.2: Synthesizing information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas) (State)
R:IT:3:2.3: Making basic inferences, drawing basic conclusions, or forming judgments/opinions about central ideas that are relevant (State)	R:IT:4:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain) or message; or drawing basic conclusions; or forming judgments/opinions about central ideas that are relevant (State)	R:IT:5:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or forming and supporting opinions/judgments and assertions about central ideas that are relevant (State)
R:IT:3:2.4: Distinguishing fact from opinion (State)	R:IT:4:2.4 Distinguishing fact from opinion (State)	R:IT:5:2.4: Distinguishing fact from opinion (State)
R:IT:3:2.5 Making inferences about causes or effects (State) EXAMPLE: "What probably caused the fire to start in the garage?"	R:IT:4:2.5: Making inferences about causes or effects (State)	R:IT:5:2.5: Making inferences about causes or effects (State)

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:1)		
(R:RS:1: Assumes increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:1: Demonstrates ability to monitor comprehension for different types of texts and purposes by…		
Grade 3	**Grade 4**	**Grade 5**
R:RS:3:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting upcoming text, monitoring, adjusting and confirming, through use of print, syntax/ language structure, semantics/meaning, or other context cues) (Local) R:RS:3:1.2: Subsumed in R:RS:3:1.1	R:RS:4:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting upcoming text, monitoring, adjusting and confirming, through use of print, syntax/ language structure, semantics/ meaning, or other context cues) (Local) R:RS:4:1.2: Subsumed in R:RS:4:1.1	R:RS:5:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting upcoming text, monitoring, adjusting, and confirming through use of print, syntax/ language structure, semantics/ meaning, or other context cues) (Local) R:RS:5:1.2: Subsumed in R:RS:5:1.1

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:2)		
(R:RS:2: Assumes increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:2: Uses comprehension strategies (with flexibility and as needed)…		
Grade 3	**Grade 4**	**Grade 5**
R:RS:3:2.1: Using strategies before, during, and after reading literary and informational text. (Local) EXAMPLES of reading comprehension strategies might include :using prior knowledge; predicting and making text-based inferences; determining importance; generating literal and clarifying questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); or locating and using text features (e.g., transition words, subheadings, bold/italicized print, parts of the book) (See also Appendix D)	R:RS:4:2.1:Using strategies before, during, and after reading literary and informational text. (Local) EXAMPLES of reading comprehension strategies might include: using prior knowledge; sampling a page for readability; summarizing; predicting and making text-based inferences; determining importance; generating literal and clarifying questions; constructing sensory images(e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); locating and using text features (e.g., transition words, subheadings, bold/italicized print, parts of the book); or using text structure clues (e.g., chronological, cause/effect, compare/contrast, proposition and support, description, classification) (See also Appendix D)	R:RS:5:2.1: Using strategies before, during, and after reading literary and informational text. (Local) EXAMPLES of reading comprehension strategies might include: using prior knowledge; sampling a page for readability; summarizing; predicting and making text-based inferences; determining importance; generating literal, clarifying, and inferential questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); taking notes; locating, using, and analyzing text features (e.g., transition words, subheadings, bold/italicized print, parts of the book); or using text structure clues (e.g., chronological, cause/effect, compare/contrast, proposition, description classification, support, and logical/ sequential) (See also Appendix D)

Breadth of Reading: Reading Extensively* and In Depth (B:1)		
R:B:1: Demonstrates the habit of reading widely and extensively* by…		
Grade 3	**Grade 4**	**Grade 5**
R:B:3:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:3:1.2: Reading from a wide range of genres/ kinds of text and a variety of authors (e.g., literary, informational, and practical texts) (Local) (See Appendix A) R:B:3:1.3: Reading multiple texts for depth of understanding an author or genre (Local)	R:B:4:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:4:1.2: Reading from a wide range of genres/ kinds of text and a variety of authors (e.g., literary, informational, and practical texts) (Local) (See Appendix A) R:B:4:1.3: Reading multiple texts for depth of understanding an author or genre (Local)	R:B:5:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:5:1.2: Reading from a wide range of genres/ kinds of text and a variety of authors (e.g., literary, informational, and practical texts) (Local) (See Appendix A) R:B:5:1.3: Reading multiple texts for depth of understanding an author, a subject, a theme, or genre (Local)

Breadth of Reading: Reading Extensively* and In Depth (B:2)		
***Materials should be at the student's instructional <u>and</u> independent reading levels. The specific number of books should be viewed flexibly and is less important than the extensiveness, duration/ time, and frequency of reading.**		
R:B:2: Demonstrates participation in a literate community by…		
Grade 3	**Grade 4**	**Grade 5**
R:B:3:2.1: Self-selecting reading materials aligned with reading ability and personal interests (Local) R:B:3:2.2: Participating in discussions about text, ideas, and student "writing" by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:4:2.1: Self-selecting reading materials aligned with reading ability and personal interests (Local) R:B:4:2.2: Participating in discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:5:2.1: Self-selecting reading materials aligned with reading ability and personal interests (Local) R:B:5:2.2: Participating in discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)

Breadth of Reading: Reading for Research Across Content Areas (B:3)		
***Research materials should be at the student's instructional and independent reading levels, including print and non-print texts.**		
R:B:3:3: Research* by reading multiple sources (including print and non-print texts) to report information by… **R:B:4:3: Research* by reading multiple sources (including print and non-print texts) to report information, or to <u>formulate a judgment</u> by…** **R:B:5:3: Research* by reading multiple sources (including print and non-print texts) to report information, <u>solve a problem</u>, or to formulate a judgment by…**		
Grade 3	**Grade 4**	**Grade 5**
R:B:3:3.1: Using sources provided (Local) R:B:3:3.2: Evaluating information presented in terms of relevance (Local) R:B:3:3.3: Gathering information and using a given structure (e.g., chart, diagram, outline, etc.) to organize it (Local) R:B:3:3.4: Using evidence to support conclusions (Local)	R:B:4:3.1: Using sources provided (Local) R:B:4:3.2: Evaluating information presented in terms of relevance (Local) R:B:4:3.3: Gathering information and using a given structure (e.g., chart, diagram, outline, etc.) to organize it (Local) R:B:4:3.4: Using evidence to support conclusions (Local)	R:B:5:3.1: <u>Identifying potential sources of information from those provided</u> (Local) R:B:5:3.2: Evaluating information presented in terms of relevance (Local) R:B:5:3.3: Gathering, <u>organizing, and interpreting</u> the information (Local) R:B:5:3.4: Using evidence to support conclusions (Local)

Early Reading Strategies (ERS:1) Phonemic Awareness and Phonological Knowledge		
R:ERS:1: Demonstrates phonemic awareness and applies phonological knowledge and skills by…		
Grade 6	**Grade 7**	**Grade 8**
No GLE at this grade level	No GLE at this grade level	No GLE at this grade level

Early Reading Strategies (ERS:2) Concepts of Print		
R:ERS:2: Demonstrates understanding of concepts of print during shared or individual reading by…		
Grade 6	**Grade 7**	**Grade 8**
No GLE at this grade level	No GLE at this grade level	No GLE at this grade level

Reading Fluency and Accuracy (F&A)		
(R:F&A: Assumes a variety of text and increasing text complexity across grade levels. See Appendix D for descriptions of increasing text complexity.)		
R:F&A: Reads grade-level appropriate material with…		
Grade 6	**Grade 7**	**Grade 8**
R:F&A:6:1.1: Accuracy: reading material appropriate for grade 6 with 90-94% accuracy (Local) (See Appendix F for sample titles.) R:F&A:6:1.2: Fluency: reading with appropriate silent and oral reading fluency rates as determined by text demands and purpose for reading (Local) (See Appendix C for suggested rates.) R:F&A:6:1.3: Fluency: reading familiar text with phrasing and expression, and with attention to text features, such as punctuation, italics, and dialogue (Local)	R:F&A:7:1.1: Accuracy: reading material appropriate for grade 7 with at least 90-94% accuracy (Local) (See Appendix F for sample titles.) R:F&A:7:1.2: Fluency: reading with appropriate silent and oral reading fluency rates as determined by text demands, and purpose for reading (Local) (See Appendix C for suggested rates.) R:F&A:7:1.3: Fluency: reading familiar text with phrasing and expression, and with attention to text features such as punctuation, italics, and dialogue (Local)	R:F&A:8:1.1: Accuracy: reading material appropriate for grade 8 with at least 90-94% accuracy (Local) (See Appendix F for sample titles.) R:F&A:8:1.2: Fluency: reading with appropriate silent and oral reading fluency rates as determined by text demands, and purpose for reading (Local) (See Appendix C for suggested rates.) R:F&A:8:1.3: Fluency: reading familiar text with phrasing and expression, and with attention to text features such as punctuation, italics, and dialogue (Local)

Word Identification Skills and Strategies (WID)		
R:WID: Applies word identification/ decoding strategies by …		
Grade 6	**Grade 7**	**Grade 8**
R:WID:6:1.1: Identifying multi-syllabic words by using knowledge of sounds, syllable division, and word patterns (Local)	R:WID:7:1.1: Identifying multi-syllabic words by using knowledge of sounds, syllable division, and word patterns (Local)	R:WID:8:1.1: Identifying multi-syllabic words by using knowledge of sounds, syllable division, and word patterns (Local)

Vocabulary Strategies (V:1)		
(R:V:1: Assumes a variety of text and increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:V:1: Students identify the meaning of unfamiliar vocabulary by…		
Grade 6	**Grade 7**	**Grade 8**
R:V:6:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes and base words; or context clues; or other resources, such as dictionaries, glossaries, thesauruses; or prior knowledge) (State)	R:V:7:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes, base words, common roots, or word origins; or context clues; or other resources, such as, dictionaries, glossaries, thesauruses; or prior knowledge) (State) EXAMPLE (of common root): inspection (in -**spec**-tion)	R:V:8:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes, base words, common roots, or word origins; or context clues; or other resources, such as dictionaries, glossaries, thesauruses; or prior knowledge) (Local)

Breadth of Vocabulary (V:2)		
R:V:2: Shows breadth of vocabulary knowledge through demonstrating understanding of word meanings or relationships by …		
Grade 6	**Grade 7**	**Grade 8**
R:V:6:2.1: Identifying synonyms, antonyms, homonyms/ homophones, or shades of meaning (State) R:V:6:2.2: Selecting appropriate words or explaining the use of words in context, including content specific vocabulary, words with multiple meanings, or precise vocabulary (State)	R:V:7:2.1: Identifying synonyms, antonyms, homonyms/ homophones, or shades of meaning (State) R:V:7:2.2: Selecting appropriate words or explaining the use of words in context, including content specific vocabulary, words with multiple meanings, or precise vocabulary (State)	R:V:8:2.1: Identifying synonyms, antonyms, homonyms/ homophones, shades of meaning, or word origins, including words from other languages that have been adopted into our language (Local) EXAMPLE (word origin from other language): de'ja' vu R:V:8:2.2: Selecting appropriate words or explaining the use of words in context, including content specific vocabulary, words with multiple meanings, or precise vocabulary (Local)

Initial Understanding of Literary Texts (LT:1)		
(R:LT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:1: Demonstrate initial understanding of elements of literary texts by…		
Grade 6	**Grade 7**	**Grade 8**
R:LT:6:1.1: Identifying or describing character(s), setting, problem/ solution, or plot, as appropriate to text; or identifying any significant changes in character or setting over time (State) EXAMPLE (of setting changing): In this poem, how does the farm's appearance change over the years? R:LT:6:1.2: Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (State) R:LT:6:1.3: Generating questions before, during, and after reading to enhance understanding and recall, expand understanding and/or gain new information (Local) R:LT:6:1.4: Identifying the characteristics of a variety of types/genres of literary text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends (Local) R:LT:6:1.5: Identifying literary devices as appropriate to genre: rhyme, alliteration, simile, dialogue, imagery, simple metaphors, flashback, onomatopoeia, repetition, or idioms (Local)	R:LT:7:1.1: Identifying or describing character(s), setting, problem/ solution, or plot, as appropriate to text; or identifying any significant changes in character or setting over time; or identifying rising action, climax, or falling action (State) R:LT:7:1.2 Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (State) R:LT:7:1.3: Generating questions before, during, and after reading to enhance//expand understanding and /or gaining new information (Local) R:LT:7:1.4: Identifying the characteristics of a variety of types/genres of literary text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, short stories (Local) R:LT:7:1.5: Identifying literary devices as appropriate to genre: rhyme schemes, alliteration, simile, dialogue, imagery, metaphors, flashback, onomatopoeia, repetition, or personification (Local)	R:LT:8:1.1: Identifying or describing character(s), setting, problem/ solution, or plots/subplots, as appropriate to text; or identifying any significant changes in character or setting over time; or identifying rising action, climax, or falling action (Local) R:LT:8:1.2: Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (State) R:LT:8:1.3: Generating questions before, during, and after reading to enhance//expand understanding and /or gaining new information (Local) R:LT:8:1.4: Identifying the characteristics of a variety of types/genres of literary text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, short stories, epics (poems, novels, dramas) (Local) R:LT:8:1.5: Identifying literary devices as appropriate to genre: rhyme schemes, alliteration, simile, dialogue, imagery, metaphors, flashback, onomatopoeia, repetition, personification, or hyperbole (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:2)		
(R:LT:2: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:2: Analyze and interpret elements of literary texts, citing evidence where appropriate by…		
Grade 6	**Grade 7**	**Grade 8**
R:LT:6:2.1 Explaining or supporting logical predictions (e.g., providing evidence from text to explain why something is likely to happen next) (State) R:LT:6:2.2: Describing characters' traits, motivation, or interactions, citing thoughts, words, or actions that reveal characters' traits, motivations, or their changes over time (State) R:LT:6:2.3: Making inferences about cause/effect, external conflicts (e.g., person versus person, person versus nature/society/fate), or the relationship among elements within text (e.g., how the historical era influences the characters' actions or thinking) (State) R:LT:6:2.4: Explaining how the narrator's point of view affects the reader's interpretation (State) EXAMPLE: "This story is told from Ted's point of view. What do you know about how Ted feels because he tells the story?" R:LT:6:2.5: Identifying author's message or theme (State) R:LT:6:2.6: is subsumed under R:LT:6:2.2 and R:LT:6:2.3	R:LT:7:2.1: Explaining or supporting logical predictions (State) R:LT:7:2.2: Describing characters' traits, motivation, or interactions, citing thoughts, words, or actions that reveal characters' traits, motivations, or their changes over time (State) R:LT:7:2.3: Making inferences about cause/effect (e.g., explaining how an event gives rise to the next), internal or external conflicts (e.g., person versus self, person versus person, person versus nature/society/fate), or the relationship among elements within text (State) R:LT:7:2.4: Explaining how the narrator's point of view affects the reader's interpretation (State) R:LT:7:2.5: Explaining how the author's message or theme is supported within the text (State)	R:LT:8:2.1: Explaining or supporting logical predictions (Local) R:LT:8:2.2: Describing characterization (e.g., stereotype, antagonist, protagonist), motivation, or interactions, citing thoughts, words, or actions that reveal characters' traits, motivations, or their changes over time (Local) R:LT:8:2.3: Making inferences about cause/effect, internal or external conflicts (e.g., person versus self, person versus person, person versus nature/society/fate), or the relationship among elements within text (e.g., describing the interaction among plot/subplots) (Local) R:LT:8:2.4: Explaining how the narrator's point of view affects the reader's interpretation (Local) R:LT:8:2.5: Explaining how the author's message or theme (which may include universal themes) is supported within the text (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:3)		
(R:LT:3: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:3: Analyze and interpret author's craft, citing evidence where appropriate by …		
Grade 6	**Grade 7**	**Grade 8**
R:LT:6:3.1: Demonstrating knowledge of use of literary elements and devices (i.e., imagery, exaggeration, simile, metaphor, foreshadowing, or suspense) to analyze literary work (State) R:LT:6:3.2: Demonstrating knowledge of use of literary elements and devices (e.g., rhyme, alliteration, dialogue, flashback, onomatopoeia, repetition, or idioms) to analyze literary works (Local)	R:LT:7:3.1: Demonstrating knowledge of use of literary elements and devices (i.e., imagery, exaggeration, repetition, flashback, foreshadowing, or personification) to analyze literary works (State) EXAMPLE: "Why did the author choose to use flashback in this story?" R:LT:7:3.2: Demonstrating knowledge of use of literary elements and devices (e.g., rhyme schemes, alliteration, simile, dialogue, metaphors, onomatopoeia, repetition, or idioms to analyze literary works (Local)	R:LT:8:3.1: Demonstrating knowledge of author's style or use of literary elements and devices (e.g., imagery, repetition, flashback, foreshadowing, personification, hyperbole, symbolism, or use of punctuation) to analyze literary works (Local) R:LT:8:3.2: is subsumed under R:LT:8:3.1, since all aspects are assessed Locally in grade 8

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:4)		
(R:LT:4: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:4: Generates a personal response to what is read through a variety of means by…		
Grade 6	**Grade 7**	**Grade 8**
R:LT:6:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:6:4.2: Providing relevant details to support the connections made or judgments (interpretive, analytical, evaluative, or reflective) (Local)	R:LT:7:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:7:4.2: Providing relevant details to support the connections made or judgments (interpretive, analytical, evaluative, or reflective) (Local)	R:LT:8:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:8:4.2: Providing relevant details to support the connections made or judgments (interpretive, analytical, evaluative, or reflective) (Local)

Initial Understanding of Informational Texts (IT:1)		
(R:IT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:1: Demonstrate initial understanding of informational texts (expository and practical texts) by…		
Grade 6	**Grade 7**	**Grade 8**
R:IT:6:1.1a: Obtaining information from text features (e.g., table of contents, glossary, index, transition words /phrases, bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations) (State) R:IT:6:1.1b: Obtaining information from text features (e.g., maps, diagrams, tables, captions, timelines, citations, or transitional devices) (Local) R:IT:6:1.2: Using information from the text to answer questions related to main/central ideas or key details (State) R:IT:6:1.3: Organizing information to show understanding (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, summarizing, or comparing/contrasting) (State) R:IT:6:1.4: Generating questions before, during, and after reading to enhance understanding and recall; expand understanding and/or gain new information (Local) R:IT:6:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference:** dictionaries, glossaries, thesauruses, encyclopedias, reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles; and **practical/functional:** procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets) (Local)	R:IT:7:1.1: Obtaining information from text features (e.g., table of contents, glossary, index, transition words /phrases, transitional devices, bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations) (State) R:IT:7:1.2: Using information from the text to answer questions, to state the main/central ideas, or to provide supporting details (State) R:IT:7:1.3: Organizing information to show understanding (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, summarizing, or comparing/contrasting) (State) R:IT:7:1.4: Generating questions before, during, and after reading to enhance understanding and recall; expand understanding and/or gain new information (Local) R:IT:7:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference:** thesauruses, reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles, technical manuals; and **practical/functional:** procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets) (Local)	R:IT:8:1.1: Obtaining information from text features (e.g., table of contents, glossary, index, transition words /phrases, transitional devices, bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations) (Local) R:IT:8:1.2: Using information from the text to answer questions, to state the main/central ideas, or to provide supporting details (Local) R:IT:8:1.3: Organizing information to show understanding or relationships among facts, ideas, and events (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, summarizing, comparing/contrasting, or outlining) (Local) R:IT:8:1.4: Generating questions before, during, and after reading to enhance understanding and recall; expand understanding and/or gain new information (Local) R:IT:8:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference:** reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles, technical manuals ; and **practical/functional:** procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, schedules) (Local)

Analysis and Interpretation of Informational Texts/Citing Evidence (IT:2)		
(R:IT:2: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:2: Analyze and interpret informational text, citing evidence as appropriate by…		
Grade 6	**Grade 7**	**Grade 8**
R:IT:6:2.1: Connecting information *within* a text or *across* texts (State)	R:IT:7:2.1: Explaining connections about information *within* a text, *across* texts, or to related ideas (State)	R:IT:8:2.1: Explaining connections about information *within* a text, *across* texts, or to related ideas (Local)
R:IT:6:2.2: Synthesizing information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas (State)	R:IT:7:2.2: Synthesizing and evaluating information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas (State)	R:IT:8:2.2: Synthesizing and evaluating information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas) (Local)
R:IT:6:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or forming and supporting opinions/judgments and assertions about central ideas that are relevant (State)	R:IT:7:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or using supporting evidence to form or evaluate opinions/judgments and assertions about the central ideas that are relevant (State) EXAMPLE (of evaluating): Given a statement (opinion, judgment, or assertion), students provide evidence from the text that this statement does/does not support the author's purpose in writing the piece.	R:IT:8:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or explaining how purpose may affect the interpretation of the text; or using supporting evidence to form or evaluate opinions/judgments and assertions about central ideas that are relevant (Local)
R:IT:6:2.4: Distinguishing fact from opinion, and identifying possible bias/propaganda (State)	R:IT:7:2.4: Distinguishing fact from opinion, and identifying possible bias/propaganda or conflicting information within or across texts (State)	R:IT:8:2.4: Distinguishing fact from opinion, and identifying possible bias/propaganda or conflicting information within or across texts (Local)
R:IT:6:2.5 Making inferences about causes or effects (State)	R:IT:7:2.5: Making inferences about causes or effects (State)	R:IT:8:2.5: Making inferences about causes or effects (Local)
R:IT:6:2.6: No GLE at this grade level	R:IT:7:2.6: Evaluating the clarity and accuracy of information (Local)	R:IT:8:2.6: Evaluating the clarity and accuracy of information (Local)

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:1)		
(R:RS:1: Assumes increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:1: Demonstrates ability to monitor comprehension for different types of texts and purposes by…		
Grade 6	**Grade 7**	**Grade 8**
R:RS:6:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting and confirming, rereading, adjusting rate, sub-vocalizing, consulting resources, questioning, skimming, scanning, using syntax/language structure, semantics/ meaning, or other context cues, etc.) (Local)	R:RS:7:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting and confirming, rereading, adjusting rate, sub-vocalizing, consulting resources, questioning, skimming, scanning, using syntax/language structure, semantics/ meaning, or other context cues, etc.) (Local)	R:RS:8:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting and confirming, rereading, adjusting rate, sub-vocalizing, consulting resources, questioning, skimming, scanning, using syntax/language structure, semantics/ meaning, or other context cues, etc.) (Local)

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:2)		
(R:RS:2: Assumes increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:2: Uses comprehension strategies (flexibly and as needed) before, during, and after reading literary and informational text. (Local)		
Grade 6	**Grade 7**	**Grade 8**
R:RS:6:2.1: Using strategies before, during, and after reading literary and informational text. EXAMPLES of reading comprehension strategies might include: using prior knowledge; sampling a page for readability; summarizing; predicting and making text based inferences; determining importance; generating literal, clarifying, and inferential questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); taking notes; locating, using, and analyzing text features (e.g., transition words, subheadings, bold/italicized print, parts of the book); or using text structure clues (e.g., chronological, cause/effect, compare/contrast, proposition, description, classification and support, logical/ sequential) (Local) (See also Appendix D)	R:RS:7:2.1: Using strategies before, during, and after reading literary and informational text. EXAMPLES of reading comprehension strategies might include: using prior knowledge; sampling a page for readability; summarizing; predicting and making text based inferences; determining importance; generating literal, clarifying, and inferential questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); taking notes; locating, using, and analyzing text features (e.g., transition words, subheadings, bold/italicized print, parts of the book); or using text structure clues (e.g., chronological, cause/effect, compare/contrast, proposition and support, description, classification, logical/ sequential) (Local) (See also Appendix D)	R:RS:8:2.1: Using strategies before, during, and after reading literary and informational text. EXAMPLES of reading comprehension strategies might include: using prior knowledge; sampling a page for readability; summarizing; predicting and making text based inferences; determining importance; generating literal, clarifying, and inferential questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); taking notes; locating, using, and analyzing text features (e.g., transition words, subheadings, bold/italicized print, parts of the book); or using text structure clues (e.g., chronological, cause/effect, compare/contrast, proposition and support, description, classification, logical/ sequential) (Local) (See also Appendix D)

Breadth of Reading: Reading Extensively* and In Depth (B:1)		
R:B:1: Demonstrates the habit of reading widely and extensively* by…		
Grade 6	**Grade 7**	**Grade 8**
R:B:6:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:6:1.2: Reading from a wide range of genres/ kinds of text, <u>including primary and secondary sources,</u> and a variety of authors (e.g., literary, informational, and practical/functional texts) (Local) (See Appendix A) R:B:6:1.3: Reading multiple texts for depth of understanding an author, a subject, a theme, or genre (Local)	R:B:7:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:7:1.2: Reading from a wide range of genres/ kinds of text, including primary and secondary sources, and a variety of authors (e.g., literary, informational, and practical/functional texts) (Local) (See Appendix A) R:B:7:1.3: Reading multiple texts for depth of understanding an author, a subject, a theme, or genre (Local)	R:B:8:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:8:1.2: Reading from a wide range of genres/ kinds of text, including primary and secondary sources, and a variety of authors (e.g., literary, informational, and practical/functional texts) (Local) (See Appendix A) R:B:8:1.3: Reading multiple texts for depth of understanding an author, a subject, a theme, or genre (Local)

Breadth of Reading: Reading Extensively* and In Depth (B:2)		
***Materials should be at the student's instructional <u>and</u> independent reading levels. The specific number of books should be viewed flexibly and is less important than the extensiveness, duration/ time, and frequency of reading.**		
R:B:2: Demonstrates participation in a literate community by…		
Grade 6	**Grade 7**	**Grade 8**
R:B:6:2.1: Self-selecting reading materials aligned with reading ability and personal interests (Local) R:B:6:2.2: Participating in in-depth discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:7:2.1: Self-selecting reading materials in line with reading ability and personal interests (Local) R:B:7:2.2: Participating in in-depth discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:8:2.1: Self-selecting reading materials in line with reading ability and personal interests (Local) R:B:8:2.2: Participating in in-depth discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)

Breadth of Reading: Reading for Research Across Content Areas (B:3)		
***Research materials should be at the student's instructional and independent reading levels, including print and non-print texts.**		
R:B:6:3: Research* by reading multiple sources (including print and non-print texts) to report information, to solve a problem, or to make a decision, or to formulate a judgment by… **R:B:7:3: Research* by reading multiple sources (including print and non-print texts) to solve a problem, or to make a decision, or to formulate a judgment, or to support a thesis by…** **R:B:8:3: Research* by reading multiple sources (including print and non-print texts) to solve a problem, or to make a decision, or to formulate a judgment, or to support a thesis by…**		
Grade 6	**Grade 7**	**Grade 8**
R:B:6:3.1: Identifying potential sources of information (Local) R:B:6:3.2: Evaluating information presented, in terms of relevance (Local) R:B:6:3.3: Gathering, organizing, and interpreting the information (Local) R:B:6:3.4: Using evidence to support conclusions (Local)	R:B:7:3.1: Identifying potential sources of information (Local) R:B:7:3.2: Evaluating information presented, in terms of relevance (Local) R:B:7:3.3: Gathering, organizing, analyzing, and interpreting the information (Local) R:B:7:3.4: Using evidence to support conclusions (Local)	R:B:8:3.1: Identifying and evaluating potential sources of information (Local) R:B:8:3.2: Evaluating information presented, in terms of completeness and relevance (Local) R:B:8:3.3: Gathering, organizing, analyzing, and interpreting the information (Local) R:B:8:3.4: Using evidence to support conclusions (Local)

Early Reading Strategies (ERS:1) Phonemic Awareness and Phonological Knowledge		
R:ERS:1: Demonstrates phonemic awareness and applies phonological knowledge and skills by…		
Grade 8	**Grade 10**	**Grade 12**
No GLE at this grade level	No GLE at this grade level	No GLE at this grade level

Early Reading Strategies (ERS:2) Concepts of Print		
R:ERS:2: Demonstrates understanding of concepts of print during shared or individual reading by…		
Grade 8	**Grade 10**	**Grade 12**
No GLE at this grade level	No GLE at this grade level	No GLE at this grade level

Reading Fluency and Accuracy (F&A)		
(R:F&A: Assumes a variety of text and increasing text complexity across grade levels. See Appendix D for descriptions of increasing text complexity.)		
R:F&A: Reads grade-level appropriate material with…		
Grade 8	**Grade 10**	**Grade 12**
R:F&A:8:1.1: Accuracy: reading material appropriate for grade 8 with at least 90-94% accuracy (Local) (See Appendix F for sample titles.) R:F&A:8:1.2: Fluency: reading with appropriate silent and oral reading fluency rates as determined by text demands, and purpose for reading (Local) (See Appendix C for suggested rates.) R:F&A:8:1.3: Fluency: reading familiar text with phrasing and expression, and with attention to text features such as punctuation, italics, and dialogue (Local)	R:F&A:10:1.1: Accuracy: reading material appropriate for high school with at least 90-94% accuracy (Local) (See Appendix F for sample titles.) R:F&A:10:1.2: Fluency: reading with appropriate silent and oral reading fluency rates as determined by text demands, and purpose for reading (Local) (See Appendix C for suggested rates.) R:F&A:10:1.3: Fluency: reading familiar text with phrasing and expression, and with attention to text features such as punctuation, italics, and dialogue (Local)	R:F&A:12:1.1: Accuracy: reading material appropriate for high school with at least 90-94% accuracy (Local) (See Appendix F for sample titles.) R:F&A:12:1.2: Fluency: reading with appropriate silent and oral reading fluency rates as determined by text demands, and purpose for reading (Local) (See Appendix C for suggested rates.) R:F&A:12:1.3: Fluency: reading familiar text with phrasing and expression, and with attention to text features such as punctuation, italics, and dialogue (Local)

Word Identification Skills and Strategies (WID)		
R:WID: Applies word identification/ decoding strategies by …		
Grade 8	**Grade 10**	**Grade 12**
R:WID:8:1.1: Identifying multi-syllabic words by using knowledge of sounds, syllable division, and word patterns (Local)	R:WID:10:1.1: Identifying multi-syllabic words by using knowledge of sounds, syllable division, and word patterns (Local)	R:WID:12:1.1: Identifying multi-syllabic words by using knowledge of sounds, syllable division, and word patterns (Local)

Vocabulary Strategies (V:1)		
(R:V:1: Assumes a variety of text and increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:V:1: Students identify the meaning of unfamiliar vocabulary by…		
Grade 8	**Grade 10**	**Grade 12**
R:V:8:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes, base words, common roots, or word origins; or context clues; or other resources, such as dictionaries, glossaries, thesauruses; or prior knowledge) (Local)	R:V:10:1.1a: Using strategies to unlock meaning (e.g., prior knowledge of word structure) including prefixes/suffixes, common roots, or word origins; or context clues; or resources including dictionaries, glossaries, or thesauruses <u>to determine definition, pronunciation, etymology, or usage of words</u>; (State) R:V:10:1.1b: Using strategies to unlock meaning including prior knowledge, base words, <u>general and specialized print or electronic resources to determine definition, pronunciation, etymology, or usage of words</u> (Local)	R:V:12:1.1a: Using strategies to unlock meaning (e.g., prior knowledge of word structure, including prefixes/suffixes, common roots, or word origins; or context clues; or resources including dictionaries, glossaries, or thesauruses to determine definition, pronunciation, etymology, or usage of words) (Local) R:V:12:1.1b: Using strategies to unlock meaning including prior knowledge, base words, <u>general and specialized print or electronic resources to determine definition, pronunciation, etymology, or usage of words</u> (Local)

Breadth of Vocabulary (V:2)		
R:V:2: Shows breadth of vocabulary knowledge through demonstrating understanding of word meanings and relationships by …		
Grade 8	**Grade 10**	**Grade 12**
R:V:8:2.1: Identifying synonyms, antonyms, homonyms/ homophones, shades of meaning, or word origins, including words from other languages that have been adopted into our language (Local) EXAMPLE (word origin from other language): de'ja' vu R:V:8:2.2: Selecting appropriate words or explaining the use of words in context, including content specific vocabulary, words with multiple meanings, or precise vocabulary (Local)	R:V:10:2.1: Identifying synonyms, antonyms, homonyms/ homophones, shades of meaning, idioms, or word origins, including words from dialects, or other languages that have been adopted into our language/standard English (State) R:V:10:2.2: Selecting appropriate words or explaining the use of words in context, including connotation or denotation, shades of meanings of words/nuances, or idioms; or use of content-specific vocabulary, words with multiple meanings, precise language, or technical vocabulary (State) EXAMPLE: Students might be asked to explain the meaning of terminology appropriate to the content of the subject area as used in a text passage	R:V:12:2.1: Identifying synonyms, antonyms, homonyms/ homophones, shades of meaning, analogies, idioms, or word origins, including words from dialects, or other languages that have been adopted into standard English (Local) R:V:12:2.2: Selecting appropriate words or explaining the use of words in context, including connotation or denotation, shades of meanings of words/nuances, or idioms; or use of content-specific vocabulary, words with multiple meanings, precise language, or technical vocabulary (Local)

Initial Understanding of Literary Texts (LT:1)		
(R:LT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:1: Demonstrate initial understanding of elements of literary texts by…		
Grade 8	**Grade 10**	**Grade 12**
R:LT:8:1.1: Identifying or describing character(s), setting, problem/ solution, or plots/subplots, as appropriate to text; or identifying any significant changes in character or setting over time; or identifying rising action, climax, or falling action (Local) R:LT:8:1.2: Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (State) R:LT:8:1.3: Generating questions before, during, and after reading to enhance//expand understanding and /or gaining new information (Local) R:LT:8:1.4: Identifying the characteristics of a variety of types/genres of literary text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, short stories, epics (poems, novels, dramas) (Local) R:LT:8:1.5: Identifying literary devices as appropriate to genre: rhyme schemes, alliteration, simile, dialogue, imagery, metaphors, flashback, onomatopoeia, repetition, personification, or hyperbole (Local)	R:LT:10:1.1: Identifying, describing, or making logical predictions about character (such as protagonist or antagonist), setting, problem/solution, or plots/subplots, as appropriate to text; or identifying any significant changes in character, relationships, or setting over time; or identifying rising action, climax, or falling action (State) R:LT:10:1.2 Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (State) R:LT:10:1.3: Generating questions before, during, and after reading to enhance//expand understanding and /or gaining new information(Local) R:LT:10:1.4: Identifying the characteristics of a variety of types/genres of literary text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, legends, myths, short stories, epics, novels, dramatic presentations, comedies, tragedies, satires, parodies, memoirs, epistles) (Local) R:LT:10:1.5: Identify literary devices as appropriate to genre (e.g., similes, metaphors, alliteration, rhyme scheme, onomatopoeia, imagery, repetition, flashback, foreshadowing, personification, hyperbole, symbolism, allusion, diction, syntax, bias, or point of view) (Local)	R:LT:12:1.1: Identifying, describing, or making logical predictions about character (such as protagonist or antagonist), setting, problem/solution, or plots/subplots, as appropriate to text; or identifying any significant changes in character, relationships, or setting over time; or identifying rising action, climax, or falling action (Local) R:LT:12:1.2: Paraphrasing or summarizing key ideas/plot, with major events sequenced, as appropriate to text (Local) R:LT:12:1.3: Generating questions before, during, and after reading to enhance understanding and recall enhance//expand understanding and /or gaining new information (Local) R:LT:12:1.4: Identifying the characteristics of a variety of types/genres of literary text (e.g., **literary texts:** poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, legends, myths, short stories, epics, novels, dramatic presentations, comedies, tragedies, satires, parodies, memoirs, epistles) (Local) R:LT:12:1.5: Identify literary devices as appropriate to genre (e.g., similes, metaphors, alliteration, rhyme scheme, onomatopoeia, imagery, repetition, flashback, foreshadowing, personification, hyperbole, symbolism, allusion, diction, syntax, bias, or point of view) (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:2)		
(R:LT:2: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:8:2: Analyze and interpret elements of literary texts, citing evidence where appropriate by… **R:LT:10:2: Analyze and interpret elements of literary texts, citing evidence where appropriate by…** **R:LT:12:2: Analyze and interpret literary elements within or across texts, citing evidence where appropriate by…**		
Grade 8	**Grade 10**	**Grade 12**
R:LT:8:2.1: Explaining or supporting logical predictions (Local) R:LT:8:2.2: Describing characterization (e.g., stereotype, antagonist, protagonist), motivation, or interactions, citing thoughts, words, or actions that reveal characters' traits, motivations, or their changes over time (Local) R:LT:8:2.3: Making inferences about cause/effect, internal or external conflicts (e.g., person versus self, person versus person, person versus nature/society/fate), or the relationship among elements within text (e.g., describing the interaction among plot/subplots) (Local) R:LT:8:2.4: Explaining how the narrator's point of view affects the reader's interpretation (Local) R:LT:8:2.5: Explaining how the author's message or theme (which may include universal themes) is supported within the text (Local)	R:LT:10:2.1: Explaining and supporting logical predictions or logical outcomes (e.g., drawing conclusions based on interactions between characters or evolving plot) (State) R:LT:10:2.2: Examining characterization (e.g., stereotype, antagonist, protagonist), motivation, or interactions (including relationships), citing thoughts, words, or actions that reveal character traits, motivations, or changes over time (State) R:LT:10:2.3: Making inferences about cause/effect, internal or external conflicts (e.g., person versus self, person versus person, person versus nature/society/fate), or the relationship among elements within text (e.g., describing the interaction among plot/subplots) (State) R:LT:10:2.4: Explaining how the narrator's point of view or author's style is evident and affects the reader's interpretation (State) EXAMPLE: "If this story were told from another character's point of view, how would the reader's interpretation be different?" R:LT:10:2.5: Explaining how the author's purpose (e.g., to entertain, inform or persuade) message or theme (which may include universal themes) is supported within the text (State)	R:LT:12:2.1: Explaining and supporting logical predictions or logical outcomes (e.g., drawing conclusions based on interactions between characters or evolving plot) (Local) R:LT:12:2.2: Examining characterization (e.g., stereotype, antagonist, protagonist), motivation, or interactions (including relationships), citing thoughts, words, or actions that reveal character traits, motivations, or changes over time (Local) R:LT:12:2.3: Making inferences about cause/effect, internal or external conflicts (e.g., person versus self, person versus person, person versus nature/society/fate), or the relationship among elements within text(s) (e.g., describing the interaction among plot/subplots, theme/setting, symbolism/characterization) (Local) R:LT:12:2.4: Explaining how the narrator's point of view, or author's style, or tone is evident and affects the reader's interpretation or is supported throughout the text(s) (Local) R:LT:12:2.5: Explaining how the author's purpose (e.g., to entertain, inform or persuade) message or theme (which may include universal themes) is supported within the text(s) (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:3)		
(R:LT:3: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:8:3: Analyze and interpret author's craft, citing evidence where appropriate by … **R:LT:8:3: Analyze and interpret author's craft, citing evidence where appropriate by …** **R:LT:12:3: Analyze and interpret author's craft <u>within or across texts</u>, citing evidence where appropriate by…**		
Grade 8	**Grade 10**	**Grade 12**
R:LT:8:3.1: Demonstrating knowledge of <u>author's style</u> or use of literary elements and devices (e.g., imagery, repetition, flashback, foreshadowing, personification, <u>hyperbole, symbolism, or use of punctuation</u>) to analyze literary works (Local) R:LT:8:3.2: is subsumed under R:LT:8:3.1, since all aspects are assessed Locally in grade 8	R:LT:10:3.1: Demonstrating knowledge of author's style or use of literary elements and devices (i.e., imagery, repetition, flashback, foreshadowing, personification, hyperbole, symbolism, <u>analogy, allusion, diction, syntax</u>, or use of punctuation) to analyze literary works (State)	R:LT:12:3.1a: Demonstrating knowledge of author's style or use of literary elements and devices (e.g., <u>simile, metaphor, point of view</u>, imagery, repetition, flashback, foreshadowing, personification, hyperbole, symbolism, analogize allusion, diction, syntax, genre, or bias, or use of punctuation, etc.) to analyze literary works (Local) R:LT:12:3.1b: <u>Examining author's style or use of literary devices to convey theme</u> (Local)

Analysis and Interpretation of Literary Texts/Citing Evidence (LT:4)		
(R:LT:4: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:LT:4: Generates a personal response to what is read through a variety of means by…		
Grade 8	**Grade 10**	**Grade 12**
R:LT:8:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:8:4.2: Providing relevant details to support the connections made or judgments (interpretive, analytical, evaluative, or reflective) (Local)	R:LT:10:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:10:4.2: Providing relevant details to support the connections made or judgments (interpretive, analytical, evaluative, or reflective) (Local)	R:LT:12:4.1: Comparing stories or other texts to related personal experience, prior knowledge, or to other books (Local) R:LT:12:4.2: Providing relevant details to support the connections made or judgments (interpretive, analytical, evaluative, or reflective) (Local)

Initial Understanding of Informational Texts (IT:1)		
(R:IT:1: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:1: Demonstrate initial understanding of informational texts (expository and practical texts) by…		
Grade 8	**Grade 10**	**Grade 12**
R:IT:8:1.1: Obtaining information from text features (e.g., table of contents, glossary, index, transition words /phrases, transitional devices, bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations) (Local) R:IT:8:1.2: Using information from the text to answer questions, to state the main/central ideas, or to provide supporting details (Local) R:IT:8:1.3: Organizing information to show understanding or relationships among facts, ideas, and events (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, summarizing, comparing/contrasting, or outlining) (Local) R:IT:8:1.4: Generating questions before, during, and after reading to enhance understanding and recall; expand understanding and/or gain new information (Local) R:IT:8:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference:** reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles, technical manuals ; and **practical/functional:** procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, schedules) (Local)	R:IT:10:1.1: Obtaining information from text features [e.g., table of contents, glossary, index, transition words/phrases, transitional devices (including use of white space), bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations] (State) R:IT:10:1.2: Using information from the text to answer questions; to state the main/central ideas; to provide supporting details; to explain visual components supporting the text; or, to interpret maps, charts, timelines, tables, or diagrams. (State) R:IT:10:1.3: Organizing information to show understanding or relationships among facts, ideas, and events (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, summarizing, comparing/contrasting, outlining (State) R:IT:10:1.4: Generating questions before, during, and after reading to enhance understanding and recall; expand understanding and/or gain new information (Local) R:IT:10:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference** - See Appendix A for suggestions), public documents (drivers' manuals) and discourse, essays (including literary criticisms), articles, technical manuals, editorials/commentaries, primary source documents, periodicals, job-related materials, speeches, on-line reading, documentaries; and **practical/functional** procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, schedules) (Local)	R:IT:12:1.1: Obtaining information from text features [e.g., table of contents, glossary, index, transition words/phrases, transitional devices (including use of white space), bold or italicized text, headings, subheadings, graphic organizers, charts, graphs, or illustrations] (Local) R:IT:12:1.2: Using information from the text to answer questions, perform specific tasks, or solve problems; to state the main/central ideas; to provide supporting details; to explain visual components supporting the text; or to interpret maps, charts, timelines, tables, or diagrams (Local) R:IT:12:1.3: Organizing information to show understanding or relationships among facts, ideas, and events (e.g., representing main/central ideas or details within text through charting (including flowcharts), mapping, paraphrasing, summarizing, comparing/contrasting, outlining, or connecting information with related ideas, etc.) (Local) R:IT:12:1.4: Generating questions before, during, and after reading to enhance understanding and recall; expand understanding and/or gain new information (Local) R:IT:12:1.5: Identifying the characteristics of a variety of types of text (e.g., **reference** - See Appendix A for suggestions), public documents (drivers' manuals) and discourse, essays (including literary criticisms), articles, technical manuals, editorials/commentaries, primary source documents, periodicals, job-related materials, speeches, on-line reading, documentaries; and **practical/functional** procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, schedules) (Local)

Analysis and Interpretation of Informational Texts/Citing Evidence (IT:2)		
(R:IT:2: Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		
R:IT:8:2/R:IT:10:2: Analyze and interpret informational text, citing evidence as appropriate by… **R:IT:12:2: Analyze and interpret informational text (which may include technical writing), citing evidence as appropriate by…**		
Grade 8	**Grade 10**	**Grade 12**
R:IT:8:2.1: Explaining connections about information *within* a text, *across* texts, or to related ideas (Local) R:IT:8:2.2: Synthesizing and evaluating information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas) (Local) R:IT:8:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or explaining how purpose may affect the interpretation of the text; or using supporting evidence to form or evaluate opinions/judgments and assertions about central ideas that are relevant (Local) R:IT:8:2.4: Distinguishing fact from opinion, and identifying possible bias/propaganda or conflicting information within or across texts (Local) R:IT:8:2.5: Making inferences about causes or effects (Local) R:IT:8:2.6: Evaluating the clarity and accuracy of information (Local)	R:IT:10:2.1: Explaining connections about information *within* a text, *across* texts, or to related ideas (State) EXAMPLE: Students are asked to compare information presented in two textual excerpts. R:IT:10:2.2: Synthesizing and evaluating information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas) (State) EXAMPLE: "How does the title of the article reflect the author's perspective?" R:IT:10:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or explaining how purpose may affect the interpretation of the text; or using supporting evidence to form or evaluate opinions/judgments and assertions about central ideas that are relevant (State) R:IT:10:2.4 Distinguishing fact from opinion, and evaluating possible bias/propaganda or conflicting information within or across texts R:IT:10:2.5: Making inferences about causes and/or effects (State) R:IT:10:2.6: Evaluating the clarity and accuracy of information (e.g., consistency, effectiveness of organizational pattern, or logic of arguments) (State)	R:IT:12:2.1: Explaining connections among ideas *across multiple* texts (Local) R:IT:12:2.2: Synthesizing and evaluating information within or across text(s) (e.g., constructing appropriate titles; or formulating assertions or controlling ideas) (Local) R:IT:12:2.3: Drawing inferences about text, including author's purpose (e.g., to inform, explain, entertain, persuade) or message; or explaining how purpose may affect the interpretation of the text; or using supporting evidence to form or evaluate opinions/judgments and assertions about central ideas that are relevant (Local) R:IT:12:2.4: Critiquing author's use of strategies to achieve intended purpose or message (e.g., to inform, explain, entertain, persuade) (Local) EXAMPLE (critique public documents): May include analysis of using anecdotes, addressing counterclaims, appealing to audience, using emotionally-laden language EXAMPLE (critique functional documents): May include visual appeal, logical sequences, awareness of possible reader misunderstanding R:IT:12:2.5: Making inferences about causes and effects (Local) R:IT:12:2.6: Evaluating the clarity and accuracy of information (e.g., consistency, effectiveness of organizational pattern, or logic of arguments) (Local)

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:1)		
(R:RS:1: Assumes increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:8:1: Demonstrates ability to monitor comprehension for different types of texts and purposes by… **R:RS:10:1: Demonstrates ability to monitor comprehension and strategy use for different types of texts and purposes by…** **R:RS:12:1: Demonstrates ability to monitor comprehension and strategy use for different types of texts and purposes by…**		
Grade 8	**Grade 10**	**Grade 12**
R:RS:8:1.1: Using a range of self-monitoring and self-correction approaches (e.g., predicting and confirming, rereading, adjusting rate, sub-vocalizing, consulting resources, questioning, skimming, scanning, using syntax/language structure, semantics/ meaning, or other context cues, etc.) (Local)	R:RS:10:1.1: Using a range of self-monitoring and self-correction approaches (e.g., rereading, adjusting rate, sub-vocalizing, consulting resources, questioning, using flexible note taking/mapping systems, skimming, scanning, etc.) (Local)	R:RS:12:1.1: Using a range of self-monitoring and self-correction approaches (e.g., rereading, adjusting rate, sub-vocalizing, consulting resources, questioning, using flexible note taking/mapping systems, skimming, scanning, etc.) (Local)

Reading Strategies: Strategies for Monitoring and Adjusting and Reading Comprehension Strategies (RS:2)		
(R:RS:2: Assumes increasing text complexity across grade levels. See Appendix F or descriptions of increasing text complexity.)		
R:RS:2: Uses comprehension strategies (flexibly and as needed) before, during, and after reading literary and informational text. (Local)		
Grade 8	**Grade 10**	**Grade 12**
R:RS:8:2.1: Using strategies before, during, and after reading literary and informational text. EXAMPLES of reading comprehension strategies might include: using prior knowledge; sampling a page for readability; summarizing; predicting and making text based inferences; determining importance; generating literal, clarifying, and inferential questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); taking notes; locating, using, and analyzing text features (e.g., transition words, subheadings, bold/italicized print, parts of the book); or using text structure clues (e.g., chronological, cause/effect, compare/contrast, proposition and support, description, classification, logical/ sequential) (Local) (See also Appendix D)	R:RS:10:2.1: Using strategies before, during, and after reading literary and informational text. EXAMPLES of reading comprehension strategies might include: using prior knowledge; summarizing; predicting and making text based inferences; determining importance; generating literal, clarifying, inferential, analysis, synthesis, and evaluative questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); taking notes; locating and using text discourse features and elements to support inferences and generalizations about information (e.g., vocabulary, text structure, evidence, format, use of language, arguments used); or using cues for text structures (e.g., chronological, cause/effect, compare/contrast, proposition and support, description, classification, logical, sequential) (Local) (See also Appendix D)	R:RS:12:2.1: Using strategies before, during, and after reading literary and informational text. EXAMPLES of reading comprehension strategies might include: using prior knowledge; summarizing; predicting and making text based inferences; determining importance; generating literal, clarifying, inferential, analysis, synthesis, and evaluative questions; constructing sensory images (e.g., making pictures in one's mind); making connections (text to self, text to text, and text to world); taking notes; locating and using text discourse features and elements to support inferences and generalizations about information (e.g., vocabulary, text structure, evidence, format, use of language, arguments used); or using cues for text structures (e.g., chronological, cause/effect, compare/contrast, proposition and support, description, classification, logical, sequential like Grade 10) (Local) (See also Appendix D)

Breadth of Reading: Reading Extensively* and In Depth (B:1)		
R:B:1: Demonstrates the habit of reading widely and extensively* by…		
Grade 8	**Grade 10**	**Grade 12**
R:B:8:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:8:1.2: Reading from a wide range of genres/ kinds of text, including primary and secondary sources, and a variety of authors (e.g., literary, informational, and practical/functional texts) (Local) (See Appendix A) R:B:8:1.3: Reading multiple texts for depth of understanding an author, a subject, a theme, or genre (Local)	R:B:10:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:10:1.2: Reading from a wide range of genres/ kinds of text, including primary and secondary sources, and a variety of authors (e.g., literary, informational, and practical/functional texts) (Local) (See Appendix A) R:B:10:1.3: Reading multiple texts for depth of understanding an author, a subject, a theme, or genre (Local)	R:B:12:1.1: Reading with frequency, including in-school, out-of-school, and summer reading (Local) R:B:12:1.2: Reading from a wide range of genres/ kinds of text, including primary and secondary sources, and a variety of authors (e.g., literary, informational, and practical/functional texts) (Local) (See Appendix A) R:B:12:1.3: Reading multiple texts for depth of understanding an author, a subject, a theme, or genre (Local)

Breadth of Reading: Reading Extensively* and In Depth (B:2)		
***Materials should be at the student's instructional <u>and</u> independent reading levels. The specific number of books should be viewed flexibly and is less important than the extensiveness, duration/ time, and frequency of reading.**		
R:B:2: Demonstrates participation in a literate community by…		
Grade 8	**Grade 10**	**Grade 12**
R:B:8:2.1: Self-selecting reading materials in line with reading ability and personal interests (Local) R:B:8:2.2: Participating in in-depth discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:10:2.1: Self-selecting reading materials in line with reading ability and personal interests (Local) R:B:10:2.2: Participating in in-depth discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)	R:B:12:2.1: Self-selecting reading materials in line with reading ability and personal interests (Local) R:B:12:2.2: Participating in in-depth discussions about text, ideas, and student writing by offering comments and supporting evidence, recommending books and other materials, and responding to the comments and recommendations of peers, librarians, teachers, and others (Local)

Breadth of Reading: Reading for Research Across Content Areas (B:3)		
***Research materials should be at the student's instructional and independent reading levels, including print and non-print texts.**		
R:B:3: Research* by reading multiple sources (including print and non-print texts) to solve a problem, or to make a decision, or to formulate a judgment, or to support a thesis by…		
Grade 8	**Grade 10**	**Grade 12**
R:B:8:3.1: Identifying and evaluating potential sources of information (Local) R:B:8:3.2: Evaluating information presented, in terms of completeness and relevance (Local) R:B:8:3.3: Gathering, organizing, analyzing, and interpreting the information (Local) R:B:8:3.4: Using evidence to support conclusions (Local)	R:B:10:3.1: Identifying and evaluating potential sources of information (Local) R:B:10:3.2: Evaluating and selecting the information presented, in terms of completeness, relevance, and validity (Local) R:B:10:3.3: Organizing, analyzing, and interpreting the information (Local) R:B:10:3.4: Drawing conclusions/judgments and supporting them with evidence (Local)	R:B:12:3.1: Identifying and evaluating potential sources of information (Local) R:B:12:3.2: Evaluating and selecting the information presented, in terms of completeness, relevance, and validity (Local) R:B:12:3.3: Organizing, analyzing, and interpreting the information (Local) R:B:12:3.4: Drawing conclusions/judgments and supporting them with evidence (Local)

Appendix A: *Suggested* Informational and Literary Texts (Grades K-2)

Suggested Print and Non-Print Informational and Literary Texts – for Instruction and Assessment **All students need ongoing opportunities to apply and practice reading strategies with many different types of LITERARY and INFORMATIONAL texts. Recognizing a variety of texts and their characteristics will help students in meeting grade level expectations described in the NECAP GLEs. Suggested Texts listed below are not meant to be exhaustive for any given grade level.**		
Grade K	**Grade 1**	**Grade 2**
Suggested **Informational Texts include, but are not limited to** **Reference materials:** Read-alouds and guided/shared reading of children's magazines, content trade books, informational charts, etc. **Practical texts:** lists, signs, labels, environmental print, pictorial charts and graphs, etc.	***Suggested*** **Informational Texts include, but are not limited to** **Reference materials:** Read-alouds and guided/shared reading of children's magazines, content trade books, informational charts, etc. **Practical texts:** lists, labels, environmental print, pictorial charts and graphs, simple directions, invitations, calendar, simple maps/classroom maps, etc.	***Suggested*** **Informational Texts include, but are not limited to** **Reference materials:** Beginning dictionaries, glossaries, children's magazines, content trade books, children's newspapers, etc. **Practical texts:** Procedures/instructions, announcements, invitations, book orders, etc.
Suggested **Literary Texts** **include, but are not limited to** Nursery rhymes, poetry, fairytales, fantasy, realistic fiction, songs, chants, etc.	***Suggested*** **Literary Texts** **include, but are not limited to** Poetry, fairytales, fantasy, realistic fiction, songs, chants, etc.	***Suggested*** **Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, tall tales, realistic fiction, etc.
(Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		

Appendix A: *Suggested* Informational and Literary Texts (Grades 3-5)

Suggested Print and Non-Print Informational and Literary Texts – for Instruction and Assessment **All students need ongoing opportunities to apply and practice reading strategies with many different types of LITERARY and INFORMATIONAL texts. Recognizing a variety of texts and their characteristics will help students in meeting grade level expectations described in the NECAP GLEs. Suggested Texts listed below are not meant to be exhaustive for any given grade level.**		
Grade 3	**Grade 4**	**Grade 5**
Suggested **Informational Texts include, but are not limited to** **Reference materials:** Dictionaries, glossaries, children's magazines, content trade books, children's newspapers, textbooks, etc. **Practical texts:** Procedures/instructions, announcements, invitations, book orders, etc.	***Suggested*** **Informational Texts include, but are not limited to** **Reference materials:** Dictionaries, glossaries, encyclopedias, children's magazines, content trade books, student newspapers, textbooks, etc. **Practical texts:** Procedures/instructions, announcements, invitations, book orders, etc.	***Suggested*** **Informational Texts include, but are not limited to** **Reference materials:** Dictionaries, glossaries, reports, encyclopedias, children's magazines, content trade books, student newspapers, textbooks, biographies, Internet websites, etc. **Practical texts:** Procedures/instructions, announcements, invitations, book orders, recipes, menus, etc.
Suggested **Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, tall tales, realistic fiction, etc.	***Suggested*** **Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, etc.	***Suggested*** **Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, etc.
(Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		

Appendix A: *Suggested* Informational and Literary Texts (Grades 6-8)

***Suggested* Informational and Literary Texts (Print and Non-Print) for Instruction and Assessment** **All students need ongoing opportunities to apply and practice reading strategies with many different types of LITERARY and INFORMATIONAL texts. Recognizing a variety of texts and their characteristics will help students in meeting grade level expectations described in the NECAP GLEs and GSEs. Suggested Texts listed below are not meant to be exhaustive for any given grade level.** (Underlining indicates additional text types introduced for the first time at this grade level.)		
Grade 6	**Grade 7**	**Grade 8**
Suggested **Informational Texts include, but are not limited to** **Reference materials:** Dictionaries, thesauruses, reports, encyclopedias, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles, etc. **Practical/functional texts:** Procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, etc.	***Suggested*** **Informational Texts include, but are not limited to** **Reference materials:** Thesauruses, reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles, technical manuals, etc. **Practical/functional texts:** Procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, etc.	***Suggested*** **Informational Texts include, but are not limited to** **Reference materials:** Reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles, technical manuals, etc. **Practical/functional texts:** Procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, schedules, etc.
***Suggested* Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, etc.	***Suggested* Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, short stories, etc.	***Suggested* Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, short stories, epics (poems, novels, dramas), etc.
(Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)		

Appendix A: *Suggested* Informational and Literary Texts (Grades 9-12)

***Suggested* Informational and Literary Texts (Print and Non-Print) for Instruction and Assessment** **All students need ongoing opportunities to apply and practice reading strategies with many different types of LITERARY and INFORMATIONAL texts. Recognizing a variety of texts and their characteristics will help students in meeting grade level expectations described in the NECAP GLEs and GSEs. Suggested Texts listed below are not meant to be exhaustive for any given grade level.** (Underlining indicates additional text types introduced for the first time at this grade level.)	
Grade 8	**High School**
Suggested **Informational Texts include, but are not limited to** **Reference materials:** Reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, public documents and discourse, essays, articles, technical manuals, etc. **Practical/functional texts:** Procedures/instructions, announcements, invitations, book orders, recipes, menus, advertisements, pamphlets, schedules, etc.	***Suggested*** **Informational Texts include, but are not limited to** **Reference materials:** Reports, magazines, newspapers, textbooks, biographies, autobiographies, Internet websites, legal documents (i.e, Supreme Court case decisions, lease agreements), public documents (drivers' manuals) and discourse, essays (including literary criticisms), articles, technical manuals, editorials/commentaries, primary source documents, periodicals, job-related materials, speeches, on-line reading, documentaries, etc. **Practical/functional texts:** Procedures/instructions, announcements, invitations, advertisements, pamphlets, schedules, memos, applications, catalogues, etc.
***Suggested* Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, short stories, epics (poems, novels, dramas), etc.	***Suggested* Literary Texts** **include, but are not limited to** Poetry, plays, fairytales, fantasy, fables, realistic fiction, folktales, historical fiction, mysteries, science fiction, myths, legends, short stories, epics, novels, dramatic presentations, comedies, tragedies, satires, parodies, memoirs, epistles, etc.
(Assumes increasing text complexity across grade levels. See Appendix F for descriptions of increasing text complexity.)	

Appendix B: The Six Syllable Types

1. closed – [not] - closed in by a consonant - vowel makes its **short** sound
2. open – [no] - ends in a vowel - vowel makes its **long** sound
3. silent e – [note] - ends in vowel consonant e - vowel makes its **long** sound
4. vowel combination – **[**nail] the two vowels together make a sound
5. r-controlled – [bird] - contains a vowel plus "r" - vowel sound is changed
6. consonant - l - e –[table] - at the end of a word

Appendix C: Reading Fluency Rates

Recommended Fluency Rates * **(in words read correctly per minute)**	**Grade K**	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade 5**	**Grade 6**	**Grade 7**	**Grade 8**
Oral:	**N/A**	**50-80** words correct per minute	**80-100** words correct per minute	**90-120** words correct per minute	**115-140** words correct per minute	**125-150** words correct per minute	**135-160** words correct per minute	**140-175** words correct per minute	**150-180** words correct per minute
Silent:	**N/A**	**N/A**	**N/A**	**115-140**	**130-175**	**160-200**	**190-220**	**215-245**	**235-270**

The following sources were referenced to determine fluency rates:

- Caldwell, *Reading Assessment*, Guilford Press, 2002
- Fountas and Pinnell, *Guiding Readers and Writers Grades 3-6*, Heinemann, 2001
- *Put Reading First*, National Institute for Literacy, 2001
- Lipson and Wixson, *Assessment and Instruction of Reading and Writing Difficulty*, Pearson Education, 2003
- NAEP's Scale for Assessing Oral Reading Fluency, 2001

Appendix D: Metacognition Strategies for Understanding Text

Teachers continually model and reinforce use of strategies, so that students learn to flexibly apply strategies that help them comprehend and interpret literary and informational texts.
Reading and learning to read are problem solving processes that require strategies for the reader to make sense of written language and remain engaged with texts.
Complexity of text and purpose of reading will determine the extent to which each strategy is applied.

Before reading, students…	During reading, students…	After reading, students…
• Set a purpose • Activate prior knowledge (schema) • Preview text • Identify text structure clues (e.g., chronological, cause/effect, compare/contrast, etc.) • Locate text features (e.g., transitional words, subheadings, bold print, etc.) • Use Cues: graphics and pictures • Skim/Scan • Predict and make text-based references • Sample a page of text for readability and interest	• Self-monitor using: ➢ Meaning ➢ Language structure ➢ Print cues • Reread • Self-correct • Clarify • Determine Importance • Generate literal, clarifying, and inferential questions • Visualize • Construct sensory images • Summarize and paraphrase • Check predictions • Interpret ➢ Literal meaning ➢ Inferential meaning • Make Connections, using ➢ Graphics ➢ Pictures • Monitor fluency (oral/silent; or text complexity) ➢ Adjust rate ➢ Use punctuation and dialogue cues ➢ Use phrasing, intonation, expression • Read for accuracy • Use note-taking strategies	• Reread for confirmation • Summarize and paraphrase key ideas • Evaluate ➢ Accuracy of information ➢ Literary merit and use of author's craft • Clarify • Analyze information within and across texts • Support conclusions with references from text • Synthesize • Connect ideas/themes in text to… ➢ Text: Compare one text to another text ➢ Self: Relate and explain ideas or events in text to personal experience ➢ World: Recognize commonalities of text to world

Appendix E: Glossary of Reading Terms

Affix – A meaningful part of a word that is attached before (prefix) or after (suffix) a root or base word to modify its meaning.

Alliteration - The repetition of initial consonant sounds in neighboring words. (For example: The slithering, slimy snake)

Allusion - A reference to a familiar person, place, or thing.

Analogy - A comparison of two or more similar objects, suggesting that if they are alike in certain respects, they will probably be like in other ways, too.

Analysis - A separating of a whole into its parts with an examination of these parts to find out their nature and function.

Antagonist - A person or thing working against the main character.

Antonym - A word that is opposite in meaning to another word. (For example: love – hate, hot-cold)

Author's Craft – The techniques the author chooses to enhance writing. (Examples of author's craft: style, bias, point of view, flashback, foreshadowing, symbolism, figurative language, sensory details, soliloquy, stream of consciousness, etc.)

Autobiography – An account of the life of an individual written by the subject, classified as non-fiction.

Base Word – A free morpheme (can stand alone), to which affixes can be added. (For example: worry)

Bias - A highly personal judgment.

Biography – An account of the life of an individual, classified as non-fiction or informational text.

Cause/Effect – A text or response to reading text which provides explanations or reasons for phenomena.

Character - A person, animal, or object that takes part in the action of a literary work. The main or major character is the most important and central to the action. A minor or supporting character is one who takes part in the action, but is not the focus of the attention.

Characterization - The method an author uses to reveal the characters and their various personalities. Authors use two major methods of characterization: direct and indirect. When using direct characterization, a writer states the characters' traits, actions, motives, or feelings. When describing a character indirectly, a writer depends on the reader to draw conclusions about the character's traits or uses other participants in the story to reveal a character's traits and motives.

Cite - To quote as an example.

Citation - A direct quote from the text, as opposed to a generalized summary or statement; an acknowledgment and documentation of sources of information.

Climax – The high point or turning point in the plot of a story.

Comparison/Contrast - A text or response to reading text that identifies how information presented has similar or different characteristics or qualities.

Conflict - The problem or struggle in a story that triggers the action. Conflicts may be internal (struggles from within a character) or external.

Context - The set of facts or circumstances surrounding an event or a situation, explanation of characters, or definition of important terms in text; the background information the reader needs to know in order to fully understand the message of the text.

Context clues - Information in the reading passage that helps the reader determine the meaning of unfamiliar words or phrases, such as illustrations or the meaning of other words in the text.

Controlling Idea – This is the main idea/focus that runs throughout the paper or text.

Conventions - Features of standard written English that usually include sentence formation, grammar, spelling, usage, punctuation, and capitalization.

Decode – The ability to translate a word from print to speech, usually by employing knowledge of sound-symbol correspondence

Dialogue - A conversation between two characters. In poems, novels, and short stories, dialogue is usually set off by quotations marks to indicate a speaker's exact words; in a play, dialogue follows the names of the characters, and no quotation marks are used.

Diction - An author's choice of words based on their accuracy, clarity, and effectiveness.

Drama - A story written to be performed by actors. Dramas are often divided into parts called acts, which are often divided into smaller parts called scenes.

Evaluate - Examine and judge carefully, based on evidence found in the text.

Figurative Language - Language used in writing or speech that is not meant to be interpreted literally, as the intent of the language is to create a special effect, idea, image, or feeling.

Fluency - The clear, easy, written or spoken expression of ideas, or freedom from word-identification problems that may hinder comprehension during silent reading or the expression of ideas during oral reading; The ability to read text accurately, quickly, and with proper expression, phrasing, and intonation between word recognition and comprehension; Rapidly and automatically recognizing and decoding words, with evidence that the reader is accessing the deeper meaning of the text; Assessment of fluency is associated with rate, accuracy, and scores on comprehension tests.

Focus - The concentration of a specific idea(s) within the topic the writer is addressing; the main/central idea that runs through a text. (For example: If the topic is "horses," the focus might be: Horses are very expensive to own.)

Genre - A category used to classify literary works, usually by form, technique, or content. For example, literature is commonly divided into three manor genres: poetry, prose, and drama. Each genre is, in turn, divided into sub-genres

Graphic Organizer- A diagram or pictorial device used to record and show relationships among ideas or information.

Historical fiction – Fiction drawn from the writer's imagination, but true to life in some period of the past.

Homonym - One of two words that have the same sound and often the same spelling but differ in meaning. (For example, *bear* "to carry," *bear* (the animal), and *bare* "naked.")

Homophone - One of two or more words that are pronounced the same but differ in meaning, origin, and sometimes spelling. [For example, hair/hare, knight/night, and (fish) scale /(musical) scale.]

Hyperbole - A figure of speech in which exaggeration is used for emphasis or effect.

Inference - A deduction or conclusion made from facts that are suggested or implied rather than overly stated. (For example: Mom said that I should study more and watch television less. I inferred that I should get better grades or the television would be taken out of my room.)

Informational text – A text that provides facts, ideas, and principles that are related to the physical, biological, or social world; classified as non-fiction text.

Literary conflict - The tension that grows out of the interplay of the two opposing forces in a plot.

Literary devices - Tools used by the author to enliven and provide voice to the writing, such as dialogue, alliteration, foreshadowing, personification, metaphors, etc.

Literary elements - The essential techniques used in literature, such as characterization, setting, plot, and theme.

Metaphor - A figure of speech in which one thing is described in terms of another to make an implicit comparison – that is, a comparison that does not use words such as "like" or "as." (For example: The sky's lamp was bright.)

Morpheme – The smallest meaningful unit of language; may be a word or part of a word (For example – "less" or "child")

Narrative - A story, actual or fictional, expressed orally or in writing; a text that tells about a sequence of events.

Narrative passage - Text in any form that recounts or tells a story.

Narrator - The person (or animal or object) telling a story, who may be a character within the story or someone outside of the story.

Onomatopoeia - A figure of speech in which the sound of the word imitates the sounds associated with the objects or actions to which they refer. (For example, *crackle, moo, pop, zoom.)*

Opinion - A belief or conclusion held with confidence, but not sustained with proof.

Paraphrase - Restate text or passage mostly in other (or in own) words.

Personification - The attribution of human qualities to inanimate objects. (For example: *The clouds played and danced in the sky.*)

Phoneme - The smallest unit of sound in a spoken word; a speech sound that combines with other sounds in a language to make words.

Phonemic awareness ability to hear, identify and manipulate individual sounds in spoken words; Involves blending, segmenting, deleting sounds, etc.

Phonics - Relationships between the letters of written language and the individual sounds of spoken language.

Plot - The plan, design, storyline, or pattern of events in a play, poem, or works of fiction.

Poem - A composition characterized by use of condensed language, chosen for its sound and suggestive power and the use of literary techniques such as rhyme, blank verse, rhythm, meter, and metaphor.

Point of View - The way in which an author reveals characters, events, and ideas when telling a story; the perspective or vantage point from which a story is told.

Problem - The conflict or struggle (internal or external) that causes the action in a story or play. An internal conflict takes place within the mind of a character, such as a struggle to make a decision, take an action, or overcome a feeling. An external conflict is one in which a character struggles against some outside force, such as another person or something in nature.

Prose - Writing that is not restricted in rhythm, measure, or rhyme; most writing that is not drama, poetry, or song is considered prose.

Protagonist - The main character or hero of a text.

Reading critically - Reading in which a questioning attitude, logical analysis, and inference are used to judge the worth of the text; evaluating relevancy and adequacy of what is read; the judgment of validity of worth of what is read, based on sound criteria and evidence.

Reading rate - The speed at which a person reads; generally measured as words per minute or words correct per minute.

Realistic Fiction – Fiction drawn from the writer's imagination, but is true to life; often focuses on universal human problems.

Resolution - The portion of the play or story in which the problem is resolved. It comes after the climax and falling action and is intended to bring the story to a satisfying end.

Rhyme - A metrical device in which sounds at the ends of words or lines or verse correspond. Another common device is the use of internal rhymes, or rhyming words within lines.

Rhyme scheme - A regular pattern of rhyming words in a poem, usually indicated by assigning a different letter to each rhyme in a stanza such as, *a-b-a-b*.

Rhythm - In verse or prose, the movement or sense of movement communicated by the arrangement of long and short or stressed and unstressed syllables.

Root – A bound morpheme, usually of Latin origin, that cannot stand alone, but is used to form a family of words with related meanings. (For example: "spec")

Self-monitor - Metacognitive awareness and processes whereby the reader realizes that what is being read is or is not making sense, and adjusts reading strategies to improve comprehension.

Semantics - The study of meaning in language, particularly the meaning of words and changes in the meanings.

Setting - The time and place of the action in a literary work. The setting includes all the details of a place and time. In most stories, the setting serves as a backdrop or context in which the characters interact and the plot progresses.

Simile - A figure of speech in which one thing is likened to another using an explicit comparison (that is, using the words "like" or "as") to clarify or enhance an image. (For example: It was as cold as an ice cube.)

Soliloquy - A speech delivered by a character when he/she is alone on the stage; monologue.

Stereotype - A pattern or form that does not change. A character is "stereotyped" if she or he has no individuality and fits the mold of that particular type of person or character, such as a villain.

Style - The characteristic manner used by an author to express ideas and create intended effects, including the writer's use of language, choice of words, and use of literary devices.

Summary - Writing that presents the main/central points of a larger work in condensed form.

Synonym - Two or more words that have highly similar meanings. (For example: *happy, glad,* and *cheerful.)*

Syntax - The pattern or structure of word order in sentences, clauses, and phrases.

Temporal Sequence – Ideas or events presented in the order in which they happen.

Text Structure – The way information is organized and presented. (For example: Fiction texts and biographies generally use a narrative structure and are meant to be read from beginning to end; nonfiction or informational texts are organized by topics or into sections, using text features such as headings, bold print, transitional words/phrases, etc.)

Theme - The central idea, message, concern, or purpose in a literary work, which may be stated directly or indirectly. (For example: In the book *The Pancake*, by Anita Lobel, "People should work together" or "Don't be too cocky" are themes.)

Thesis - The basic proposition put forward by a speaker or writer, which then is proved through fact, argument, or support from a text; the subject or argument of a composition. It is the controlling idea about a topic that the writer is attempting to prove; a sentence that announced the writer's main, unifying controlling idea about a topic. A thesis statement usually contains two main elements: a limited subject (Internet), a strong verb, and the reason for it - the "why"- (The Internet provides information of varying depth and quality).

Tone - The overall feeling or effect created by a writer's use of words, sentence structure, and attitude towards the audience, characters, or topic. This feeling, which pervades the work, may be serious, mock-serious, humorous, sarcastic, solemn, objective, etc.

Traditional literature – Stories passed down orally throughout history. (Examples include: folk tales, fairy tales, myths, legends, and epics.)

Turning Point - The moment in a story or a play when there is a definite change in direction and one becomes aware that it is now about to move toward the end.

Voice - The style and quality of the writing which includes word choice, a variety of sentence structures, and evidence of investment. Voice portrays the author's personality or the personality of the chosen persona. It is the fluency, rhythm, and liveliness in writing that makes it unique to the writer. A distinctive voice establishes personal expression and enhances the writing.

The following sources were referenced in developing the glossary:

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- (2004) *Tri-State New England Grade Level Expectations* for *Writing* - Appendix A: Writing Glossary

Appendix F: A Discussion of "Increasing Text Complexity"
(K. Hess and S. Biggam, 2004)

The instruction and assessment of reading comprehension presents unique challenges to classroom teachers and test developers alike; and the criteria used in selecting a variety and range of appropriate texts are essential to meeting those purposes. In the classroom, students learn to apply and practice a variety of reading strategies, for different purposes and with different text types. Over time, students who are exposed to a variety of text types with increasing complexity also learn how text features differ by genre, and they gain confidence in pealing back the layers of complexity for a deeper understanding of what is read. In test development, the overall number of test items is driven by the length and type of reading passages and the number of items possible accompanying each passage. Passages for reading assessment, drawn from "authentic" text whenever possible, should include both literary and informational texts. A series of questions accompanying each reading passage may include initial understanding of text, analysis and interpretation of text, or a combination of both types of questions, especially for longer text passages.

We have learned from NAEP research (1985) that difficulty of text passages was one of the three most important factors in reading comprehension performance of 4th, 8th, and 12th grade students. The other two factors were familiarity with subject matter presented in text and the type (literal, inferential, etc.) of question asked. (Chall and Conard, 1991) Other research suggests that at grades 2 and 3, word difficulty may influence text complexity more than other factors. (Anderson, 1992) Lipson and Wixon (2003) summarize the challenges of understanding text complexity this way:

"In the past, one of the few text features that was given much attention was its difficulty or readability, as measured by factors such as the number of syllables in the words and the number of words in the sentences. Current research has demonstrated that a number of other factors have a significant impact on both how much and what students understand and learn from a text. The presence or absence of these factors determines the extent to which a given text can be considered 'considerate' (to enable readers with minimal effort) or 'inconsiderate' (text requiring much greater effort). (Armbruster, 1984) "

A variety of factors influence text complexity. The complexity of text, or the degree of challenge of a particular text, is the result of specific combinations and interactions of these factors. For example, a text that has short simple sentences may, nevertheless, be challenging to read/comprehend when it contains ideas or concepts that are unfamiliar or requires a greater level of interpretation to unlock intended meaning. Pinnell and Fountas' text leveling system (2002), an extension of the system used by Reading Recovery developed for classroom use at grades 3-6, includes these factors for determining complexity: understanding the nature of print, repeated text, natural language versus book text, supportive text, and high frequency vocabulary. Their system also calls attention to differences between fiction and nonfiction texts in book leveling, and includes descriptors that "overlap" to the next level of difficulty.

Chall, Bissex, Conard, and Harris-Sharples (*Qualitative Assessment of Text Difficulty*, 1996) suggest that linguistic characteristics (vocabulary and sentence structure and variety) as well as concepts presented, text organization, and background knowledge required of readers all need to be considered in determining appropriateness of text for a given grade level. "Merely breaking up longer sentences and simplifying vocabulary does not guarantee that reading materials will be completely appropriate for lower reading levels." They also point out differences between popular fiction, literature, and informational texts with regard to text difficulty. For example, popular fiction tends to (a) use less figurative language than literature, (b) be more repetition of information, and (c) have more conventional language use; therefore demands on the reader of popular fiction are more about basic understanding of explicit messages than on interpretation of the message.

Criteria for increasing text complexity include factors that interact to affect the relative difficulty of reading particular material. The table on the following pages describes ways in which text materials generally increase in difficulty over the grade span of grades 1-12. The descriptors in the table build from one grade or grade cluster to the next. It is expected that students would have experience reading text described for their grades, as well as those of earlier grade clusters.

Factors that Influence Increasing Text Complexity:

- **Word Difficulty and Language Structure,** including vocabulary and sentence type and complexity (often determined through the use of multiple readability formulas)
- **Text Structure and Discourse Style** (e.g., satire, humor)
- **Genre and the Characteristic Features of the each type of text**
- **Background Knowledge and/or Degree of Familiarity with Content needed by the reader**
- **Level of Reasoning Required** (e.g., sophistication of themes and ideas presented)
- **Format and Layout,** including how text is organized/layout, size and location of print, graphics, and other book/print features
- **Length of Text**

Note: Sample grade-appropriate text titles are included at the end of the descriptors for each grade span as examples of text that would illustrate many of the characteristics described in the table. In many cases, particular teachers and schools will choose to introduce these specific texts at grade levels below or above the grade level indicated. While every descriptor might not be evident in a sample text passage, it is expected that the sample texts reflect the intent of the descriptors, and many of the indicators.

Text Complexity Descriptors End of Grade 1	Text Complexity Descriptors End of Grade 2
❖ Includes a variety of literary texts (such as fantasy, realistic fiction, poetry), with some complexity in story structure (e.g., multiple episodes) and literary language ❖ Simple informational books/text ❖ Illustrations provide moderate support for the reader ❖ Texts have several sentences per page, with sentences of moderate length and generally simple sentence structure ❖ Very straightforward text structures ❖ Familiar content ❖ In narrative text, details related to story elements (setting, characterization, events, resolution) provide strong support for both literal and interpretive meanings (e.g., for drawing basic inferences or basic conclusions) ❖ Informational texts use clear and consistent formats (e.g., print location on page),illustrations, and simple graphics to support understanding of content ❖ Simple punctuation is used: period, question mark, exclamation point, quotation marks, commas	❖ Includes a variety of literary texts (such as realistic fiction, folktales, humorous stories, poetry)with elaborated episodes and events, and some extended descriptions ❖ Stories usually have well-developed characters and episodes ❖ Informational books/text ❖ Some use of unfamiliar vocabulary, supported by other text features (e.g., such as headings and chapter titles) ❖ Illustrations may or may not be present on each page, but usually provide low to moderate support for the reader. ❖ Sentence structure becomes more complex -- including causal phrases. ❖ Straightforward text structures in informational text ❖ Content usually familiar ❖ In narrative text, details related to story elements (setting, characterization, goals, attempts, consequences and resolutions) provide moderate support for both literal and interpretive meanings (e.g., for predicting logical outcomes or drawing inferences about problem/solution) ❖ Informational texts use clear formats (e.g., use of simple headings to organize information into categories), illustrations that extend meaning, and simple graphics to support understanding of content ❖ Full range of punctuation used, except dashes, colons, and semicolons
SAMPLE TEXTS AT THE END OF GRADE 1: *There's a Nightmare in My Closet; The Very Busy Spider; Nobody Listens to Andrew; Ants (Sunshine Science Series)*	*SAMPLE TEXTS AT THE END OF GRADE 2:* *George and Martha; Cam Jansen and the Mystery of the Dinosaur Bones; The Stories Julian Tells; Happy Birthday Martin Luther King (Scholastic)*

<table>
<tr><th colspan="2">Text Complexity Descriptors Grades 3-4</th><th colspan="2">Text Complexity Descriptors Grades 5-6</th></tr>
<tr><td colspan="2">❖ Includes a range of longer literary selections, including realistic fiction and fantasies. Narratives usually include familiar characters or settings.
❖ Informational/ functional text including short expository pieces, e.g., descriptive, compare/ contrast, directions, simple recipes, etc.
❖ Varied vocabulary, but generally familiar; some figurative language (e.g., similes). Increased use of challenging vocabulary (e.g., multi-syllabic words, words with multiple meanings). Technical words are defined or explained in context.
❖ Sentence structure becoming more elaborated and complex, including some use of passive voice, abstract or descriptive language.
❖ Relatively straightforward text structures. Texts include more information, more complex ideas and relationships (e.g., examples, comparisons).
❖ Content usually builds from shared/ somewhat familiar experiences.
❖ In narrative text, the story elements (plot, setting, characterization) provide support for both literal and interpretive meanings.
❖ Informational texts use clear formats, illustrations, and graphics to support understanding of content. Text features include timelines, captions, and maps.
❖ Full range of punctuation used.</td><td colspan="2">❖ Includes a range of literary selections, such as full-length novels, well-crafted short stories (with increasingly diverse characters and settings), historical fiction and myths.
❖ Includes more complex informational/ functional texts, such as persuasive essays, procedural “how to” guides, scientific and historical summaries (e.g., textbooks).
❖ More varied and challenging vocabulary, including use of figurative language (idioms, metaphors) and analogies. Some technical terms.
❖ Language in narrative text includes dialect and other linguistic variants to enhance characterization and setting.
❖ Ideas and content increase in number and density. Relationships between ideas become more complex (e.g., flashback may be introduces) in narrative text; graphs and charts are needed to convey key information in expository text.
❖ Content requires general background knowledge. Underlying themes become more complex and more universal.
❖ Interrelationships among story elements become more complex and require more interpretation. Literary elements include flashback, humor, suspense, personification, and exaggeration.
❖ Informational and functional texts use a variety of formats, illustrations, and graphics to support understanding. Texts features include chapter headings, glossaries, punctuation guides.</td></tr>
<tr><td><u>SAMPLE TEXTS AT GRADE 3: The Mouse and the Motorcycle; Sideways Stories; What’s the Big Idea; Ben Franklin; Time for Kids</u></td><td><u>SAMPLE TEXTS AT GRADE 4:</u> <u>Cricket in Times Square; Castle in the Attic; Wow</u> (National Wildlife Federation)</td><td><u>SAMPLE TEXTS AT GRADE 5: Tuck Everlasting; Shh! We’re Writing the Constitution</u>; <u>Cricket</u> magazine</td><td><u>SAMPLE TEXTS AT GRADE 6:</u> <u>True Confessions of Charlotte Doyle; Holes, The Grey King; Cobblestone</u> magazine</td></tr>
</table>

Text Complexity Descriptors Grades 7-8 and High School		
❖ Includes a full range of literary genres, including realistic and historical fiction, science fiction, fantasy, and folk literature ❖ Informational/functional texts include primary sources, personal narratives and autobiographies, schedules, and manuals, as well as synthesized information found in textbooks ❖ Increasing number of uncommon words, including words with non-literal meanings and more abstract vocabulary; Word choice can reflect diverse historical and cultural context; Text often includes technical words with specialized meaning(s) ❖ Language in narrative text is more elaborated and complex, and includes a wide range of dialogue, use of dialects, and varied sentence structure to convey specific meanings ❖ Prose style matches text purpose (informational, recreational, provocative, etc.) ❖ Relationships between ideas become less explicit and require more inference or interpretation ❖ Understanding content requires increasing cultural and historical breadth of knowledge ❖ More sophisticated themes ❖ Texts used often call for literary analysis ❖ Informational texts use format, illustrations, and graphics to support understanding of meaning ❖ Text features often include advance organizers, inset text, technology support		
SAMPLE TEXTS AT GRADE 7: *Roll of Thunder, Hear My Cry; Diary of a Young Girl; Muse magazine*	***SAMPLE TEXTS AT GRADE 8:*** *The Upstairs Room; Narrative of the Life of Frederick Douglass; The Giver; Science magazine*	***SAMPLE TEXTS AT HIGH SCHOOL:*** *To Kill a Mockingbird; Night; Into Thin Air; Newsweek magazine*

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Contributors

The federal law, *No Child Left Behind*, requires states to develop grade-level expectations in reading/language areas for grades 3-8. Grade-span expectations were developed also for grades 9-10 and 11-12 in reading and writing for high school. Both the grade-level expectations (GLEs) and the grade-span expectations (GSEs) have been incorporated into this revised version of the *K-12 English Language Arts Curriculum Framework.*

The following is a list of committee members representing the state of New Hampshire who developed the grade-level and grade-span expectations. Although this list represents those individual who formally served on the GLE and GSE committees, we are extremely grateful to the numerous people who provided feedback through technical review sessions, focus groups, on-line surveys, e-mails, and phone calls.

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K-12 Written and Oral Communication New Hampshire Curriculum Framework

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New Hampshire Curriculum Framework Written and Oral Communication

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New Hampshire Curriculum Framework Written and Oral Communication

Introduction

The purpose of this framework is to serve (1) as the basis for the development of assessment instruments to be administered statewide and (2) as a guide for making local decisions about curriculum development and delivery, in accordance with RSA 193-C relative to the New Hampshire Educational Improvement and Assessment Program.

This framework establishes curriculum and expectations for English language arts. This is the accepted professional term for the subject area of reading and language arts as it is taught throughout the grades. "English" is more commonly used in high school; "language arts," in most elementary and middle/junior high schools. The English language arts consist of the interactive processes of reading, writing, speaking, listening, and viewing.

This framework will be used at the local level, in conjunction with assessment results, as a guide for making decisions about development of curriculum, delivery of instruction and utilization of classroom, school, and district assessments. Educators, school board members, and citizens are encouraged to work cooperatively to develop local educational improvement and assessment plans that build on and complement the state effort.

How this framework is organized

The *K-12 English Language Arts Curriculum Framework* is organized into Grade-Level Expectations (GLEs) and Grade-Span Expectations (GSEs). Both the GLEs and GSEs contain statements about what all New Hampshire students are expected to know and be able to do. The GLEs are delineated by grade level across grades K-8. The GSEs are organized by grade spans of 9-10 and 11-12. Both the GLEs and GSEs are built upon the *K-12 English Language Arts Curriculum Framework* (1995).

Both the GLEs and GSEs are organized into five content strands for Reading: Vocabulary, Initial Understanding of Literary Texts, Analysis and Interpretation of Literary Texts, Initial Understanding of Informational Texts and Analysis and Interpretation of Informational Texts. There are eight strands for Written and Oral Communication: Habit of Writing, Structures of Language, Writing in Response to Literary Text, Writing in Response to Informational Text, Narratives, Informational Writing, Writing Conventions and Oral Communication Strategies.

At the beginning of each strand is a purpose statement which places the strand in the context of the K-12 English Language Arts curriculum. Furthermore, each strand contains a number of big ideas referred to as stems. The stems articulate the main curricular focus across grades K-12.

There are two types of expectations throughout the document, those identified for state assessment purposes and those identified for local curriculum and assessment. The state assessment expectations appear in bold boxes; all other expectations are guidance for local curriculum and assessment.

New Hampshire Curriculum Framework Written and Oral Communication

K-12 Broad Goals for English-Language Arts

These goal statements establish general expectations of what New Hampshire students should know and be able to do in English language arts.

- Students will read fluently with understanding and appreciation.
- Students will write effectively for a variety of purposes and audiences.
- Students will speak purposefully and articulately.
- Students will listen and view attentively and critically.
- Students will understand, appreciate, interpret, and critically analyze classical and contemporary literature as well as works of nonfiction and informational texts.
- Students will use reading, writing, speaking, listening, and viewing to:
  gather and organize information;
  communicate effectively; and
  succeed in educational, occupational, civic, and social settings.

New Hampshire Curriculum Framework Written and Oral Communication

Reading

Purpose: The ability to read is essential for students to succeed as learners, both in school and throughout their lives, and to become contributing members of society. Students must be able to deal critically with a variety of complex texts including literary, informational, and practical. Good readers combine the inclination to read with the ability to use monitoring and discussion to develop understanding. They employ multiple strategies and processes to understand the written word. Throughout their formal instruction, students should read authentic materials including worthy examples of literature as well as texts that reinforce other content areas of the school's curriculum.

Writing

Purpose: Through writing students transmit information, construct meaning and communicate good ideas. Good writers employ language successfully in a wide range of settings for academic, personal, occupational, and public uses. Frequent writing practice across a variety of situations and tasks and in all content areas enables students to refine and expand both their knowledge base and their thinking skills.

English Language Uses

Purpose: Students needs to learn how to use language to communicate in multiple ways and for multiple purposes. To this end, the language processes of reading, writing, speaking, listening, and viewing must become integral parts of their lives. By systematically employing these interactive processes, students are able to gather needed information and to prioritize and organize this material. The skillful use of these language processes provides students with the means of acquiring, constructing, and expressing knowledge in all school content areas and in the human experience. In order to be successful, students must become powerful users of language.

Introduction

The New England Common Assessment Program (NECAP) Writing GLEs/GSEs have been developed as a means to identify the writing content knowledge and skills expected of all students, for large-scale assessment of writing in grade levels 5 and 8 and 11. **GLEs and GSEs *are meant to capture the "big ideas" of writing that can be assessed, without narrowing the curriculum locally***. They *are not intended* to represent the full curriculum for instruction and assessment locally, at each grade. The set of GLEs/GSEs includes concepts and skills intended to be assessed on demand, in a large-scale assessment (indicated by "State") and other GLEs/GSEs indicated by ("Local") are for local assessment purposes only. All of the Writing GLEs/GSEs described in this document are expected to be assessed locally, even if indicated for large-scale assessment. "Local GLEs" in writing include those concepts and skills not easily assessed in an on-demand setting (e.g., writing process) and those GLEs/GSEs not designated for large-scale assessment at some or all grade levels (e.g., oral communication, poetry writing, etc.). Grade Level/Span Expectations – at any grade – represent writing content knowledge and skills *introduced instructionally at least one to two years before* students are expected to demonstrate confidence in applying them independently in an on-demand assessment.

The GLEs and GSEs in this document can be interpreted as describing the expectations for the end of the grade/grade span identified, or the beginning of the next grade/grade span. For example, grade 7 GLEs identify grade span expectations in writing for both the end of grade 7 and the beginning of grade 8, for large-scale assessment purposes.

When using Written and Oral Communications Grade Level and Grade Span Expectations, the following are important to understand:

1. **Writing Dimensions: Purpose, Organization, Details, Voice/Tone** are addressed throughout the set of Writing GLEs/GSEs using descriptions appropriate to the related writing genres. Writing Dimensions are not addressed, nor intended to be assessed with a single GLE.

2. All of the concepts and skills identified at a given grade level are "fair game" for large-scale assessment purposes if "(State)" appears at the end of the GLE/GSE. Conjunctions used throughout this document have specific meaning. The use of the conjunction "or" means that a student can be assessed on all or just some of the elements of the GLE/GSE in a given year. The use of "and" between elements of a GLE/GSE means that the *intent* is to assess each element every year. In some situations, "or" is used when students have choices about how they will provide supporting evidence for their response (e.g., when writing in response to text, a student might choose to support an opinion or judgment about text with appropriate examples, OR quotations, OR citations).

3. Each GLE/GSE includes three parts.
   a. **A statement in bold,** called the "stem," is at the beginning of each GLE/GSE. Each "stem" is the same or similar across the grades for a given GLE/GSE, and is meant to communicate the main curriculum and instructional focus of the GLE/GSE across the grades.
   b. The non-bold text within a GLE/GSE indicates how the GLE/GSE is specified at a given grade level or grade span. There are often several indicators for each GLE/GSE stem. Each indicator is coded and indicated as fair game for "state" or "local" assessment.
   c. Differences between adjacent grades are <u>underlined</u>. (Note: Sometimes nothing is underlined within a GLE/GSE. In these situations, differences in adjacent grades assume "applying writing skills with increasing complexity.")

4. Each GLE/GSE is coded for the content area, the grade span, the GSE "stem" number, and the specific indicator for that GSE stem. [E.g., "W (Writing) – SL (means Structures of Language) - 2 (grade 2) - 1 (1st stem) – 6 (the sixth specific indicator for the 1st GSE stem).]

Stem – The BIG Idea

Bold lines around a cell/box indicate a State assessed GLE/GSE

Reading Connection **Writing in Response to Literary or Informational Text – Showing Understanding of Ideas in Text (RC:1)**		
W:RC:8:1.1: In response to literary or informational text, students show understanding of plot /ideas/concepts by…		
Grade 8	**Grade 10**	**Grade 12**
W:RC:8:1.1: Selecting and summarizing key ideas to set context (Local)	W:RC:10:1.1: Selecting and summarizing key ideas to set context, <u>appropriate to audience</u> (State)	W:RC:12:1.1: Selecting and summarizing key ideas to set context, appropriate to audience (Local)

Specific indicator for assessment at this grade, followed by "(Local)" or

<u>Differences</u> between this grade span and prior grade are underlined.

The GLE/GSE stem identifies "the what" – meaning, "What is the big idea for instruction and assessment?"
The indicators following each stem identify "the how" – meaning, "How will students demonstrate what they know?"

Overview of New Hampshire Grade Level and Grade Span Expectations (GLEs/GSEs) for Written & Oral Communication

Content Clusters for Written & Oral Communication	Focus of GLE/GSE	GLE/GSE Number*	K-2 Page	3-5 Page	6-8 Page	9-12 Page
Structures of Language	Applying Understanding of Sentences, Paragraphs, Text Structures	**SL:1**	10	23	36	52
Reading Connection	Writing in Response to Literary or Informational Text – Showing Understanding of Ideas in Text	**RC:1**	11	24	37	53
	Writing in Response to Literary or Informational Text – Making Analytical Judgments about Text	**RC:2**	12	25	38	54
Expressive Writing	Narrative Writing – Creating a Story Line and Applying Narrative Strategies	**EW:1**	13	26	39	55
	Narrative Writing – Applying Narrative Strategies	**EW:2**	14	27	40	56
	Poetry	**EW:3**			41	57
	Poetry	**EW:4**			42	58
	Reflective Essay	**EW:5**			43	59
Informational Writing	Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information	**IW:1**	15	28	44	60
	Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information	**IW:2**	16	29	45	61
	Reports, Procedures, or Persuasive Writing – Using Elaboration Strategies	**IW:3**	17	30	46	62
Conventions	Applying Rules of Grammar, Usage, and Mechanics	**C:1**	18	31	47	63
Habits of Writing	Uses a Writing Process	**HW:1**	19	32	48	64
	Writing Extensively	**HW:2**	20	33	49	65
Oral Communications	Interactive Listening	**OC:1**	21	34	50	66
	Make Oral Presentations	**OC:2**	22	35	51	67
Writing Appendices	Appendix A: Glossary of Terms Used in Writing Instruction and Assessment		68			
	Appendix B: Overview of The Writing Process		72			

Structures of Language Applying Understanding of Sentences, Paragraphs, Text Structures (SL)		
W:SL:1: Students demonstrate command of the structures of sentences, paragraphs, and text by…		
Grade K	**Grade 1**	**Grade 2**
W:SL:K:1.1: Expresses an idea using pictures and letters (Local) W:SL:K:1.2: Not assessed at this grade level W:SL:K:1.3: Not assessed at this grade level W:SL:K:1.4: Not assessed at this grade level W:SL:K:1.5: Not assessed at this grade level W:SL:K:1.6: Not assessed at this grade level	W:SL:1:1.1: Writing recognizable short sentences (Local) W:SL:1:1.2: Not assessed at this grade level W:SL:1:1.3: Not assessed at this grade level W:SL:1:1.4: Not assessed at this grade level W:SL:1:1.5: Distinguishing between letters, words, and sentences (Local) W:SL:1:1.6: Applying directionality as appropriate to text (e.g., left to right, top to bottom) (Local)	W:SL:2:1.1: Writing short sentences (Local) W:SL:2:1.2: Not assessed at this grade level W:SL:2:1.3: Not assessed at this grade level W:SL:2:1.4: Not assessed at this grade level W:SL:2:1.5: Distinguishing between letters, words, sentences, and paragraphs (Local) W:SL:2:1.6: Applying directionality as appropriate to text (e.g., left to right, top to bottom, front and back)

Reading Connection Writing in Response to Literary or Informational Text – Showing Understanding of Ideas in Text (RC:1)		
W:RC:1: In response to literary or informational text, students show understanding of plot /ideas/concepts by…		
Grade K	**Grade 1**	**Grade 2**
W:RC:K:1.1: Representing understanding of text through pictures (pictures may include labels, which might only include beginning sounds and/or ending sounds) (Local) W:RC:K:1.2: Not assessed at this grade level W:RC:K:1.3: Not assessed at this grade level	W:RC:1:1.1: Representing understanding of text through pictures, "words," "sentences," or some combination (Local) W:RC:1:1.2: Not assessed at this grade level W:RC:1:1.3: Not assessed at this grade level	W:RC:2:1.1: Selecting information to set context/background (Local) EXAMPLE: When setting context include author and title W:RC:2:1.2: Not assessed at this grade level W:RC:2:1.3: Not assessed at this grade level

Reading Connection Writing in Response to Literary or Informational Text – Making Analytical Judgments about Text (RC:2)		
W:RC:2: In response to literary or informational text read aloud, students make and support analytical judgments about text by…		
Grade K	**Grade 1**	**Grade 2**
W:RC:K:2.1: Using prior knowledge or reference to text to respond to a question using pictures (pictures may include labels, which might only include beginning sounds and/or ending sounds) (Local) W:RC:K:2.2: Not assessed at this grade level W:RC:K:2.3: Not assessed at this grade level W:RC:K:2.4: Not assessed at this grade level	W:RC:1:2.1: Using prior knowledge or references to text to respond to a question (evidence may take the form of pictures, words, sentences, or some combination) (Local) W:RC:1:2.2: Not assessed at this grade level W:RC:1:2.3: Not assessed at this grade level W:RC:1:2.4: Organizing ideas by using a beginning and an ending given a structure (Local)	W:RC:2:2.1: Stating a focus (purpose), when responding to a given question (Local) W:RC:2:2.2: Not assessed at this grade level W:RC:2:2.3: Using details or references to text to support a given focus (Note: support may include prior knowledge) (Local) W:RC:2:2.4: Organizing ideas by using a beginning, middle, and concluding statement/sentence given a structure (Local) EXAMPLES: template, frame, graphic organizer

Expressive Writing Narrative Writing – Creating a Story Line and Applying Narrative Strategies (EW:1)		
W:EW:K:1: Students organize and relate a story line/plot/series of events by… **W:EW:1:1: In written narratives, students organize and relate a story line/plot/series of events by…** **W:EW:2:1: In written narratives, students organize and relate a story line/plot/series of events by…**		
Grade K	**Grade 1**	**Grade 2**
W:EW:K:1.1: Using pictures to create an understandable story line, when given a structure (pictures may include labels) (Local) EXAMPLES: Draw a picture that tells a story about your family. Given a picture, a student is asked to tell a story about what's happening in the picture. W:EW:K:1.2: Not assessed at this grade level W:EW:K:1.3: Not assessed at this grade level	W:EW:1:1.1: Creating an understandable story line, when given a structure (may take form of words or pictures or some combination) (Local) W:EW:1:1.2: Not assessed at this grade level W:EW:1:1.3: Not assessed at this grade level	W:EW:2:1.1: Creating a clear understandable story line, with a beginning, middle, and end, when given a structure (Local) W:EW:2:1.2: Not assessed at this grade level W:EW:2:1.3: Not assessed at this grade level

Expressive Writing Narrative Writing – Creating a Story Line and Applying Narrative Strategies (EW:2)		
W:EW:2: Students demonstrate use of narrative strategies by…		
Grade K	**Grade 1**	**Grade 2**
W:EW:K:2.1: Not assessed at this grade level	W:EW:1:2.1: Not assessed at this grade level	W:EW:2:2.1: Not assessed at this grade level
W:EW:K:2.2: Not assessed at this grade level	W:EW:1:2.2: Not assessed at this grade level	W:EW:2:2.2: Not assessed at this grade level
W:EW:K:2.3: Using pictures to create character(s) (Local)	W:EW:1:2.3: Creating character(s) (may take form of words or pictures or some combination) (Local)	W:EW:2:2.3: Creating character(s) through description (Local)
W:EW:K:2.4: Not assessed at this grade level	W:EW:1:2.4: Not assessed at this grade level	W:EW:2:2.4: Not assessed at this grade level
W:EW:K:2.5: Expressing ideas and recognizing that experiences and stories can be written about (Local)	W:EW:1:2.5: Writing about observations and experiences (Local)	W:EW:2:2.5: Writing about observations and experiences (Local)
W:EW:K:2.6: Not assessed at this grade level	W:EW:1:2.6: Extending ideas (Local)	W:EW:2:2.6: Extending and elaborating ideas (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:1)		
W:IW:1: In informational writing (reports or procedures), students organize ideas/concepts by …		
Grade K	**Grade 1**	**Grade 2**
W:IW:K:1.1: Naming or labeling objects or pictures (Local) W:IW:K:1.2: Representing facts through pictures (Local) W:IW:K:1.3: Not assessed at this grade level W:IW:K:1.4: Not assessed at this grade level W:IW:K:1.5: Not assessed at this grade level	W:IW:1:1.1: Sorting and classifying facts (Local) W:IW:1:1.2: Representing facts through pictures, "words," "sentences," or some combination (Local) W:IW:1:1.3: Listing steps of a procedure in a logical order, with instructional support (Local) W:IW:1:1.4: Not assessed at this grade level W:IW:1:1.5: Not assessed at this grade level	W:IW:2:1.1: Using a given organizational structure for grouping facts (e.g., template, frame, graphic organizer), with instructional support (Local) W:IW:2:1.2: Selecting facts to set context/background (Local) W:IW:2:1.3: Listing steps of a procedure in a logical order (Local) W:IW:2:1.4: Not assessed at this grade level W:IW:2:1.5: Providing a list of resources (e.g. materials to be used in a task) (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:2)		
W:IW:2: In informational writing (reports or procedures only), students effectively convey purpose by…		
Grade K	**Grade 1**	**Grade 2**
W:IW:K:2.1: Not assessed at this grade level W:IW:K:2.2: Not assessed at this grade level	W:IW:1:2.1: Using pictures to create meaning (Local) W:IW:1:2.2: Not assessed at this grade level	W:IW:2:2.1: Establishing a topic (Local) W:IW:2:2.2: Restating a given focus/controlling idea on a topic (purpose) (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Using Elaboration Strategies (IW:3)		
W:IW:3: In informational writing(reports or procedures only), students demonstrate use of a range of elaboration strategies by:		
Grade K	**Grade 1**	**Grade 2**
W:IW:K:3.1: Using pictures to illustrate details/information related to topic (pictures may include labels) (Local) W:IW:K:3.2: Not assessed at this grade level	W:IW:1:3.1: Including details/information relevant to topic (details/information may take the form of pictures with captions, "words", "sentences", or some combination) (Local) W:IW:1:3.2: Not assessed at this grade level	W:IW:2:3.1: Including details/information relevant to topic and/or focus (Local) W:IW:2:3.2: Using sufficient details/pictures to illustrate facts (Local)

Writing Conventions – Applying Rules of Grammar, Usage, and Mechanics (C)		
W:C:1: In independent writing, students demonstrate command of appropriate English conventions by…		
Grade K	**Grade 1**	**Grade 2**
W:C:K:1.1: Not assessed at this grade level W:C:K:1.2: Not assessed at this grade level W:C:K:1.3: Not assessed at this grade level W:C:K:1.4: Not assessed at this grade level W:C:K:1.5: Using phonemic awareness and letter knowledge to spell independently (using phonetic or temporary spelling) and logically representing consonant sounds (e.g., initial or final sounds) (Local)	W:C:1:1.1: Not assessed at this grade level W:C:1:1.2: Not assessed at this grade level W:C:1:1.3: Not assessed at this grade level W:C:1:1.4: Not assessed at this grade level W:C:1:1.5a: Using phonemic awareness and letter knowledge to spell independently (using phonetic or temporary spelling when needed) (Local) W:C:1:1.5b: Correctly spelling many common words (e.g., had, can, including own first name) (Local)	W:C:2:1.1: Not assessed at this grade level W:C:2:1.2: Using capital letters for the beginning of sentences and names (Local) W:C:2:1.3: Not assessed at this grade level W:C:2:1.4: Using correct ***end*** punctuation in simple sentences (e.g., period) (Local) W:C:2:1.5a: Correctly spelling grade-appropriate, high-frequency words (Local) W:C:2:1.5b: Correctly spelling most words with regularly spelled patterns (e.g., consonant-vowel consonant, CVC with silent e, one syllable words with blends) (Local) W:C:2:1.5c: Giving a readable and accurate phonetic spelling for words that have not been taught (Local)

Habit of Writing: Uses a Writing Process (HW)		
W:HW:1: Students use pre-writing, drafting, revising, editing, and critiquing to produce final drafts of written products.		
Grade K	**Grade 1**	**Grade 2**
Note: students at this level will only be pre-writing and drafting. See Appendix B for Writing Process	Note: students at this level will only be pre-writing and drafting. See Appendix B for Writing Process	See Appendix B for Writing Process

Habit of Writing: Writing Extensively (HW:2)		
W:HW:2: Demonstrates the habit of writing extensively by…		
Grade K	**Grade 1**	**Grade 2**
Not assessed at this grade level	Not assessed at this grade level	Not assessed at this grade level

Oral Communication Strategies (OC:1)		
W:OC:1: In oral communication, students demonstrate interactive listening by …		
Grade K	**Grade 1**	**Grade 2**
W:OC:K:1.1: Following simple verbal instructions and directions W:OC:K:1.2: Listening and responding to stories, songs, or poems W:OC:K:1.3: Not assessed at this grade level W:OC:K:1.4: Not assessed at this grade level W:OC:K:1.5a: Understanding that communicating is verbal and nonverbal W:OC:K:1.5b: Attending to speaker and waiting for appropriate turn to speak	W:OC:1:1.1: Following simple verbal instructions and directions to answer questions W:OC:1:1.2: Responding to or reacting to stories, songs or poems by using simple words, phrases, and sentences W:OC:1:1.3: Not assessed at this grade level W:OC:1:1.4: Not assessed at this grade level W:OC:1:1.5a: Understanding that communicating is verbal and nonverbal W:OC:1:1.5b: Attending to speaker and waiting for appropriate turn to speak	W:OC:2:1.1: Following multi-step verbal instructions and directions to answer questions W:OC:2:1.2: Conversing, and asking questions to what has been heard (e.g., stories, songs or poems) W:OC:2:1.3: Not assessed at this grade level W:OC:2:1.4: Not assessed at this grade level W:OC:2:1.5a: Understanding that meaning can be conveyed by facial expressions W:OC:2:1.5b: Attending to speaker and waiting for appropriate turn to speak

Oral Communication Strategies (OC:2)		
W:OC:2: In oral communication, students make oral presentations by…		
Grade K	**Grade 1**	**Grade 2**
W:OC:K:2.1: Speaking clearly and distinctly, orally sharing information and experiences W:OC:K:2.2: Demonstrating an awareness of options of language (e.g., imitating speech patterns and identifying source of sounds, interpreting nonverbal messages through pictures) W:OC:K:2.3: Telling stories about pictures, books or experiences W:OC:K:2.4: Not assessed at this grade level W:OC:K:2.5: Not assessed at this grade level	W:OC:1:2.1: Orally ordering ideas in a sequence or tell a familiar story W:OC:1:2.2: Using various forms of linguistic elements and structures (e.g., saying "Please" in a command, asking about the weather as a form of polite address;, stating a question in affirmative form, etc.) W:OC:1:2.3: Telling/ retelling stories using details W:OC:1:2.4: Not assessed at this grade level W:OC:1:2.5: Not assessed at this grade level	W:OC:2:2.1: Orally ordering ideas in a sequence, carrying on a conversation, asking and answering questions W:OC:2:2.2: Using various linguistic elements and structures to convey meaning W:OC:2:2.3: Telling stories or giving information using details W:OC:2:2.4: Not assessed at this grade level W:OC:2:2.5: Using eye-contact and adjustment of rate and volume

Structures of Language Applying Understanding of Sentences, Paragraphs, Text Structures (SL)		
W:SL:1: Students demonstrate command of the structures of sentences, paragraphs, and text by…		
Grade 3	**Grade 4**	**Grade 5**
W:SL:3:1.1: Writing a variety of complete simple sentences (Local) EXAMPLES: declarative, exclamatory, and interrogative W:SL:3:1.2: Recognizing indentations for new paragraphs) (Local) W:SL:3:1.3: Not assessed at this grade level W:SL:3:1.4: Not assessed at this grade level W:SL:3:1.5: Recognizing complete sentences (Local) EXAMPLES: simple and compound sentences W:SL:3:1.6: Applying directionality as appropriate to text (Local)	W:SL:4:1.1: Writing a variety of complete simple and compound sentences (State) W:SL:4:1.2: Using the paragraph form: indenting, main idea, supporting details (State) W:SL:4:1.3: Not assessed at this grade level W:SL:4:1.4: Not assessed at this grade level W:SL:4:1.5: Subsumed in W:SL:4:1.1 W:SL:4:1.6: Applying directionality as appropriate to text (Local)	W:SL:5:1.1: Using varied sentence length and structure to enhance meaning (e.g., including phrases and clauses) (Local) W:SL:5:1.2: Using the paragraph form: indenting, main idea, supporting details (Local) W:SL:5:1.3: Recognizing organizational structures ***within*** paragraphs (Local) EXAMPLES (of text structures): description, sequential, chronology, proposition/support, compare/contrast EXAMPLE: When given a paragraph and a list of text structures W:SL:5:1.4: Not assessed at this grade level W:SL:5:1.5: Subsumed in W:SL:5:1.1 W:SL:5:1.6: Applying directionality as appropriate to text (Local) EXAMPLE: double-columned text

Reading Connection Writing in Response to Literary or Informational Text – Showing Understanding of Ideas in Text (RC:1)		
W:RC:1: In response to literary or informational text, students show understanding of plot /ideas/concepts by…		
Grade 3	**Grade 4**	**Grade 5**
W:RC:3:1.1: Selecting appropriate information to set context/background (Local) EXAMPLE: When setting context, include author, title, brief summary W:RC:3:1.2: Selecting ideas that support the development of a summary W:RC:3:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge, which might include other texts (Local)	W:RC:4:1.1a: Selecting appropriate information to set context/background (State) W:RC:4:1.1b: Writing an introduction that sets context/background (Local) W:RC:4:1.2: Summarizing ideas (Local) W:RC:4:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge, which might include other texts (State)	W:RC:5:1.1: Selecting appropriate information to set context/background (Local) EXAMPLE: When setting context, include introduction of a character to make sure the reader understands who the character is W:RC:5:1.2: Summarizing key ideas (Local) W:RC:5:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge or other texts, by referring to relevant ideas (Local)

Reading Connection Writing in Response to Literary or Informational Text – Making Analytical Judgments about Text (RC:2)		
W:RC:2: In response to literary or informational text read aloud, students make and support analytical judgments about text by…		
Grade 3	**Grade 4**	**Grade 5**
W:RC:3:2.1: Stating a focus (purpose), when responding to a given question (Local) W:RC:3:2.2: Making inferences about content, events, characters, or setting (Local) W:RC:3:2.3: Using details or references to text to support focus (Note: support may include prior knowledge) (Local) W:RC:3:2.4: Organizing ideas, using basic transition words (e.g., first, next, then, finally) and having a concluding statement (Local)	W:RC:4:2.1: Stating and maintaining a focus (purpose) when responding to a given question (State) W:RC:4:2.2: Making inferences about content, events, characters, setting, or common themes (State) EXAMPLE (of theme): honesty isn't always easy W:RC:4:2.3: Using specific details and references to text to support focus (State) W:RC:4:2.4: Organizing ideas, using transition words/phrases and writing a conclusion (State)	W:RC:5:2.1: Stating and maintaining a focus (purpose) when responding to a given a question (Local) W:RC:5:2.2: Making inferences about the content, events, characters, setting, or common themes (Local) W:RC:5:2.3: Using specific details and references to text or citations to support focus (Local) W:RC:5:2.4: Organizing ideas, using transition words/phrases and writing a conclusion that provides closure (Local)

Expressive Writing Narrative Writing – Creating a Story Line and Applying Narrative Strategies (EW:1)		
W:EW:1: In written narratives, students organize and relate a story line/plot/series of events by…		
Grade 3	**Grade 4**	**Grade 5**
W:EW:3:1.1: Creating a clear, understandable story line with a beginning, middle, and end (Local) W:EW:3:1.2: Not assessed at this grade level W:EW:3:1.3: Using basic transition words, when appropriate	W:EW:4:1.1: Creating a clear, understandable story line with a beginning, middle, and end (State) W:EW:4:1.2: Establishing a problem and solution (State) W:EW:4:1.3: Establishing transitions by using signal words/phrases (Local)	W:EW:5:1.1: Creating a clear and coherent (logically consistent) story line (Local) W:EW:5:1.2: Establishing context (setting or background information), problem/conflict/challenge, and resolution (Local) W:EW:5:1.3: Using transition words/phrases to establish clear chronology and to enhance meaning (Local)

Expressive Writing Narrative Writing – Creating a Story Line and Applying Narrative Strategies (EW:2)		
W:EW:2: Students demonstrate use of narrative strategies by…		
Grade 3	**Grade 4**	**Grade 5**
W:EW:3:2.1: Using details (Local) W:EW:3:2.2: Not assessed at this grade level W:EW:3:2.3: Creating character(s) through description of physical attributes (Local) W:EW:3:2.4: Not assessed at this grade level W:EW:3:2.5: Writing about observations and experiences (Local) W:EW:3:2.6: Extending and elaborating ideas with purpose (Local)	W:EW:4:2.1: Using relevant and descriptive details (State) W:EW:4:2.2: Not assessed at this grade level W:EW:4:2.3a: Identifying characters (State) W:EW:4:2.3b: Creating character(s) through description of physical attributes and behaviors (Local) W:EW:4:2.4: Not assessed at this grade level W:EW:4:2.5: Writing about observations and experiences (Local) W:EW:4:2.6: Selecting and elaborating important ideas (Local)	W:EW:5:2.1: Using relevant and descriptive details and sensory language to advance the plot/story line (Local) W:EW:5:2.2: Using dialogue to advance plot/story line (Local) W:EW:5:2.3: Developing characters through description (Local) W:EW:5:2.4: Not assessed at this grade level W:EW:5:2.5: Establishing a focus when writing about observations and experiences (Local) W:EW:5:2.6: Selecting and elaborating important ideas; and excluding extraneous details (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:1)		
W:IW:1: In informational writing (reports or procedures), students organize ideas/concepts by …		
Grade 3	**Grade 4**	**Grade 5**
W:IW:3:1.1: Using a given organizational structure for grouping facts and ideas (e.g., template, frame, graphic organizer) (Local) W:IW:3:1.2: Selecting appropriate facts to set context/background (Local) W:IW:3:1.3a: Using basic transition words, when appropriate (Local) W:IW:3:1.3b: Using numbering or words to arrange the steps in a logical manner (Local) W:IW:3:1.4: Providing a concluding statement (Local) W:IW:3:1.5: Providing a list of resources (e.g. materials to be used in a task) (Local)	W:IW:4:1.1: Grouping ideas logically (e.g., predictable categories, steps of a procedure, reasons/arguments) (State) W:IW:4:1.2a: Writing an introduction that sets the context (including materials list in procedures) (State) W:IW:4:1.2b: Selecting appropriate information to set context/background (Local) W:IW:4:1.3a: Using transition words or phrases (State) W:IW:4:1.3b: Using numbering or words to arrange the steps in a logical manner (Local) W:IW:4:1.4: Writing a conclusion (State) W:IW:4:1.5: Providing a list of resources (e.g. materials used in a tasks; sources used for reference) (Local)	W:IW:5:1.1: Using an organizational text structure appropriate to focus/controlling idea (Local) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast W:IW:5:1.2: Selecting appropriate information to set the context W:IW:5:1.3: Using transition words or phrases appropriate to organizing text structure (Local) EXAMPLES: for procedures – using numbering, ordering; for compare/contrast - using "on the other hand" W:IW:5:1.4: Writing a conclusion that provides closure (Local) W:IW:5:1.5: Providing a list of resources (e.g. materials used in a tasks; sources used for reference) (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:2)		
W:IW:2: In informational writing (reports or procedures only), students effectively convey purpose by…		
Grade 3	**Grade 4**	**Grade 5**
W:IW:3:2.1: Establishing a topic (Local) W:IW:3:2.2: Stating a focus/controlling idea on a topic (Local) EXAMPLES: "Dogs" = topic; "Dogs make good pets" = focus	W:IW:4:2.1: Establishing a topic (State) W:IW:4:2.2: Stating and maintaining a focus/controlling idea on a topic (State)	W:IW:5:2.1: Establishing a topic (Local) W:IW:5:2.2: Stating and maintaining a focus/controlling idea on a topic (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Using Elaboration Strategies (IW:3)		
W:IW:3: In informational writing(reports or procedures only), students demonstrate use of a range of elaboration strategies by:		
Grade 3	**Grade 4**	**Grade 5**
W:IW:3:3.1: Including details/information relevant to topic and/or focus (Local) W:IW:3:3.2: Including sufficient details for appropriate depth of information: naming, describing, explaining, comparing, using visual images (Local)	W:IW:4:3.1: Including facts and details relevant to focus/controlling idea (State) W:IW:4:3.2: Including sufficient details or facts for appropriate depth of information: naming, describing, explaining, comparing, using visual images (State)	W:IW:5:3.1: Including facts and details relevant to focus/controlling idea, and excluding extraneous information (Local) W:IW:5:3.2: Including sufficient details or facts for appropriate depth of information: naming, describing, explaining, comparing, using visual images (Local)

Writing Conventions – Applying Rules of Grammar, Usage, and Mechanics (C)		
W:C:1: In independent writing, students demonstrate command of appropriate English conventions by…		
Grade 3	**Grade 4**	**Grade 5**
W:C:3:1.1: Not assessed at this grade level W:C:3:1.2: Using capital letters for the beginning of sentences and names (Local) W:C:3:1.3: Not assessed at this grade level W:C:3:1.4: Using ***end*** punctuation correctly in simple sentences (i.e., period, question mark, exclamation point) (Local) W:C:3:1.5: Correctly spelling grade-appropriate, high-frequency words and using within-word patterns to correct spelling EXAMPLES: single syllable words, regular long and short vowels	W:C:4:1.1: Identifying grammatical errors, when given examples (State) EXAMPLES: he don't; Him and me went W:C:4:1.2: Applying basic capitalization rules (State) EXAMPLES: names, beginning sentences, proper nouns, titles W:C:4:1.3: Using commas correctly in dates and in a series (Note: either form is correct – *x, y, and z* or *x, y and z*) (State) W:C:4:1.4: Using ***end*** punctuation correctly in a variety of sentence structures (State) W:C:4:1.5: Correctly spelling grade-appropriate, high-frequency words and recognizing syllables and affix patterns/rules that are characteristic of the English spelling system (State) EXAMPLES: consonant doubling, change y to i, drop silent e, spelling rules for affixes	W:C:5:1.1: Identifying or correcting grammatical errors (Local) EXAMPLES: subject-verb agreement W:C:5:1.2: Applying basic capitalization rules W:C:5:1.3: Subsumed in W:C:5:1.4 W:C:5:1.4: Using punctuation to clarify meaning (Local) EXAMPLES: commas, apostrophes, quotation marks W:C:5:1.5: Correctly spelling grade-appropriate, high-frequency words, including homonyms and homophones and applying syllables and affix spelling patterns/rules EXAMPLES: consonant doubling, consonant patterns, units of meaning – common roots, base words, pre/suffixes

Habit of Writing: Uses a Writing Process (HW)		
W:HW:1: Students use pre-writing, drafting, revising, editing, and critiquing to produce final drafts of written products.		
Grade 3	**Grade 4**	**Grade 5**
See Appendix B for Writing Process	See Appendix B for Writing Process	See Appendix B for Writing Process

Habit of Writing: Writing Extensively (HW:2)		
W:HW:2: Demonstrates the habit of writing extensively by…		
Grade 3	**Grade 4**	**Grade 5**
W:HW:3:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:3:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:3:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook W:HW:3:2.4: Not assessed at this grade level	W:HW:4:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:4:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:4:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, and letters and personal notes W:HW:4:2.4: Writing in a variety of genres (Local)	W:HW:5:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:5:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:5:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, letters and personal notes, reading response journals W:HW:5:2.4: Writing in a variety of genres (Local)

Oral Communication Strategies (OC:1)		
W:OC:1: In oral communication, students demonstrate interactive listening by …		
Grade 3	**Grade 4**	**Grade 5**
W:OC:3:1.1: Following multi-step verbal instructions and directions to answer questions, or to solve problems W:OC:3:1.2: Understanding content to summarize and question about what has been presented (e.g., stories, songs, or poems) W:OC:3:1.3: Not assessed at this grade level W:OC:3:1.4: Participating in large group discussions to show understanding of how other group members think W:OC:3:1.5a: Understanding how alternative nonverbal actions reinforce a verbal message (e.g., use of gestures) W:OC:3:1.5b: Attending to speaker and waiting for appropriate turn to speak	W:OC:4:1.1: Following verbal instructions to perform tasks, to answer questions, or to solve problems W:OC:4:1.2: Identifying cue words to categorize and understand content to summarize, question or contribute to information presented W:OC:4:1.3: Not assessed at this grade level W:OC:4:1.4: Participating in large and small group discussions to show understanding how other group members think. W:OC:4:1.5a: Identifying choices, alternatives and consequences for problem solving W:OC:4:1.5b: Attending to speaker and waiting for appropriate turn to speak	W:OC:5:1.1: Following verbal instructions to perform specific tasks, to answer questions, or to solve problems (Local) W:OC:5:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented (Local) W:OC:5:1.3: Not assessed at this grade level W:OC:5:1.4: Participating in large and small group discussions showing respect for a range of individual ideas (Local) W:OC:5:1.5: Reaching consensus to solve a problem, make a decision, or achieve a goal (Local)

Oral Communication Strategies (OC:2)		
W:OC:2: In oral communication, students make oral presentations by…		
Grade 3	**Grade 4**	**Grade 5**
W:OC:3:2.1: Identifying standards for good speaking in different kinds of small groups and cultural settings W:OC:3:2.2: Using various linguistic elements and structures to convey meaning W:OC:3:2.3: Telling stories, giving information using details and providing a conclusion W:OC:3:2.4: Not assessed at this grade level W:OC:3:2.5: Using eye contact and adjusting rate, pace and volume	W:OC:4:2.1: Identifying rules that regulate social conventions in small groups (e.g., interviews, small group discussions, etc.) W:OC:4:2.2: Identifying how different verbal and nonverbal choices alter the meanings conveyed to others W:OC:4:2.3: Telling stories, giving information using details, providing conclusions that include inflectional tone to convey meaning EXAMPLE: using books, pictures, graphics, or artifacts W:OC:4:2.4: Providing effective and appropriate feedback W:OC:4:2.5: Using variety of strategies to engage audience (e.g., eye contact, voice tone, and gestures)	W:OC:5:2.1: Demonstrating skills required in interpersonal, small group, and public exchanges (e.g., discussions, interviews) W:OC:5:2.2: Using verbal and nonverbal choices to convey consistent focus W:OC:5:2.3: Telling stories, giving information using details and providing a coherent conclusion EXAMPLE: using books, pictures, displays, graphics, or artifacts W:OC:5:2.4: Providing effective and appropriate feedback to audience and small groups W:OC:5:2.5: Using variety of strategies to engage audience (e.g., eye contact, voice tone, and gestures)

Structures of Language Applying Understanding of Sentences, Paragraphs, Text Structures (SL)		
W:SL:1: Students demonstrate command of the structures of sentences, paragraphs, and text by…		
Grade 6	**Grade 7**	**Grade 8**
W:SL:6:1.1: Using varied sentence length and structure to enhance meaning (e.g., including phrases and clauses) (Local) W:SL:6:1.2: Using the paragraph form: indenting, main idea, supporting details (Local) W:SL:6:1.3: Recognizing organizational structures ***within*** paragraphs (Local) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast W:SL:6:1.4: Applying a format and text structure appropriate to the purpose of the writing (Local) EXAMPLE: Given a paragraph, students write the next paragraph, using appropriate and consistent text structure W:SL:6:1.5: Subsumed in W:SL:6:1.1 W:SL:6:1.6: Applying directionality as appropriate to text (Local)	W:SL:7:1.1: Using varied sentence length and structure to enhance meaning (e.g., including phrases and clauses) (State) W:SL:7:1.2: Using the paragraph form: indenting, main idea, supporting details (State) W:SL:7:1.3: Recognizing organizational structures within paragraphs <u>or within texts</u> (State) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast, problem/solution EXAMPLE: When given a paragraph or text and a description of text structures, students identify structure used or their purposes W:SL:7:1.4: Applying a format and text structure appropriate to the purpose of the writing (State) W:SL:7:1.5: Subsumed in W:SL:7:1.1 W:SL:7:1.6: Applying directionality as appropriate to text (Local)	W:SL:8:1.1: Using varied sentence length and structure to enhance meaning (e.g., including phrases and clauses) (Local) W:SL:8:1.2: Using the paragraph form: indenting, main idea, supporting details (Local) W:SL:8:1.3: Recognizing organizational structures within paragraphs or within texts (Local) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast, problem/solution, <u>cause/effect, investigation</u> W:SL:8:1.4: Applying a format and text structure appropriate to the purpose of the writing (Local) W:SL:8:1.5: Subsumed in W:SL:8:1.1 W:SL:8:1.6: Applying directionality as appropriate to text (Local)

Reading Connection Writing in Response to Literary or Informational Text – Showing Understanding of Ideas in Text (RC:1)		
W:RC:1: In response to literary or informational text, students show understanding of plot /ideas/concepts by…		
Grade 6	**Grade 7**	**Grade 8**
W:RC:6:1.1: Selecting appropriate information to set context/background (Local) W:RC:6:1.2: Summarizing key ideas (Local) W:RC:6:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge or other texts, by referring to relevant ideas (Local) W:RC:6:1.4: Not assessed at this grade level	W:RC:7:1.1: Selecting and summarizing key ideas to set context (State) W:RC:7:1.2: Subsumed in W:RC:7:1.1 W:RC:7:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge, other texts, or the broader world of ideas, by referring to and explaining relevant ideas (State) W:RC:8:1.4: Not assessed at this grade level	W:RC:8:1.1: Selecting and summarizing key ideas to set context (Local) W:RC:8:1.2: Subsumed in W:RC:8:1.1 W:RC:8:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge, other texts, or the broader world of ideas, by referring to and explaining relevant ideas (Local) W:RC:8:1.4: Not assessed at this grade level

Reading Connection Writing in Response to Literary or Informational Text – Making Analytical Judgments about Text (RC:2)		
W:RC:2: In response to literary or informational text read aloud, students make and support analytical judgments about text by…		
Grade 6	**Grade 7**	**Grade 8**
W:RC:6:2.1: Stating and maintaining a focus (purpose), a firm judgment, or point of view when responding to a given question (Local) W:RC:6:2.2: Making inferences about content, events, characters, setting, or common themes and the relationship(s) among them (Local) EXAMPLE: Identifying theme and then making links between content/events and theme W:RC:6:2.3: Using specific details and references to text or relevant citations to support focus or judgment (Local) W:RC:6:2.4: Organizing ideas, using transition words/phrases and writing a conclusion that provides closure (Local)	W:RC:7:2.1: Stating and maintaining a focus (purpose), a firm judgment, or point of view when responding to a given question (State) W:RC:7:2.2: Making inferences about the relationship(s) among content, events, characters, setting, theme, or author's craft (State) EXAMPLES: Making links between characterization and author's choice of words; making links to characteristics of literary forms or genres W:RC:7:2.3: Using specific details and references to text or relevant citations to support focus or judgment (State) W:RC:6:2.4: Organizing ideas, using transitional words/phrases and writing a conclusion that provides closure (State)	W:RC:8:2.1: Stating and maintaining a focus (purpose), a firm judgment, or point of view when responding to a given question (Local) W:RC:8:2.2: Making inferences about the relationship(s) among content, events, characters, setting, theme, or author's craft (Local) EXAMPLES: Making links to author's choice of words, style, bias, literary techniques, or point of view; making links to characteristics of literary forms or genres W:RC:8:2.3: Using specific details and references to text or relevant citations to support focus or judgment (Local) W:RC:8:2.4: Organizing ideas, using transitional words/phrases and drawing a conclusion by synthesizing information (e.g., demonstrate a connection to the broader world of ideas) (Local)

Expressive Writing Narrative Writing – Creating a Story Line and Applying Narrative Strategies (EW:1)		
W:EW:1: In written narratives, students organize and relate a story line/plot/series of events by…		
Grade 6	**Grade 7**	**Grade 8**
W:EW:6:1.1: Creating a clear and coherent (logically consistent) story line W:EW:6:1.2: Establishing context, problem/conflict/ challenge, and resolution, and maintaining point of view, (1st person, 3rd person, or omniscient) W:EW:6:1.3: Using transition words/phrases to establish clear chronology and to enhance meaning W:EW:6:1.4: Not assessed at this grade level W:EW:6:1.5: Not assessed at this grade level W:EW:6:1.6: Not assessed at this grade level	W:EW:7:1.1: Creating a clear and coherent (logically consistent) story line (State) W:EW:7:1.2: Establishing context, character motivation, problem/conflict/challenge, and resolution and maintaining point of view (State) W:EW:7:1.3: Using a variety of effective transitional devices (e.g., ellipses, time transitions, white space, or words/phrases) to enhance meaning (State) W:EW:7:1.4: Not assessed at this grade level W:EW:7:1.5: Establishing and maintaining a theme (Local) W:EW:7:1.6: Providing a sense of closure (Local)	W:EW:8:1.1: Creating a clear and coherent (logically consistent) story line (Local) W:EW:8:1.2: Establishing context, character motivation, problem/conflict/challenge, and resolution, and maintaining point of view (Local) W:EW:8:1.3: Using a variety of effective transitional devices (e.g., ellipses, time transitions, white space, or words/phrases) to enhance meaning (Local) W:EW:8:1.4: Not assessed at this grade level W:EW:8:1.5: Establishing and maintaining a theme (Local) W:EW:8:1.6: Providing a sense of closure (Local)

Expressive Writing Narrative – Applying Narrative Strategies (EW:2)		
W:EW:2: Students demonstrate use of narrative strategies by…		
Grade 6	**Grade 7**	**Grade 8**
W:EW:6:2.1: Using relevant and descriptive details and sensory language to advance the plot/story line (Local) EXAMPLE: I could hear bells ringing. It sent shivers down my spine. W:EW:6:2.2: Using dialogue to advance plot/story line (Local) W:EW:6:2.3: Developing characters through description, dialogue, and actions (Local) W:EW:6:2.4: Using voice appropriate to purpose (Local) W:EW:6:2.5: Maintaining focus (Local) W:EW:6:2.6: Selecting and elaborating important ideas; and excluding extraneous details (Local) W:EW:6:2.7: Not assessed at this level	W:EW:7:2.1: Using relevant and descriptive details and sensory language to advance the plot/story line (State) W:EW:7:2.2: Using dialogue to advance plot/story line (State) W:EW:7:2.3: Developing characters through description, dialogue, and actions (State) W:EW:7:2.4: Using voice appropriate to purpose (State) W:EW:7:2.5: Maintaining focus (State) W:EW:7:2.6: Selecting and elaborating important ideas; and excluding extraneous details (Local) W:EW:7:2.7: Not assessed at this level	W:EW:8:2.1: Creating images, using details and sensory language to advance the plot/story line (Local) W:EW:8:2.2: Using dialogue to advance plot/story line (Local) W:EW:8:2.3: Developing characters through description, dialogue, actions, and relationships with other characters, when appropriate (Local) W:EW:8:2.4: Using voice appropriate to purpose (Local) W:EW:8:2.5: Maintaining focus (Local) W:EW:8:2.6: Selecting and elaborating important ideas; and excluding extraneous details (Local) W:EW:8:2.7: Controlling the pace of the story (Local) EXAMPLE: Developing the narrative with greatest emphasis on the most important parts

Expressive Writing Poetry (EW:3)		
W:EW:3: In writing poetry, students demonstrate awareness of purpose by…		
Grade 6	**Grade 7**	**Grade 8**
W:EW:6:3.1: Not assessed at this grade level W:EW:6:3.2: Not assessed at this grade level W:EW:6:3.3: Not assessed at this grade level	W:EW:7:3.1: Not assessed at this grade level W:EW:7:3.2: Writing poems that express the speaker's moods, thoughts, or feelings (Local) W:EW:7:3.3: Choosing conventional or alternative text structures to achieve impact (Local) EXAMPLES (text structures): free verse, haiku, concrete poems	W:EW:8:3.1: Writing poems in a variety of voices for a variety of audiences (purpose) (Local) W:EW:8:3.2: Writing poems that express speaker's moods, thoughts, or feelings (Local) W:EW:8:3.3: Choosing conventional or alternative text structures to achieve impact (Local) EXAMPLES (Text structures): free verse, haiku, concrete poems

Expressive Writing Poetry (EW:4)		
W:EW:4: In writing poetry, use language effectively by…		
Grade 6	**Grade 7**	**Grade 8**
W:EW:6:4.1: Not assessed at this grade level W:EW:6:4.2: Not assessed at this grade level W:EW:6:4.3: Not assessed at this grade level W:EW:6:4.4: Not assessed at this grade level	W:EW:7:4.1: Not assessed at this grade level W:EW:7:4.2: Not assessed at this grade level W:EW:7:4.3: Not assessed at this grade level W:EW:7:4.4: Not assessed at this grade level	W:EW:8:4.1: Selecting vocabulary according to purpose and for effect on audience (Local) W:EW:8:4.2: Using rhyme, figurative language (Local) EXAMPLES (of figurative language): simile, personification, alliteration, onomatopoeia (Local) W:EW:8:4.3: Not assessed at this grade level W:EW:8:4.4: Using a variety of poetic forms (Local)

Expressive Writing Reflective Essay (EW:5)		
W:EW:5: In reflective writing, students explore and share thoughts, observations, and impressions by…		
Grade 6	**Grade 7**	**Grade 8**
W:EW:6:5.1: Not assessed at this grade level W:EW:6:5.2: Not assessed at this grade level W:EW:6:5.3: Not assessed at this grade level W:EW:6:5.4: Not assessed at this grade level W:EW:6:5.5: Not assessed at this grade level W:EW:6:5.6: Not assessed at this grade level	W:EW:7:5.1: Not assessed at this grade level W:EW:7:5.2: Not assessed at this grade level W:EW:7:5.3: Not assessed at this grade level W:EW:7:5.4: Not assessed at this grade level W:EW:7:5.5: Not assessed at this grade level W:EW:7:5.6: Not assessed at this grade level	W:EW:8:5.1: Engaging the reader by establishing context (purpose) (Local) W:EW:8:5.2: Analyzing a condition or situation of significance (e.g., reflecting on a personal learning or personal growth), or developing a commonplace, concrete occasion as the basis for the reflection (Local) W:EW:8:5.3: Not assessed at this grade level W:EW:8:5.4: Using a range of elaboration techniques (i.e., questioning, comparing, connecting, interpreting, analyzing, or describing) to establish a focus (Local) W:EW:8:5.5: Providing closure - leaving the reader with something to think about (Local) W:EW:8:5.6: Not assessed at this grade level

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:1)		
W:IW:1: In informational writing (reports or procedures), students organize ideas/concepts by …		
Grade 6	**Grade 7**	**Grade 8**
W:IW:6:1.1: Using an organizational text structure appropriate to focus/controlling idea (Local) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast W:IW:6:1.2: Selecting appropriate information to set context, which may include a lead/hook (Local) EXAMPLES (of lead/hook): startling statistic, anecdote/scenario, moving from the general to the specific, quotation	W:IW:7:1.1: Using an organizational text structure appropriate to focus/controlling idea (State) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast, problem/solution W:IW:7:1.2: Selecting appropriate information to set context, which may include a lead/hook (State)	W:IW:8:1.1: Using an organizational text structure appropriate to focus/controlling idea (Local) EXAMPLES (of text structures): sequence, chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation W:IW:8:1.2: Selecting appropriate information to set context, which may include a lead/hook (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:2)		
W:IW:2: In informational writing (reports or procedures only), students effectively convey purpose by…		
Grade 6	**Grade 7**	**Grade 8**
W:IW:6:2.1: Establishing a topic (Local) W:IW:6:2.2: Stating and maintaining a focus/controlling idea on a topic (Local) W:IW:6:2.3: Not assessed at this grade level W:IW:6:2.4: Not assessed at this grade level W:IW:6:2.5: Not assessed at this grade level	W:IW:7:2.1: Establishing a topic (State) W:IW:7:2.2: Stating and maintaining a focus/controlling idea (State) W:IW:7:2.3: Writing with a sense of audience, when appropriate (State) W:IW:7:2.4: Not assessed at this grade level W:IW:7:2.5: Not assessed at this grade level	W:IW:8:2.1: Establishing a topic (Local) W:IW:8:2.2: Stating and maintaining a focus/controlling idea/thesis (Local) W:IW:8:2.3: Writing with a sense of audience, when appropriate (Local) W:IW:8:2.4: Establishing an authoritative voice (Local) W:IW:8:2.5: Not assessed at this grade level

Informational Writing Reports, Procedures, or Persuasive Writing – Using Elaboration Strategies (IW:3)		
W:IW:3: In informational writing(reports or procedures only), students demonstrate use of a range of elaboration strategies by:		
Grade 6	**Grade 7**	**Grade 8**
W:IW:6:3.1: Including facts and details relevant to focus/controlling idea, and excluding extraneous information (Local) W:IW:6:3.2: Including sufficient details or facts for appropriate depth of information*:* naming, describing, explaining, comparing, using visual images (Local) W:IW:6:3.3: Addressing readers' concerns (including counterarguments – in persuasive writing; addressing potential problems –in procedures; providing context –in reports) (Local) W:IW:6:3.4: Not assessed at this grade level	W:IW:7:3.1: Including facts and details relevant to focus/controlling idea, and excluding extraneous information (State) W:IW:7:3.2: Including sufficient details or facts for appropriate depth of information*:* naming, describing, explaining, comparing, using visual images (State) W:IW:7:3.3: Addressing readers' concerns (including counterarguments – in persuasive writing; addressing potential problems –in procedures; providing context –in reports) (State) W:IW:7:3.4: Commenting on the significance of information, when appropriate (State)	W:IW:8:3.1: Including facts and details relevant to focus/controlling idea, and excluding extraneous information (Local) W:IW:8:3.2: Including sufficient details or facts for appropriate depth of information*:* naming, describing, explaining, comparing, using visual images (Local) W:IW:8:3.3: Addressing readers' concerns (including counterarguments – in persuasive writing; addressing potential problems –in procedures; providing context –in reports) (Local) W:IW:8:3.4: Commenting on the significance of the information, when appropriate (Local)

Writing Conventions – Applying Rules of Grammar, Usage, and Mechanics (C)		
W:C:1: In independent writing, students demonstrate command of appropriate English conventions by…		
Grade 6	**Grade 7**	**Grade 8**
W:C:6:1.1: Applying rules of standard English usage to correct grammatical errors EXAMPLES: subject-verb agreement, irregular plurals, sentence fragments and run-ons W:C:6:1.2: Applying basic capitalization rules W:C:6:1.3: Subsumed in W:C:6:1.4 W:C:6:1.4: Using punctuation to clarify meaning EXAMPLES: commas, apostrophes, quotation marks W:C:6:2.5: Correctly spelling grade-appropriate, high-frequency words, including homonyms and homophones and applying syllables and affix spelling patterns/rules (Local) EXAMPLES: consonant doubling, consonant patterns, units of meaning – common roots, base words, pre/suffixes	W:C:7:1.1: Applying rules of standard English usage to correct grammatical errors EXAMPLES: Clear pronoun referent, subject-verb agreement, consistency of verb tense, irregular forms of verbs and nouns (State) W:C:7:1.2: Applying capitalization rules (State) W:C:7:1.3: Subsumed in W:C:7:1.4 W:C:7:1.4: Applying appropriate punctuation to various sentence patterns to enhance meaning (State) EXAMPLES: colons, semicolons W:C:7:2.5: Correctly spelling grade-appropriate, high-frequency words and applying conventional spelling patterns/rules (State) EXAMPLES: consonant doubling, consonant patterns, units of meaning – common roots, base words, pre/suffixes	W:C:8:1.1: Applying rules of standard English usage to correct grammatical errors (Local) EXAMPLES: subject-verb agreement, pronoun-antecedent, consistency of verb tense, case of pronouns W:C:8:1.2: Applying capitalization rules (Local) W:C:8:1.3: Subsumed in W:C:8:1.4 W:C:8:1.4: Applying appropriate punctuation to various sentence patterns to enhance meaning (Local) EXAMPLES: hyphens, dashes, parentheses W:C:8:2.5: Applying conventional and word-derivative spelling patterns/rules (Local) EXAMPLES: identifying relationships among roots and common pre/suffixes, including foreign derivation

Habit of Writing: Uses a Writing Process (HW)		
W:HW:1: Students use a recursive process, including pre-writing, drafting, revising, editing, and critiquing to produce final drafts of written products.		
Grade 6	**Grade 7**	**Grade 8**
See Appendix B for Writing Process	See Appendix B for Writing Process	See Appendix B for Writing Process

Habit of Writing: Writing Extensively (HW:2)		
W:HW:2: Demonstrates the habit of writing extensively by…		
Grade 6	**Grade 7**	**Grade 8**
W:HW:6:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:6:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:6:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, letters and personal notes, reading response journals, sketch journals/cartooning, songs, lyrics W:HW:6:2.4: Writing in a variety of genres (Local)	W:HW:7:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:7:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:7:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, letters and personal notes, reading response journals, sketch journals/cartooning, songs, lyrics W:HW:7:2.4: Writing in a variety of genres (Local)	W:HW:8:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:8:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:8:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, letters and personal notes, reading response journals, sketch journals/cartooning, songs, lyrics, reflective writing, short plays W:HW:8:2.4: Writing in a variety of genres (Local)

Oral Communication Strategies (OC:1)		
W:OC:1: In oral communication, students demonstrate interactive listening by …		
Grade 6	**Grade 7**	**Grade 8**
W:OC:6:1.1: Following verbal instructions to perform specific tasks, to answer questions, or to solve problems (Local) W:OC:6:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented (Local) W:OC:6:1.3: Not assessed at this grade level W:OC:6:1.4: Participating in large and small group discussions showing respect for a range of individual ideas (Local) W:OC:6:1.5: Reaching consensus to solve a problem, make a decision, or achieve a goal (Local)	W:OC:7:1.1: Following verbal instructions to perform specific tasks, to answer questions, or to solve problems (Local) W:OC:7:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented (Local) W:OC:7:1.3: Not assessed at this grade level W:OC:7:1.4: Participating in large and small group discussions showing respect for a range of individual ideas (Local) W:OC:7:1.5: Reaching consensus to solve a problem, make a decision, or achieve a goal (Local)	W:OC:8:1.1: Following verbal instructions to perform specific tasks, to answer questions, or to solve problems (Local) W:OC:8:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented (Local) W:OC:8:1.3: Not assessed at this grade level W:OC:8:1.4: Participating in large and small group discussions showing respect for a range of individual ideas (Local) W:OC:8:1.5: Reaching consensus to solve a problem, make a decision, or achieve a goal (Local)

Oral Communication Strategies (OC:2)		
W:OC:2: In oral communication, students make oral presentations by …		
Grade 6	**Grade 7**	**Grade 8**
W:OC:6:2.1: Demonstrating skills and logical organization and language use in interpersonal, small group and public exchanges (e.g., discussions, interviews) W:OC:6:2.2: Using verbal and nonverbal choices to convey consistent focus W:OC:6:2.3: Telling stories, giving information using details /elaboration and providing a coherent conclusion EXAMPLE: using books, pictures displays, graphics or artifacts W:OC:6:2.4: Effectively responding to audience questions and feedback W:OC:6:2.5: Using a variety of strategies of address (e.g., eye contact, speaking rate, volume, articulation, , inflection, intonation, rhythm, and gesture) to communicate ideas effectively (Local) W:OC:6:2.6: Not assessed at this grade level	W:OC:7:2.1: Exhibiting logical organization and language use, appropriate to audience, context, and purpose (Local) W:OC:7:2.2: Maintaining a consistent focus (Local) W:OC:7:2.3: Including smooth transitions, supporting thesis with well-chosen details, and providing a coherent conclusion (Local) EXAMPLES (of support and elaboration): Using illustrations, visuals, detailed descriptions, restatements, paraphrases, examples, comparisons, artifacts W:OC:7:2.4: Effectively responding to audience questions and feedback (Local) W:OC:7:2.5: Using a variety of strategies of address (e.g., eye contact, speaking rate, volume, articulation, , inflection, , intonation, rhythm, and gesture) to communicate ideas effectively (Local) W:OC:7:2.6: Not assessed at this grade level	W:OC:8:2.1: Exhibiting logical organization and language use, appropriate to audience, context, and purpose (Local) W:OC:8:2.2: Maintaining a consistent focus (Local) W:OC:8:2.3: Including smooth transitions, supporting thesis with well-chosen details, and providing a coherent conclusion (Local) EXAMPLES (of support and elaboration): Using illustrations, visuals, detailed descriptions, restatements, paraphrases, examples, comparisons, artifacts W:OC:8:2.4: Effectively responding to audience questions and feedback (Local) W:OC:8:2.5: Using a variety of strategies of address (e.g., eye contact, speaking rate, volume, articulation, , inflection, , intonation, rhythm, and gesture) to communicate ideas effectively (Local) W:OC:8:2.6: Not assessed at this grade level

Structures of Language Applying Understanding of Sentences, Paragraphs, Text Structures (SL)		
W:SL:1: Students demonstrate command of the structures of sentences, paragraphs, and text by…		
Grade 8	**Grade 10**	**Grade 12**
W:SL:8:1.1: Using varied sentence length and structure to enhance meaning (e.g., including phrases and clauses) (Local) W:SL:8:1.2: Using the paragraph form: indenting, main idea, supporting details (Local) W:SL:8:1.3: Recognizing organizational structures within paragraphs or within texts (Local) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation W:SL:8:1.4: Applying a format and text structure appropriate to the purpose of the writing (Local) W:SL:8:1.5: Subsumed in W:SL:8:1.1 W:SL:8:1.6: Applying directionality as appropriate to text (Local)	W:SL:10:1.1: Using varied sentence length and structure to enhance meaning (e.g., including phrases and clauses) (State) W:SL:10:1.2: Using paragraph structures appropriately (e.g., block or indented format (Local) W:SL:10:1.3: Recognizing organizational structures within paragraphs or within texts (State) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation, deductive/inductive W:SL:10:1.4: Applying a format and text structure appropriate to purpose, audience, and context (State) W:SL:10:1.5: Subsumed in W:SL:10:1.1 W:SL:10:1.6: Applying directionality as appropriate to text (Local)	W:SL:12:1.1: Using varied sentence length and structure to enhance meaning (e.g., including phrases, clauses, and parallel structure) (Local) W:SL:12:1.2: Using paragraph structures appropriately (e.g., block or indented format) (Local) W:SL:12:1.3: Recognizing organizational structures within paragraphs or within texts (Local) EXAMPLES (of text structures): description, sequence, chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation, deductive/inductive (Local) W:SL:12:1.4: Applying a format and text structure appropriate to purpose, audience, and context (Local) EXAMPLES (of formats): academic essay, extended research essay, critical analysis W:SL:12:1.5: Subsumed in W:SL:12:1. W:SL:12:1.6: Applying directionality as appropriate to text (Local)

Reading Connection Writing in Response to Literary or Informational Text – Showing Understanding of Ideas in Text (RC:1)		
W:RC:1: In response to literary or informational text, students show understanding of plot /ideas/concepts by…		
Grade 8	**Grade 10**	**Grade 12**
W:RC:8:1.1: Selecting and summarizing key ideas to set context (Local) W:RC:8:1.2: Subsumed in W:RC:8:1.1 W:RC:8:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge, other texts, or the broader world of ideas, by referring to and explaining relevant ideas (Local) W:RC:8:1.4: Not assessed at this grade level	W:RC:10:1.1: Selecting and summarizing key ideas to set context, appropriate to audience (State) W:RC:10:1.2: Subsumed in W:RC:10:1.1 W:RC:10:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge, other texts, or the broader world of ideas, by referring to and explaining relevant ideas or themes (State) W:RC:10:1.4: Not assessed at this grade level	W:RC:12:1.1: Selecting and summarizing key ideas to set context, appropriate to audience (Local) W:RC:12:1.2: Subsumed in W:RC:12:1.1 W:RC:12:1.3: Connecting what has been read (plot/ideas/concepts) to prior knowledge, other texts, or the broader world of ideas, by referring to and explaining relevant ideas, themes, motifs, or archetypes (Local) W:RC:12:1.4: Explaining the visual components (e.g., charts, diagrams, artwork) of the text, when appropriate (Local)

Reading Connection Writing in Response to Literary or Informational Text – Making Analytical Judgments about Text (RC:2)		
W:RC:2: In response to literary or informational text read aloud, students make and support analytical judgments about text by…		
Grade 8	**Grade 10**	**Grade 12**
W:RC:8:2.1: Stating and maintaining a focus (purpose), a firm judgment, or point of view when responding to a given question (Local) W:RC:8:2.2: Making inferences about the relationship(s) among content, events, characters, setting, theme, or author's craft (Local) EXAMPLES: Making links to author's choice of words, style, bias, literary techniques, or point of view; making links to characteristics of literary forms or genres W:RC:8:2.3: Using specific details and references to text or relevant citations to support focus or judgment (Local) W:RC:8:2.4: Organizing ideas, using transitional words/phrases and drawing a conclusion by synthesizing information (e.g., demonstrate a connection to the broader world of ideas) (Local)	W:RC:10:2.1a: Establishing an interpretive claim/assertion in the form of a thesis (purpose), when responding to a given prompt (State) W:RC:10:2.1b: Establishing an interpretive claim/assertion in the form of a thesis (purpose) (Local) W:RC:10:2.2: Making inferences about the relationship(s) among content, events, characters, setting, theme, or author's craft (State) EXAMPLES: Making links to author's choice of words, style, bias, literary techniques, or point of view; making links to characteristics of literary forms or genres W:RC:10:2.3: Using specific details and references to text or relevant citations to support thesis, interpretations, or conclusions (State) W:RC:10:2.4: Organizing ideas, using transitional words/phrases and drawing a conclusion by synthesizing information (e.g., demonstrate a connection to the broader world of ideas) (State)	W:RC:12:2.1: Establishing an interpretive claim/assertion in the form of a thesis (purpose) (Local) W:RC:12:2.2: Making inferences about the relationship(s) among content, events, characters, setting, theme, or author's craft (Local) EXAMPLES: Making links to author's choice of words, style, bias, literary techniques, or point of view; making links to characteristics of literary forms or genres W:RC:12:2.3: Using specific details and references to text or relevant citations to support thesis, interpretations, or conclusions (Local) W:RC:12:2.4: Organizing ideas, using transitional words/phrases and drawing a conclusion by synthesizing information (e.g., demonstrate a connection to the broader world of ideas) (Local)

Expressive Writing Narrative Writing – Creating a Story Line and Applying Narrative Strategies (EW:1)		
W:EW:1: In written narratives, students organize and relate a story line/plot/series of events by…		
Grade 8	**Grade 10**	**Grade 12**
W:EW:8:1.1: Creating a clear and coherent (logically consistent) story line (Local) W:EW:8:1.2: Establishing context, character motivation, problem/conflict/challenge, and resolution, and maintaining point of view (Local) W:EW:8:1.3: Using a variety of effective transitional devices (e.g., ellipses, time transitions, white space, or words/phrases) to enhance meaning (Local) W:EW:8:1.4: Not assessed at this grade level W:EW:8:1.5: Establishing and maintaining a theme (Local) W:EW:8:1.6: Providing a sense of closure (Local)	W:EW:10:1.1: Creating a clear and coherent (logically consistent) story line (Local) W:EW:10:1.2: Establishing context, character motivation, problem/conflict/challenge, and resolution, significance of setting, and maintaining point of view (Local) W:EW:10:1.3: Using a variety of effective transitional devices (e.g., ellipses; time transitions: such as flashback or foreshadowing; white space; or words/phrases) to enhance meaning (Local) W:EW:10:1.4: Using a variety of effective literary devices (i.e., flashback or foreshadowing, figurative language imagery) to enhance meaning (Local) W:EW:10:1.5: Establishing and maintaining a theme (Local) W:EW:10:1.6: Providing a sense of closure (Local)	W:EW:12:1.1: Creating a clear and coherent, logically consistent structure (Local) EXAMPLES: Biographical or historical accounts, fiction or non-fiction stories, personal narratives, narrative poems or songs, parodies of particular narrative styles (fable, soap opera) W:EW:12:1.2: Establishing context, character motivation, problem/conflict/challenge, and resolution, significance of setting, and maintaining point of view (Local) W:EW:12:1.3: Using a variety of effective transitional devices (e.g., ellipses; time transitions: such as flashback or foreshadowing; white space; or words/phrases) to enhance meaning (Local) W:EW:12:1.4: Using a variety of effective literary devices (i.e., flashback or foreshadowing, figurative language imagery) to enhance meaning (Local) W:EW:12:1.5: Establishing and maintaining a theme (Local) W:EW:12:1.6: Providing a sense of closure (Local)

Expressive Writing Narrative Writing – Applying Narrative Strategies (EW:2)		
W:EW:8:2: Students demonstrate use of narrative strategies by… **W:EW:10:2: Students demonstrate use of narrative strategies to engage the reader by…** **W:EW:12:2: Students demonstrate use of narrative strategies to engage the reader by…**		
Grade 8	**Grade 10**	**Grade 12**
W:EW:8:2.1: Creating images, using details and sensory language to advance the plot/story line (Local) W:EW:8:2.2: Using dialogue to advance plot/story line (Local) W:EW:8:2.3: Developing characters through description, dialogue, actions, and relationships with other characters, when appropriate (Local) W:EW:8:2.4: Using voice appropriate to purpose (Local) W:EW:8:2.5: Maintaining focus (Local) W:EW:8:2.6: Selecting and elaborating important ideas; and excluding extraneous details (Local) W:EW:8:2.7: Controlling the pace of the story (Local) EXAMPLE: Developing the narrative with greatest emphasis on the most important parts	W:EW:10:2.1: Creating images, using relevant and descriptive details and sensory language to advance the plot/story line (Local) W:EW:10:2.2: Using dialogue to advance plot/story line (Local) W:EW:10:2.3: Developing characters through description, dialogue, actions, and relationships with other characters, when appropriate (Local) W:EW:10:2.4: Using voice appropriate to purpose (Local) W:EW:10:2.5: Maintaining focus (Local) W:EW:10:2.6: Selecting and elaborating important ideas; and excluding extraneous details (Local) W:EW:10:2.7: Controlling the pace of the story (Local) EXAMPLE: Intentional use of sentence length and punctuation	W:EW:12:2.1: Creating images, using relevant and descriptive details and sensory language to advance the plot/story line (Local) W:EW:12:2.2: Using dialogue to advance plot/story line (Local) W:EW:12:2.3: Developing characters through description, dialogue, actions (including gestures, expressions), and relationships with other characters, when appropriate (Local) W:EW:12:2.4: Using voice appropriate to purpose (Local) W:EW:12:2.5: Maintaining focus (Local) W:EW:12:2.6: Selecting and elaborating important ideas; and excluding extraneous details (Local) W:EW:12:2.7: Controlling the pace of the story (Local) EXAMPLE: Developing tension or suspense

Expressive Writing Poetry (EW:3)		
W:EW:3: In writing poetry, students demonstrate awareness of purpose by…		
Grade 8	**Grade 10**	**Grade 12**
W:EW:8:3.1: Writing poems in a variety of voices for a variety of audiences (purpose) (Local) W:EW:8:3.2: Writing poems that express speaker's moods, thoughts, or feelings (Local) W:EW:8:3.3: Choosing conventional or alternative text structures to achieve impact (Local) EXAMPLES (text structures): free verse, haiku, concrete poems	W:EW:10:3.1: Writing poems in a variety of voices for a variety of audiences (purpose) (Local) W:EW:10:3.2: Writing poems that express speaker's moods, thoughts, or feelings (Local) W:EW:10:3.3: Choosing conventional or alternative text structures to achieve impact (Local) EXAMPLES (text structures): sonnet, free verse, haiku, ballad, ode, concrete poems	W:EW:12:3.1: Writing poems in a variety of voices for a variety of audiences (purpose) (Local) W:EW:12:3.2: Writing poems that express speaker's moods, thoughts, or feelings (Local) W:EW:12:3.3: Choosing conventional or alternative text structures to achieve impact (Local)

Expressive Writing Poetry (EW:4)		
W:EW:4: In writing poetry, use language effectively by…		
Grade 8	**Grade 10**	**Grade 12**
W:EW:8:4.1: Selecting vocabulary according to purpose and for effect on audience (Local) W:EW:8:4.2: Using rhyme, figurative language (Local) EXAMPLES (of figurative language): simile, personification, alliteration, onomatopoeia W:EW:8:4.3: Not assessed at this grade level W:EW:8:4.4: Using a variety of poetic forms (Local)	W:EW:10:4.1: Selecting vocabulary according to purpose and for effect on audience (Local) W:EW:10:4.2: Using rhyme, rhythm, meter, literary elements (e.g., setting, plot, characters) or figurative language (Local) EXAMPLES (of figurative language): simile, personification, alliteration, onomatopoeia, metaphor W:EW:10:4.3: Selecting and manipulating words, phrases, or clauses, for connotation/shades of meaning and impact (Local) W:EW:10:4.4: Using a variety of poetic forms (Local)	W:EW:12:4.1: Selecting vocabulary according to purpose and for effect on audience (Local) W:EW:12:4.2: Using rhyme, rhythm, meter, literary elements (e.g., setting, plot, characters) or figurative language (Local) EXAMPLES (of figurative language): simile, personification, alliteration, onomatopoeia, metaphor W:EW:12:4.3: Selecting and manipulating words, phrases, or clauses, for connotation/shades of meaning and impact (Local) W:EW:12:4.4: Using a variety of poetic forms (Local)

Expressive Writing Reflective Essay (EW:5)		
W:EW:5: In reflective writing, students explore and share thoughts, observations, and impressions by…		
Grade 8	**Grade 10**	**Grade 12**
W:EW:8:5.1: Engaging the reader by establishing context (purpose) (Local) W:EW:8:5.2: Analyzing a condition or situation of significance (e.g., reflecting on a personal learning or personal growth), or developing a commonplace, concrete occasion as the basis for the reflection (Local) W:EW:8:5.3: Not assessed at this grade level W:EW:8:5.4: Using a range of elaboration techniques (i.e., questioning, comparing, connecting, interpreting, analyzing, or describing) to establish a focus (Local) W:EW:8:5.5: Providing closure - leaving the reader with something to think about (Local) W:EW:8:5.6: Not assessed at this grade level	W:EW:10:5.1: Engaging the reader by establishing context (purpose) (State) W:EW:10:5.2: Analyzing a condition or situation of significance (e.g., reflecting on a personal learning or personal growth), or developing a commonplace, concrete occasion as the basis for the reflection (State) W:EW:10:5.3: Using an organizational structure that allows for a progression of ideas to develop (State) W:EW:10:5.4: Using a range of elaboration techniques (i.e., questioning, comparing, connecting, interpreting, analyzing, or describing) to establish a focus (State) W:EW:10:5.5: Providing closure - leaving the reader with something to think about (State) W:EW:10:5.6: Not assessed at this grade level	W:EW:12:5.1: Engaging the reader by establishing context (purpose) (Local) W:EW:12:5.2: Analyzing a condition or situation of significance or developing a commonplace, concrete occasion as the basis for the reflection (Local) W:EW:12:5.3: Using an organizational structure that allows for a progression of ideas to develop (Local) W:EW:12:5.4: Using a range of elaboration techniques (i.e., questioning, comparing, connecting, interpreting, analyzing, or describing) to establish a focus (Local) W:EW:12:5.5: Providing closure - leaving the reader with something to think about (Local) W:EW:12:5.6: Making connections between personal ideas and experiences and more abstract aspects of life, leading to new perspectives or insights (Local) EXAMPLE: In a reflection upon a personal friendship, a student identifies a new insight about the relationship.

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:1)		
W:IW:1: In informational writing (reports or procedures), students organize ideas/concepts by …		
Grade 8	**Grade 10**	**Grade 12**
W:IW:8:1.1: Using an organizational text structure appropriate to focus/controlling idea (Local) EXAMPLES (of text structures): sequence, chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation W:IW:8:1.2: Selecting appropriate information to set context, which may include a lead/hook (Local)	W:IW:10:1.1: Using a text structure appropriate to focus/controlling idea or thesis (e.g., purpose, audience, context) (State) EXAMPLES (of text structures): sequence (in procedures), chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation, deductive/inductive reasoning W:IW:10:1.2: Selecting appropriate and relevant information (excluding extraneous details) to set context (State)	W:IW:12:1.1: Using a text structure appropriate to focus/controlling idea or thesis (e.g., purpose, audience, context) (Local) EXAMPLES (of text structures): sequence (in procedures), chronology, proposition/support, compare/contrast, problem/solution, cause/effect, investigation, deductive/inductive reasoning W:IW:12:1.2: Selecting appropriate and relevant information (excluding extraneous details) to set context (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Organizing and Conveying Information (IW:2)		
W:IW:2: In informational writing (reports or procedures only), students effectively convey purpose by…		
Grade 8	**Grade 10**	**Grade 12**
W:IW:8:2.1: Establishing a topic (Local) W:IW:8:2.2: Stating and maintaining a focus/controlling idea/thesis (Local) W:IW:8:2.3: Writing with a sense of audience, when appropriate (Local) W:IW:8:2.4: Establishing an authoritative voice (Local) W:IW:8:2.5: Not assessed at this grade level	W:IW:10:2.1: Establishing a topic (State) W:IW:10:2.2: Stating and maintaining a focus/controlling idea/thesis (State) W:IW:10:2.3: Writing with a sense of audience, when appropriate (State) W:IW:10:2.4: Establishing an authoritative voice (State) W:IW:10:2.5: Using precise and descriptive language that clarifies and supports intent (State)	W:IW:12:2.1: Establishing a topic (Local) W:IW:12:2.2: Stating and maintaining a focus/controlling idea/thesis (Local) W:IW:12:2.3: Selecting and using formal, informal, literary, or technical language appropriate to audience and context (Local) W:IW:12:2.4: Establishing an authoritative voice (Local) W:IW:12:2.5: Using precise and descriptive language that clarifies and supports intent and enhances meaning (Local)

Informational Writing Reports, Procedures, or Persuasive Writing – Using Elaboration Strategies (IW:3)		
W:IW:3: In informational writing(reports or procedures only), students demonstrate use of a range of elaboration strategies by:		
Grade 8	**Grade 10**	**Grade 12**
W:IW:8:3.1: Including facts and details relevant to focus/controlling idea, and excluding extraneous information (Local) W:IW:8:3.2: Including sufficient details or facts for appropriate depth of information*:* naming, describing, explaining, comparing, using visual images (Local) W:IW:8:3.3: Addressing readers' concerns (including counterarguments – in persuasive writing; addressing potential problems –in procedures; providing context –in reports) (Local) W:IW:8:3.4: Commenting on the significance of the information, when appropriate (Local)	W:IW:10:3.1: Including facts and details relevant to focus/controlling idea or thesis, and excluding extraneous information (State) W:IW:10:3.2: Including sufficient details or facts for appropriate depth of information*:* naming, describing, explaining, comparing, contrasting, or using visual images to support intended purpose (State) W:IW:10:3.3: Addressing readers' concerns (anticipating and addressing potential problems, mistakes, or misunderstandings that might arise for the audience) (State) W:IW:10:3.4: Commenting on the significance of the information (in reports, throughout the piece; in procedural or persuasive writing, as appropriate) (State)	W:IW:12:3.1: Including facts and details relevant to focus/controlling idea or thesis, and excluding extraneous information (Local) W:IW:12:3.2: Including sufficient details or facts for appropriate depth of information*:* naming, describing, explaining, comparing, contrasting, or using visual images to support intended purpose (Local) W:IW:12:3.3: Addressing readers' concerns (anticipating and addressing potential problems, mistakes, or misunderstandings that might arise for the audience) (Local) W:IW:12:3.4: Commenting on the significance of the information (in reports, throughout the piece; in procedural or persuasive writing, as appropriate) (Local)

Writing Conventions – Applying Rules of Grammar, Usage, and Mechanics (C)		
W:C:1: In independent writing, students demonstrate command of appropriate English conventions by…		
Grade 8	**Grade 10**	**Grade 12**
W:C:8:1.1: Applying rules of standard English usage to correct grammatical errors (Local) EXAMPLES: subject-verb agreement, pronoun-antecedent, consistency of verb tense, case of pronouns	W:C:10:1.1: Applying rules of standard English usage to correct grammatical errors (State) EXAMPLES: subject-verb agreement, pronoun-antecedent, consistency of verb tense, case of pronouns	W:C:12:1.1: Applying rules of standard English usage to correct grammatical errors (Local) EXAMPLES: subject-verb agreement, pronoun-antecedent, consistency of verb tense, case of pronouns
W:C:8:1.2: Applying capitalization rules (Local)	W:C:10:1.2: Applying capitalization rules (Local)	W:C:12:1.2: Applying capitalization rules (Local)
W:C:8:1.3: Subsumed in W:C:8:1.4	W:C:10:1.3: Subsumed in W:C:10:1.4	W:C:12:1.3: Subsumed in W:C:12:1.4
W:C:8:1.4: Applying appropriate punctuation to various sentence patterns to enhance meaning (Local) EXAMPLES: hyphens, dashes, parentheses	W:C:10:1.4: Applying appropriate punctuation to various sentence patterns to enhance meaning (State) EXAMPLES: hyphens, dashes, parentheses	W:C:12:1.4: Applying appropriate punctuation to various sentence patterns to enhance meaning (Local) EXAMPLES: brackets
W:C:8:1:5: Applying conventional and word-derivative spelling patterns/rules (Local) EXAMPLES: identifying relationships among roots and common pre/suffixes, including foreign derivation	W:C:10:1.5: Applying conventional and word-derivative spelling patterns/rules (Local) EXAMPLES: identifying relationships among roots and common pre/suffixes, including foreign derivation	W:C:12:1.5: Applying conventional and word-derivative spelling patterns/rules (Local) EXAMPLES: identifying relationships among roots and common pre/suffixes, including foreign derivation

Habit of Writing: Uses a Writing Process (HW:1)		
W:HW:1: Students use pre-writing, drafting, revising, editing, and critiquing to produce final drafts of written products.		
Grade 8	**Grade 10**	**Grade 12**
See Appendix B for Writing Process	See Appendix B for Writing Process	See Appendix B for Writing Process

Habit of Writing: Writing Extensively (HW:2)		
W:HW:2: Demonstrates the habit of writing extensively by…		
Grade 8	**Grade 10**	**Grade 12**
W:HW:8:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:8:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:8:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, letters and personal notes, reading response journals, sketch journals/cartooning, songs, lyrics, reflective writing, short plays W:HW:8:2.4: Writing in a variety of genres (Local)	W:HW:10:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:10:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:10:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, letters and personal notes, reading response journals, sketch journals/cartooning, songs, lyrics, reflective writing, short plays W:HW:10:2.4: Writing in a variety of genres (Local)	W:HW:12:2.1: Writing with frequency, including in-school, out-of-school, and during the summer (Local) W:HW:12:2.2: Sharing thoughts, observations, or impressions (Local) W:HW:12:2.3: Generating topics for writing (Local) EXAMPLES: Journal writing, free writes, poetry, quick writes, scientific observations, learning logs, readers'/writers' notebook, letters and personal notes, reading response journals, sketch journals/cartooning, songs, lyrics, reflective writing, short plays W:HW:12:2.4: Writing in a variety of genres (Local)

Oral Communication Strategies (OC:1) Interactive Listening		
W:OC:1: In oral communication, students demonstrate interactive listening by …		
Grade 8	**Grade 10**	**Grade 12**
W:OC:8:1.1: Following verbal instructions to perform specific tasks, to answer questions, or to solve problems (Local) W:OC:8:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented (Local) W:OC:8:1.3: Not assessed at this grade level W:OC:8:1.4: Participating in large and small group discussions showing respect for a range of individual ideas (Local) W:OC:8:1.5: Reaching consensus to solve a problem, make a decision, or achieve a goal (Local)	W:OC:10:1.1: Following verbal instructions, to perform specific tasks, to answer questions, or to solve problems (Local) W:OC:10:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented (Local) W:OC:10:1.3: Identifying the thesis of a presentation, determining the essential elements of elaboration, and interpreting or evaluating the message (Local) W:OC:10:1.4: Participating in large and small group discussions showing respect for a range of individual ideas (Local) W:OC:10:1.5: Reaching consensus to solve a problem, make a decision, or achieve a goal (Local)	W:OC:12:1.1: Following verbal instructions to perform specific tasks, to answer questions, or to solve problems (Local) W:OC:12:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented to advance understanding (Local) W:OC:12:1.3: Identifying the thesis of a presentation, determining the essential elements of elaboration, and interpreting or evaluating the message (Local) W:OC:12:1.4: Participating in large and small group discussions showing respect for individual ideas (Local) W:OC:12:1.5: Reaching consensus to solve a problem, make a decision, or achieve a goal (Local)

Oral Communication Strategies (OC:2) Make Oral Presentations		
W:OC:2: In oral communication, students make oral presentations by …		
Grade 8	**Grade 10**	**Grade 12**
W:OC:8:2.1: Exhibiting logical organization and language use, appropriate to audience, context, and purpose (Local) W:OC:8:2.2: Maintaining a consistent focus (Local) W:OC:8:2.3: Including smooth transitions, supporting thesis with well-chosen details, and providing a coherent conclusion (Local) EXAMPLES (of support and elaboration): Using illustrations, visuals, detailed descriptions, restatements, paraphrases, examples, comparisons, artifacts W:OC:8:2.4: Effectively responding to audience questions and feedback (Local) W:OC:8:2.5: Using a variety of strategies of address (e.g., eye contact, speaking rate, volume, articulation, , inflection, intonation, rhythm, and gesture) to communicate ideas effectively (Local) W:OC:8:2.6: Not assessed at this grade level	W:OC:10:2.1: Exhibiting logical organization and language use, appropriate to audience, context, and purpose (Local) W:OC:10:2.2: Maintaining a consistent focus (Local) W:OC:10:2.3: 3 Including smooth transitions, supporting thesis with well-chosen details, and providing a coherent conclusion (Local) EXAMPLES (of support and elaboration): Using anecdotes, analogies, illustrations, visuals, detailed descriptions, restatements, paraphrases, examples, comparisons, artifacts W:OC:10:2.4: Effectively responding to audience questions and feedback (Local) W:OC:10:2.5: Using a variety of strategies of address (e.g., eye contact, speaking rate, volume, articulation, enunciation, pronunciation, inflection, voice modulation, intonation, rhythm, and gesture) to communicate ideas effectively (Local) W:OC:10:2.6: Using tools of technology to enhance message (Local)	W:OC:12:2.1: Exhibiting logical organization and language use, appropriate to audience, context, and purpose (Local) W:OC:12:2.2: Maintaining a consistent focus (Local) W:OC:12:2.3: Including smooth transitions, supporting thesis with well-chosen details, and providing a coherent conclusion (Local) EXAMPLES (of support and elaboration): Using anecdotes, analogies, illustrations, visuals, detailed descriptions, restatements, paraphrases, examples, comparisons, artifacts W:OC:12:2.4: Effectively responding to audience questions and feedback (Local) W:OC:12:2.5: Using a variety of strategies of address (e.g., eye contact, speaking rate, volume, articulation, enunciation, pronunciation, inflection, voice modulation, intonation, rhythm, and gesture) to communicate ideas effectively (Local) W:OC:12:2.6: Using tools of technology to enhance message (Local)

Appendix A: GLOSSARY of Terms Used in WRITING Instruction and Assessment

NECAP States have grouped the Writing GLEs/GSEs into six writing content clusters:

Habit of Writing: Writing Process and Writing Extensively (Applies to all Genres of Writing)
Structures of Language (Applies to all Genres of Writing)
Reading-Writing Connection: Writing in Response to Literary or Informational Text
Expressive Writing: Narratives, Poetry, Reflective Writing
Informational Writing: Reports, Procedures, Persuasive Writing
Writing Conventions (Applies to all Genres of Writing)

Writing Genres Defined

NARRATIVE – Writing that tells a story or recounts an event.

REFLECTIVE ESSAY – A form of writing in which the student explores and shares the meaning of a personal experience, belief, or idea.

PERSUASIVE – Persuasive writing is writing that aims to convince people to accept a point of view, to change their minds about something or to act in a certain way. A persuasive essay is a form of writing in which a writer supports an opinion and tries to persuade an audience.

PROCEDURE – Procedural writing a procedure is writing to explain a process or to inform an audience of how to do something. A procedure piece presents the steps of the process in a clear, logical, easy-to-follow manner; includes all necessary steps; and defines any terms the audience may not know.

REPORT – Writing that results from gathering, investigating, and organizing facts and thoughts on a focused topic.

RESPONSE TO LITERARY OR INFORMATIONAL TEXT – Writing in which the writer analyzes plot/ideas/concepts, making inferences about content, characters, philosophy, theme, author's craft, or other elements within a piece of literature or informational text.

Source: Adapted from Vermont Writing GLE Development, Kurzman, Gephart, Hawkins, 2000

Glossary of Writing Terms

Analysis – A separating of a whole into its parts with an examination of these parts to find out their nature and function

Antithesis - A contrast or opposition of thought, the opposite. In persuasive writing, it is the idea that every argument generates a counter argument. In effective persuasive writing, opposing arguments should be addressed and rebutted.

Audience – Those who read or hear what is written**.** Many qualities of writing must be appropriate to the audience: voice and tone, language, etc.

Author's Craft – The techniques the author chooses to enhance writing. Examples: style, bias, point of view, flashback, foreshadowing, symbolism, figurative language, sensory details, soliloquy, stream of consciousness, etc.

Citation – A direct quote from the text; acknowledgment and documentation of sources of information.

Climax – The high point or turning point in the plot of the story.

Coherence – The quality achieved when all the ideas are clearly arranged and connected. The arrangement of ideas, within and among paragraphs, should be organized in such a way that the reader can easily move from one point to another. When all ideas are arranged and connected, a piece of writing has coherence.

Context - The background information a reader needs to know. It may be a set of facts or circumstances surrounding an event or a situation, explanation of characters, or definition of important terms.

Concrete or Specific Details – Details are concrete when they can be seen, heard, smelled, tasted, or touched. The use of factual details to create a picture (e.g., ten antique, light brown wooden desks, each with a built-in ink well, were lined in two straight rows.)

Controlling Idea – This is the main idea/focus that runs throughout the paper.

Conventions - Features of standard written English that usually include sentence formation, grammar, spelling, usage, punctuation, and capitalization.

Counter Argument – See antithesis.

Diction – The writer's choice of words based on their effectiveness.

Elaboration – Words used to explain and in some way support the central idea; the development and expansion of ideas and arguments. Elaboration varies with the type of writing. (For example, a report may have statistics, examples, anecdotes, and facts, while a narrative would have description, dialogue**,** show-not-tell, etc.)

Embedded Phrases and Clauses – Grammatical structures which are placed in simple sentences to enhance sentence variety (e.g., The bird sat on the fence…chirping loudly in the early morning mist; the bird with the colorful feathers sat on the fence which divided the pasture from the yard, while the cat looked longingly from the window.)

Figurative Language – Techniques used in writing (particularly expressive writing) to create images (e.g., similes, metaphors, alliteration, assonance, personification, onomatopoeia).

Focus – The specific idea(s) within the topic that the writer is addressing. (For example, if the topic is "horses," the focus might be: Horses are very expensive to own.)

Inference - A deduction or conclusion made from facts that are suggested or implied rather than overtly stated (Example: Mom said that I should study more and watch television less. I inferred that I should get better grades or the television would be taken out of my room.)

Occasion – The happening or event that makes the response possible.

Organization – The **clear** evidence of a plan or foundation on which writing is built; includes intentional introduction, conclusion, and internal/external transitions to connect ideas.

Pacing – The rate of movement and action of a narrative. (Examples of a problem with pacing: The story may take a long time to build to the climax, it may have only one or two sentences about the climax, or it may end abruptly.)

Pedestrian – Commonplace, usual; when applied to vocabulary, over-used ("good things," "nice stuff").

Purpose – The specific reason for writing; the goal of the writing (to entertain, express, inform, explain, persuade, etc.). Purpose has to do with the topic and the focus the writer is addressing, its central idea, theme, or message.

Reference to Text – Mentioning or alluding to something in the text without directly quoting the text (For example: Pip was frightened when he met the convict in the graveyard.)

Resolution - The portion of a play or story in which the problem is resolved. It comes after the climax and falling action, and is intended to bring the story to a satisfying end.

Retelling - A restatement of the events in the story.

Sensory Description – Elaboration on a key part or character of the story that includes the five senses: sight, smell, touch, taste, and sound. All five senses do not have to be used, just the ones that naturally fit into the description. Feelings and thoughts, as well as dialogue, may be embedded.

Stance – The attitude or position the author has adopted; literally, how an author stands on the topic.

Stereotype – A pattern or form that does not change. A character is "stereotyped" if she or he has no individuality and fits a mold.

Summary – Writing that presents the main points of a larger work in condensed form.

Text Structures – The organizational structures used within paragraphs or within texts, appropriate to writing genre and purpose. Examples of text structures include: description, sequential chronology, proposition/support, compare/contrast, problem/solution, cause/effect, and investigation.

Theme – The central idea, message, concern, or purpose in a literary work, which may be stated directly or indirectly.

Thesis – The controlling idea about a topic that the writer is attempting to prove; a sentence that announces the writer's main, unifying, controlling idea about a topic. A thesis statement usually contains two main elements: a limited subject (Internet), a strong verb, and the reason for it - the "why"- (The Internet provides information of varying depth and quality).

Tone – The overall feeling or effect created by a writer's attitude, use of words, and sentence structure. This feeling may be serious, mock-serious, humorous, sarcastic, solemn, objective, etc.

Topic – The general subject matter covered in a piece of writing.

Transitions – Words or phrases that help tie ideas together (e.g., however, on the other hand, since, first, etc.); **Transitional devices** also include numbering, use of such things as space, ellipses to enhance meaning.

Voice – The style and quality of the writing which includes word choice, a variety of sentence structures, and evidence of investment. Voice portrays the author's personality. It is the fluency, rhythm, and liveliness in writing that makes it unique to the writer. A distinctive voice establishes personal expression and enhances the writing. (see Reading)

Appendix B: Overview of the Writing Process

Source: Adapted from New England Compact GLE Development; Stimson, Hyman and Bourassa, 2003

Aspects of the Writing Process	Strategies **Successful student writers learn through their own experiences with writing that writing is a recursive rather than a linear process, and that not all pieces of writing will be published. Classroom time for writing instruction should provide ample opportunities for prewriting activities, drafting multiple versions, revising, teacher and peer conferencing, self-assessment, and sharing of writing.**
Prewriting	• Establish a purpose and central/controlling idea or focus • Generate ideas – mapping, webbing, note taking, interviewing, researching, etc. • Organize ideas – consider other models of good writing, appropriate text structures to match purpose, various ways to organize information, etc.
Drafting	• Written draft(s) for an intended audience • Develop topic, elaborate, explore sentence variety and language use
Revising (Content/Ideas)	• Reflect, add, delete, define/redefine content by self, teacher, peer • Consider voice, tone, style, intended audience, coherence, transitions, pacing • Compare with rubric criteria and benchmark papers/models
Editing (Conventions and Mechanics)	• Check for correctness with self, teacher, peer • Compare with rubric criteria and benchmark papers/models • Use resources to support editing • Read aloud with self, teacher, peer
Publishing	• Share final draft with intended audience – orally, in print, electronically, etc.

Contributors

The federal law, *No Child Left Behind*, requires states to develop grade-level expectations in reading/language areas for grades 3-8. Grade-span expectations were developed also for grades 9-10 and 11-12 in reading and writing for high school. Both the grade-level expectations (GLEs) and the grade-span expectations (GSEs) have been incorporated into this revised version of the *K-12 English Language Arts Curriculum Framework*.

The following is a list of committee members representing the state of New Hampshire who developed the grade-level and grade-span expectations. Although this list represents those individual who formally served on the GLE and GSE committees, we are extremely grateful to the numerous people who provided feedback through technical review sessions, focus groups, on-line surveys, e-mails, and phone calls.

The assessment GLEs and GSEs were developed as a joint effort between the states of New Hampshire, Rhode Island, and Vermont. The local GLEs and GSEs were started as a joint effort between New Hampshire and Rhode Island. The contributors from RI and VT can be obtained by contacting the Rhode Island Department of Education and the Vermont Department of Education, respectively.

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K–12 Mathematics New Hampshire Curriculum Framework

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New Hampshire Curriculum Framework Mathematics

The information on the following pages is also available on our website at www.ed.state.nh.us/frameworks.

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How this framework is organized

The material in the K-12 Mathematics Curriculum Framework is organized into Grade-Level Expectations (GLEs) and Grade-Span Expectations (GSEs). Both GLEs and GSEs contain statements about what ALL New Hampshire students are expected to know and be able to do. GLEs are standards that are delineated by grade level covering grades K-8. GSEs are standards that cover the high school span. Both the GLEs and GSEs are built upon the extensive work that went into the 1995 K-12 Mathematics Curriculum Framework and the earlier 1993 K-3 monograph.

Both the GLEs and GSEs are organized into four content strands (Number and Operations; Geometry and Measurement; Functions and Algebra; Data, Statistics, and Probability) and two process strands (Problem Solving, Reasoning, and Proof; Communication, Connections, and Representations).

At the beginning of each strand is a purpose statement which places the strand in the context of a K-12 mathematics program. Furthermore, each strand contains a number of big ideas referred to as stems. The stems articulate the main curricular focus and stay the same or similar across grades.

There are two types of standards throughout the document. Those identified for state assessment purposes and those identified for local curriculum and assessment. The state assessment standards appear in bold boxes; all other standards are guidance for local curriculum and assessment.

The organization of the GLEs and GSEs is further clarified in *About the Mathematics GLEs*, *Reading the Mathematics GLEs*, *About the Mathematics GSEs*, and *Reading the Mathematics GSEs*.

Rationale

In the early part of the 20th century, the needs of our society were dominated by an emerging industrial age driven by mass production. The needs of that society were served by mathematics education in which the acquisition of computational skills was the primary focus. Computational skills alone are no longer sufficient for the United States to remain competitive in the world marketplace. The economy is global, the economic environment is more competitive, the workforce is more mobile, and developments in technology are changing rapidly.

The level of mathematics needed for both intelligent citizenship and the workplace has increased dramatically. Although the acquisition of computational skills remains important, it is not sufficient. The definition of basics skills in mathematics must change to include mathematical problem solving, reasoning, the ability to communicate, and the use of appropriate technology in addition to being able to compute. Individuals need to be able to apply their understanding of mathematics to solve real-world problems for which there are no simple formulas and standard procedures. Individuals need to be able to use their knowledge of mathematics to make sense of complex situations and then communicate that understanding to others. Individuals need to be able to solve tomorrow's problems, as well as today's. Mathematics education in our schools must address these needs.

GOALS FOR MATHEMATICS EDUCATION

We commit to six primary goals. These goals are closely aligned with those espoused by various national commissions and groups in their efforts to reshape the teaching and learning of mathematics.

- All students will develop a firm grounding in number sense that includes computational fluency.
- All students will develop a basic understanding of key concepts and principles central to the study of geometry, algebra, probability, and data analysis, while appreciating the interrelationships of all areas of mathematics.
- All students will develop strong mathematical problem solving and reasoning abilities.
- All students will develop positive attitudes about mathematics.
- All students will develop the ability to use appropriate technology to solve mathematical problems.
- All students will develop the ability to communicate their understanding of mathematics effectively.

THE LEARNING ENVIRONMENT

The New Hampshire Mathematics Curriculum Framework provides a set of goals and standards for what ALL New Hampshire students are expected to know and be able to do. However, the "what" of the goals and standards needs to be considered in the context of the "how" of mathematics teaching and learning (i.e., what type of learning environments will foster students' mathematical development consistent with the goals and standards). Every school-learning environment has several key components including the teachers, the learners, and the curriculum.

Knowledge needs to be well connected. Students who have memorized facts and procedures without understanding often do not know when or how to apply them. When students learn mathematics by doing mathematics, by exploring and discussing concepts in the context of physical situations, what emerges from these experiences are skills that are anchored in understanding and clarity. The students not only know the basic procedures, but also know how to apply them to new situations.

The attitudes students form influence their thinking and performance, and later, influence their decisions about studying mathematics. Students are active individuals who build new knowledge from experience and prior knowledge. The learning of mathematics must be an active process. The teacher plays a key role in establishing a learning environment where discussion and collaboration are expected and fostered, students are expected to justify their thinking, construct mathematical arguments, and experiment with various approaches. Beyond the physical environment, an attitude needs to be prevalent that all students can learn and that they will all be supported in efforts to attain this goal.

A learning environment that supports the stated goals for mathematics education has the following characteristics:

- students are actively involved in doing mathematics;
- problem solving, thinking, reasoning, and communicating are everyday activities;
- central mathematical concepts are understood;
- an appropriate balance between application and acquisition of knowledge and skills exists;
- manipulatives are used, when appropriate, to connect conceptual to procedural understanding;
- technology is used in appropriate ways;
- the curriculum is coherent and well-articulated across grade levels; and
- assessment is an integral part of instruction.

New Hampshire Curriculum Framework Mathematics

About the Mathematics GLEs

This set of New Hampshire Grade-Level Expectations (GLEs) for K-8 includes expectations that will be assessed on the state-level assessment and others that will be a local curriculum and assessment option (i.e., guidance for local curriculum and assessment but not assessed on the state assessment). Those GLEs that will be assessed on the state assessment are boxed with bold outlines. Furthermore, these assessment GLEs are common across NH, RI, and VT and will be assessed through the New England Common Assessment Program (NECAP). The assessment GLEs in this document can be interpreted as describing expectations for the end of the grade identified or the beginning of the next grade. The local content GLEs were developed in collaboration with the Rhode Island Department of Education. As you review the New Hampshire GLEs in Mathematics the following are important to understand.

1) The GLEs are organized into four content strands (Number and Operations; Functions and Algebra; Data, Statistics, and Probability; Geometry and Measurement) and two process strands (Problem-Solving, Reasoning, and Proof; Communications, Representations, and Connections).
2) Since it is crucial that process standards (problem-solving, reasoning, proof, communication, connections, and representations) are not seen separate from content standards, the process standards have been imbedded throughout the content strands (e.g., M:F&A:4:1 **Identifies and <u>extends to specific cases</u> a variety of patterns** (linear and <u>nonlinear</u>) represented in models, tables or sequences; and <u>writes a rule in words or[sc] symbols to find the next case.</u>). This mirrors classroom instruction as in most classes, as students are learning content knowledge, instruction is also focusing on improving their abilities in problem solving, reasoning, and communication; furthermore, students are looking for and making appropriate connections, and they are able to understand and use multiple representations of mathematical ideas. Since it is crucial that students are strong in both content and process knowledge, we have included two local process strands following the content strands. These process strands are in addition to the process standards that are embedded in the content standards and are included to help guide local curriculum, assessment, and instruction. The process standards have been separated by grade-spans (K–2, 3–5, 6–8, and 9–12). The K–2, 3–5, and 6–8 spans have been included in this section of the document. Each span should be thought of as building upon the skills and concepts in the previous span.
3) Each GLE includes a **bolded** statement called the "stem." Each "stem" is the same or similar across the grades for a given GLE, and is meant to communicate the main curricular and instructional focus of the GLE across the grades.
4) The unbolded text within a GLE indicates the expectations for that given grade-level.
5) The underlined text indicates the concepts and skills that are new to a given grade. (Note: Sometimes nothing is underlined within a GLE. In these situations, examine other GLEs across the strand to identify the differences or check the Depth of Knowledge table in the test specifications.
6) Each GLE is coded for the content strand, grade level, and the GLE "stem" number (e.g., M:F&A:7:3: The "M" stands for mathematics, the "F&A" stands for the Functions and Algebra strand, the "7" indicates a standard for grade 7 to be assessed in the fall of grade 8, and the "3" stands for stem 3 or the 3rd big idea in the Functions and Algebra strand). See the diagram on page 9.
7) Unless otherwise specified the number parameters defined in the Number and Operations strand for a particular grade-level apply to all GLEs at that grade-level.
8) All the concepts and skills identified at a given grade level that are boxed with bold outlines are "fair game" for state assessment purposes. However, conjunctions in this document have specific meaning. The conjunction "and" separates parts of a GLE that will be assessed every year (to the extent possible), while the conjunction "or" separates parts of the GLE that may be assessed each year, but will be more likely to be assessed over several years. In some situations "or[sc]" is used. While students will have choices on strategies they use or methods to communicate their thinking throughout the assessment, there are special cases that the NECAP states thought it was necessary to communicate to the test developer that students should not be required to use a specific method (e.g., "…writes in words or[sc] symbols…").

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STEM – Bolded statement communicating main curricular focus and is the same or similar across grades (K-12)

CONTENT AREA: "M" stands for mathematics

STRAND: In this case, "N&O" stands for Number and Operations

GRADE LEVEL: "8" indicates a standard for grade 8. Notice, how in this case, the standard is not in a bold box – indicating that this is a standard to guide local curriculum and assessment. In the column to the left, the state-assessment standard (the standard in the bold box) is a grade 7 standard to be assessed in the fall of grade 8.

Grade 6	Grade 7	Grade 8
M:N&O:6:4 **Accurately solves problems involving** single or multiple operations on fractions (proper, improper, and mixed), or decimals; and addition or subtraction of integers; percent of a whole; or problems involving greatest common factor or least common multiple. (IMPORTANT: *Applies the conventions of order of operations with and without parentheses.*)	M:N&O:7:4 **Accurately solves problems involving** the addition or subtraction of integers, raising numbers to whole number powers, and determining square roots of perfect square numbers and non-perfect square numbers. M:N&O:7:4 **Accurately solves problems involving** proportional reasoning; percents involving discounts, tax, or tips; and rates. (IMPORTANT: *Applies the conventions of order of operations including parentheses, brackets, or exponents.*)	M:N&O:8:4 **Accurately solves problems involving** proportional reasoning (percent increase or decrease, interest rates, markups, or rates); multiplication or division of integers; and squares, cubes, and taking square or cube roots. (IMPORTANT: *Applies the conventions of order of operations.*)

STEM Number: The big ideas in each strand are numbered. In this case, "4" indicates the 4th big idea in the Number and Operations strand.

UNDERLINING – Indicates concepts and skills that a new to the grade level

BOLD BOX – Indicates the standards to be assessed on the NECAP assessment; all other standards are guidance for local curriculum and assessment

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Number and Operations

Purpose: Numbers and operations remain a cornerstone for the study of mathematics in grades K – 12. Students use numbers to quantify sets, identify location, measure, quantify the probability of an event, analyze data, and describe and interpret real-world phenomena. Having students know basic facts and having students compute fluently (i.e., accurately and efficiently) continues to be an important goal in mathematics education. However, knowing basic facts should be incorporated into a rich mathematics curriculum that builds conceptual understanding of these facts.

Through the school years, the amount of time spent on numbers and their operations will decrease and the types of numbers studied will change. As students progress through the elementary grades and into middle school, they will need to develop an in-depth conceptual understanding of fractions, decimals, and percents prior to doing algorithmic computations with these numbers. Conceptual development of integers and meaningful computation with them are also goals for middle grade students. The study of irrational numbers and the real number system will begin in eighth grade and continue through high school. Imaginary and complex numbers are introduced in advanced mathematics. It is important for students to model and represent the different types of numbers they study.

Students cannot appreciate the power of numbers unless they also understand the operations upon those numbers. Students need to recognize which operation to apply to a given problem situation they encounter. They need to know what effect the various operations will have on different types of numbers. They need to know the relationships among the operations and among the operations and their properties. A deep understanding of the operations and their properties will help students make sense of computation algorithms and lead to fluency in computation. A firm understanding of numbers as well as operations and their properties will provide a good foundation for the study of algebra.

Grade K	Grade 1	Grade 2
M:N&O:K:1 **Demonstrates conceptual understanding of rational numbers with respect to:** **whole numbers** from 0 to 12 **through investigations** that apply the concepts of equivalency in composing or decomposing numbers **using models, explanations, or other representations;** and **positive fractional numbers** (1/2) as "fair share" (i.e., equal sized parts or sets) using **models, explanations, or other representations**.	M:N&O:1:1 **Demonstrates conceptual understanding of rational numbers with respect to:** **whole numbers** from 0 to 100 using place value, by applying the concepts of equivalency in composing or decomposing numbers; and in expanded notation using **models**, **explanations, or other representations;** and **positive fractional numbers** (benchmark fractions: *a*/2, *a*/3, or *a*/4, where *a* is a whole number greater than 0 and less than or equal to the denominator) as a part to whole relationship in area models where the denominator is equal to the number of parts in the whole **using models, explanations, or other representations**.	M:N&O:2:1 **Demonstrates conceptual understanding of rational numbers with respect to:** **whole numbers** from 0 to 199 using place value, by applying the concepts of equivalency in composing or decomposing numbers (e.g., 34 = 17 + 17; 34 = 29 + 5); and in expanded notation (e.g., 141 = 1 hundred + 4 tens + 1 one or 141 = 100 + 40 + 1) **using models, explanations, or other representations**; and **positive fractional numbers** (benchmark fractions: *a*/2, *a*/3, or *a*/4, where *a* is a whole number greater than 0 and less than or equal to the denominator) as a part to whole relationship in area and set models where the denominator is equal to the number of parts in the whole **using models, explanations, or other representations**.

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Number and Operations		
Grade K	**Grade 1**	**Grade 2**
M:N&O:K:2 **Demonstrates understanding of the relative magnitude of numbers** from 0 to 20 **through investigations** that demonstrate one-to-one correspondence; that compare whole numbers to each other or to benchmark whole numbers (5, 10); that demonstrate an understanding of the relation of inequality when comparing whole numbers by using "1 more" or "1 less"; that connect numbers orally and written as numerals to the quantities that they represent using models, representations, or number lines.	M:N&O:1:2 **Demonstrates understanding of the relative magnitude of numbers** from 0 to 100 by ordering whole numbers; by comparing whole numbers to each other or to benchmark whole numbers (5, 10, 25, 50, 75, 100); by demonstrating an understanding of the relation of inequality when comparing whole numbers by using "1 more", "1 less", "5 more", "5 less", "10 more", "10 less"; and by connecting number words (from 0 to 20) and numerals (from 0 to 100) to the quantities and positions that they represent using investigations, models, representations, or number lines.	M:N&O:2:2 **Demonstrates understanding of the relative magnitude of numbers** from 0 to 199 by ordering whole numbers; by comparing whole numbers to each other or to benchmark whole numbers (10, 25, 50, 75, 100, 125, 150, or 175); by demonstrating an understanding of the relation of inequality when comparing whole numbers by using "1 more", "1 less", "10 more", "10 less", "100 more", or "100 less"; or by connecting number words and numerals to the quantities they represent using models, number lines, or explanations.
M:N&O:K:3 **Demonstrates conceptual understanding of mathematical operations through investigations involving** addition and subtraction of whole numbers (from 0 to 10) by solving problems involving joining actions, separating actions, part-part whole relationships, and comparison situations; and addition of multiple one-digit whole numbers. (See Appendix A.)	M:N&O:1:3 **Demonstrates conceptual understanding of mathematical operations involving** addition and subtraction of whole numbers (from 0 to 30) by solving problems involving joining actions, separating actions, part-part whole relationships, and comparison situations; and addition of multiple one-digit whole numbers. (See Appendix A.)	M:N&O:2:3 **Demonstrates conceptual understanding of mathematical operations involving** addition and subtraction of whole numbers by solving problems involving joining actions, separating actions, part-part whole relationships, and comparison situations; and addition of multiple one-digit whole numbers. (See Appendix A.)
M:N&O:K:4 No standard at this grade	M:N&O:1:4 No standard at this grade	M:N&O:2:4 No standard at this grade
M:N&O:K:5 **Demonstrates understanding of monetary value through investigation involving** knowing the names and values for coins (penny, nickel and dime).	M:N&O:1:5 **Demonstrates understanding of monetary value by** knowing the names and values for coins (penny, nickel, dime, and quarter); and by adding collections of like coins together to a sum no greater than $1.00.	M:N&O:2:5 **Demonstrates understanding of monetary value** by adding coins together to a value no greater than $1.99 and representing the result in dollar notation; making change from $1.00 or less, or recognizing equivalent coin representations of the same value (values up to $1.99).

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Number and Operations		
Grade K	**Grade 1**	**Grade 2**
M:N&O:K:6 **Mentally adds and subtracts whole numbers** by naming the number that is one more or one less than the original number. (IMPORTANT: *The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:1:6 **Mentally adds and subtracts whole numbers** by naming the number that is one or two more or less than the original number; and adds and subtracts whole number facts through ten (addends whose sum is at most 10 and related subtraction facts). (IMPORTANT: *The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:2:6 **Mentally adds and subtracts whole number facts** through 20 (addends whose sum is at most 20 and related subtraction facts); names the number that is 10 more or less than the original number, and mentally adds and subtracts two-digit multiplies of ten (e.g., 60 + 80, 90 – 30). (IMPORTANT: *The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)
M:N&O:K:7 **Makes estimates** of the number of objects in a set (up to 20) by making and revising estimates as objects are counted (e.g., A student estimates the number of pennies in a jar as 20. Then the student counts the first 10 and makes another estimate based on those that have been counted and those that remain in the jar.). (IMPORTANT: *Estimation should be imbedded instructionally throughout all strands.*)	M:N&O:1:7 **Makes estimates** of the number of objects in a set (up to 30) and revises estimates as objects are counted (e.g., A student estimates the number of pennies in a jar as 28. Then the student counts the first 10 and makes another estimate based on those that have been counted and those that remain in the jar.). (IMPORTANT: *Estimation should be imbedded instructionally throughout all strands.*)	M:N&O:2:7 **Makes estimates** of the number of objects in a set (up to 50) by selecting an appropriate method of estimation. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)
	M:N&O:1:8 **Applies properties of numbers** (odd, even, composition, and decomposition [e.g., 5 is the same as 2 + 3]) and **field properties** (commutative and identity for addition) **to solve problems and to simplify computations involving whole numbers**.	M:N&O:2:8 **Applies properties of numbers** (odd and even) and **field properties** (commutative for addition, identity for addition, and associative for addition) **to solve problems and to simplify computations involving whole numbers**.

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Number and Operations		
Grade 3	**Grade 4**	**Grade 5**
M:N&O:3:1 **Demonstrates conceptual understanding of rational numbers with respect to:** **whole numbers** from 0 to 999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations**; and **positive fractional numbers** (benchmark fractions: *a*/2, *a*/3, *a*/4, *a*/6, or *a*/8, where *a* is a whole number greater than 0 and less than or equal to the denominator) as a part to whole relationship in area and set models where the number of parts in the whole is equal to the denominator; and **decimals** (within a context of money) as a part of 100 **using models, explanations, or other representations**.	M:N&O:4:1 **Demonstrates conceptual understanding of rational numbers with respect to:** **whole numbers** from 0 to 999,999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations**; and **positive fractional numbers** (benchmark fractions: *a*/2, *a*/3, *a*/4, *a*/5, *a*/6, *a*/8, or *a*/10, where *a* is a whole number greater than 0 and less than or equal to the denominator) as a part to whole relationship in area, set, or linear models where the number of parts in the whole are equal to, and a multiple or factor of the denominator; and **decimals** as hundredths within the context of money, or tenths within the context of metric measurements (e.g., 2.3 cm) **using models, explanations, or other representations**.	M:N&O:5:1 **Demonstrates conceptual understanding of rational numbers with respect to:** **whole numbers** from 0 to 9,999,999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations**; and **positive fractional numbers** (proper, mixed number, and improper) (halves, fourths, eighths, thirds, sixths, twelfths, fifths, or powers of ten (10, 100, 1000)), **decimals** (to thousandths), or **benchmark percents** (10%, 25%, 50%, 75% or 100%) as a part to whole relationship in area, set, or linear models **using models, explanations, or other representations**.
M:N&O:3:2 **Demonstrates understanding of the relative magnitude of numbers** from 0 to 999 by ordering whole numbers; by comparing whole numbers to benchmark whole numbers (100, 250, 500, 750); or by comparing whole numbers to each other; and comparing or identifying equivalent positive fractional numbers (*a*/2, *a*/3, *a*/4, where *a* is a whole number greater than 0 and less than or equal to the denominator) using models, number lines, or explanations.	M:N&O:4:2 **Demonstrates understanding of the relative magnitude of numbers** from 0 to 999,999 by ordering or comparing whole numbers; and ordering, comparing, or identifying equivalent proper positive fractional numbers; or decimals using models, number lines, or explanations.	M:N&O:5:2 **Demonstrates understanding of the relative magnitude of numbers** by ordering, comparing, or identifying equivalent positive fractional numbers, decimals, or benchmark percents within number formats (fractions to fractions, decimals to decimals, or percents to percents); or integers in context using models or number lines.

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Number and Operations		
Grade 3	**Grade 4**	**Grade 5**
M:N&O:3:3 **Demonstrates conceptual understanding of mathematical operations** by describing or illustrating the inverse relationship between addition and subtraction of whole numbers; and the relationship between repeated addition and multiplication using models, number lines, or explanations.	M:N&O:4:3 **Demonstrates conceptual understanding of mathematical operations** by describing or illustrating the relationship between repeated subtraction and division (no remainders); the inverse relationship between multiplication and division of whole numbers; or the addition or subtraction of positive fractional numbers with like denominators using models, number lines, or explanations.	M:N&O:5:3 **Demonstrates conceptual understanding of mathematical operations** by adding and subtracting decimals and positive proper fractions with unlike denominators. M:N&O:5:3 **Demonstrates conceptual understanding of mathematical operations** by describing or illustrating the meaning of a remainder with respect to division of whole numbers using models, explanations, or solving problems.
M:N&O:3:4 **Accurately solves problems involving** addition and subtraction with regrouping; the concept of multiplication; and addition or subtraction of decimals (in the context of money).	M:N&O:4:4 **Accurately solves problems involving** multiple operations on whole numbers or the use of the properties of factors and multiples; and addition or subtraction of decimals and positive proper fractions with like denominators. (Multiplication limited to 2 digits by 2 digits, and division limited to 1 digit divisors.) (IMPORTANT: *Applies the conventions of order of operations where the left to right computations are modified only by the use of parentheses.*)	M:N&O:5:4 **Accurately solves problems involving** multiple operations on whole numbers or the use of the properties of factors, multiples, prime, or composite numbers; and addition or subtraction of fractions (proper) and decimals to the hundredths place. (Division of whole numbers by up to a two-digit divisor.) (IMPORTANT: *Applies the conventions of order of operations with and without parentheses.*)
M:N&O:3:5 No standard at this grade	M:N&O:4:5 No standard at this grade	M:N&O:5:5 No standard at this grade

Number and Operations		
Grade 3	**Grade 4**	**Grade 5**
M:N&O:3:6 **Mentally adds and subtracts whole number facts** through 20 (addends whose sum is at most 20 and related subtraction facts); adds two-digit and one-digit whole numbers; adds combinations of two-digit and three-digit whole numbers that are multiples of ten (e.g., 60 + 50, 300 + 400, 320 + 90); subtracts a one-digit whole number from a two-digit whole number (e.g., 37 – 5); and subtracts two-digit whole numbers that are multiples of ten and three-digit whole numbers that are multiples one hundred (e.g., 50 – 20, 500 – 200). (IMPORTANT: *The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:4:6 **Mentally adds and subtracts whole number facts** through 20 (addends whose sum is at most 20 and related subtraction facts); multiplies whole number facts to a product of 100, and calculates related division facts; adds two-digit whole numbers, combinations of two-digit and 3-digit whole numbers that are multiples of ten, and 4-digit whole numbers that are multiples of 100 (limited to two addends) (e.g., 67 + 24; 320 + 430; 320 + 90; 1,300 + 1,400); and subtracts a one-digit whole number from a two-digit whole number (e.g., 67 – 9); and subtracts combinations of two-digit and three-digit whole numbers that are multiples of ten (e.g., 50 – 20, 230 – 80, 520 – 200). (IMPORTANT: *The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:5:6 **Mentally calculates** change back from $1.00, $5.00, and $10.00; calculates multiplication and related division facts to a product of 144; multiplies a two-digit whole number by a one-digit whole number (e.g., 45 × 5), two-digit whole numbers that are multiples of ten (e.g., 50 × 60), a three-digit whole number that is a multiple of 100 by a two- or three-digit number which is a multiple of 10 or 100, respectively (e.g., 400 × 50, 400 × 600); and divides 3- and 4-digit multiples of powers of ten by their compatible factors (e.g., 360 ÷ 6; 360 ÷ 60; 3600 ÷ 6; 3600 ÷ 60; 3600 ÷ 600; 360 ÷ 12; 360 ÷ 120; 3600 ÷ 12; 3600 ÷ 120; 3600 ÷ 1200). (IMPORTANT: *The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)
M:N&O:3:7 **Makes estimates** in a given situation by identifying when estimation is appropriate, selecting the appropriate method of estimation, and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:4:7 **Makes estimates** in a given situation by identifying when estimation is appropriate, selecting the appropriate method of estimation, and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:5:7 **Makes estimates** in a given situation by identifying when estimation is appropriate, selecting the appropriate method of estimation, determining the level of accuracy needed given the situation, analyzing the effect of the estimation method on the accuracy of results, and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)
M:N&O:3:8 **Applies properties of numbers** (odd, even, and multiplicative property of zero for single-digit whole numbers [6 x 0 = 0]) and **field properties** (commutative for addition, associative for addition, identity for multiplication, and commutative for multiplication for single-digit whole numbers [e.g., 3 × 4 = 4 × 3]) **to solve problems and to simplify computations involving whole numbers**.	M:N&O:4:8 **Applies properties of numbers** (odd, even, multiplicative property of zero, and remainders) and **field properties** (commutative, associative, and identity) **to solve problems and to simplify computations**.	M:N&O:5:8 **Applies properties of numbers** (odd, even, and divisibility) and **field properties** (commutative, associative, identity, and distributive) **to solve problems and to simplify computations**.

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Number and Operations		
Grade 6	**Grade 7**	**Grade 8**
M:N&O:6:1 **Demonstrates conceptual understanding of rational numbers with respect to** ratios (comparison of two whole numbers by division a/b, $a : b$, and $a \div b$, where $b \neq 0$); and rates (e.g., a out of b, 25%) **using models, explanations, or other representations**.	M:N&O:7:1 **Demonstrates conceptual understanding of rational numbers with respect to** square roots of perfect squares, rates, and proportional reasoning. M:N&O:7:1 **Demonstrates conceptual understanding of rational numbers with respect to** percents as a means of comparing the same or different parts of the whole when the wholes vary in magnitude (e.g., 8 girls in a classroom of 16 students compared to 8 girls in a classroom of 20 students, or 20% of 400 compared to 50% of 100); and percents as a way of expressing multiples of a number (e.g., 200% of 50) **using models, explanations, or other representations**.	M:N&O:8:1 **Demonstrates conceptual understanding of rational numbers with respect to** absolute values, perfect square and cube roots, and percents as a way of describing change (percent increase and decrease) **using explanations, models, or other representations**.
M:N&O:6:2 **Demonstrates understanding of the relative magnitude of numbers** by ordering or comparing numbers with whole number bases and whole number exponents (e.g.,3^3, 4^3), integers, or rational numbers within and across number formats (fractions, decimals, or whole number percents from 1–100) using number lines or equality and inequality symbols.	M:N&O:7:2 **Demonstrates understanding of the relative magnitude of numbers** by ordering, comparing, or identifying equivalent rational numbers across number formats, numbers with whole number bases and whole number exponents (e.g., 3^3, 4^3), integers, absolute values, or numbers represented in scientific notation using number lines or equality and inequality symbols.	M(N&O):8:2 **Demonstrates understanding of the relative magnitude of numbers** by ordering or comparing rational numbers, common irrational numbers (e.g., $\sqrt{2}$, π), numbers with whole number or fractional bases and whole number exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality
M:N&O:6:3 **Demonstrates conceptual understanding of mathematical operations** by adding and subtracting positive fractions and integers; and multiplying and dividing fractions and decimals. M:N&O:6:3 **Demonstrates conceptual understanding of mathematical operations** by describing or illustrating the meaning of a power by representing the relationship between the base (whole number) and the exponent (whole number) (e.g.,3^3, 4^3); and the effect on the magnitude of a whole number when multiplying or dividing it by a whole number, decimal, or fraction.	M:N&O:7:3 **Demonstrates conceptual understanding of operations** with integers and whole number exponents (where the base is a whole number) using models, diagrams, or explanations.	M:N&O:8:3 No standard at this grade

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Number and Operations		
Grade 6	**Grade 7**	**Grade 8**
M:N&O:6:4 **Accurately solves problems involving** single or multiple operations on fractions (proper, improper, and mixed), or decimals; and addition or subtraction of integers; percent of a whole; or problems involving greatest common factor or least common multiple. (IMPORTANT: *Applies the conventions of order of operations with and without parentheses.*)	M:N&O:7:4 **Accurately solves problems involving** the addition or subtraction of integers, raising numbers to whole number powers, and determining square roots of perfect square numbers and non-perfect square numbers. M:N&O:7:4 **Accurately solves problems involving** proportional reasoning; percents involving discounts, tax, or tips; and rates. (IMPORTANT: *Applies the conventions of order of operations including parentheses, brackets, or exponents.*)	M:N&O:8:4 **Accurately solves problems involving** proportional reasoning (percent increase or decrease, interest rates, markups, or rates); multiplication or division of integers; and squares, cubes, and taking square or cube roots. (IMPORTANT: *Applies the conventions of order of operations.*)
M:N&O:6:5 No standard at this grade	M:N&O:7:5 No standard at this grade	M:N&O:8:5 No standard at this grade
M:N&O:6:6 **Uses a variety of mental computation strategies to solve problems** (e.g., using compatible numbers, applying properties of operations, using mental imagery, using patterns) and to **determine the reasonableness of answers**; and **mentally calculates** change back from \$5.00, \$10.00, \$20.00, \$50.00, and \$100.00; multiplies a two-digit whole number by a one-digit number whole number (e.g., 45 × 5), two-digit whole numbers that are multiples of ten (e.g., 50 × 60), a three-digit whole number that is a multiple of 100 by a two- or three-digit number which is a multiple of 10 or 100, respectively (e.g., 400 × 50, 400 × 600); divides 3- and 4-digit multiples of powers of ten by their compatible factors (e.g., 360 ÷ 6; 360 ÷ 60; 3600 ÷ 6; 3600 ÷ 60; 3600 ÷ 600; 360 ÷ 12; 360 ÷ 120; 3600 ÷ 12; 3600 ÷ 120; 3600 ÷ 1200); and determines the part of a whole number using benchmark percents (1%, 10%, 25%, 50%, and 75%). (IMPORTANT: *The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:7:6 **Uses a variety of mental computation strategies to solve problems** (e.g., using compatible numbers, applying properties of operations, using mental imagery, using patterns) and to **determine the reasonableness of answers**; and **mentally calculates** benchmark perfect squares and related square roots (e.g., 1^2, 2^2, …,12^2, 15^2, 20^2, 25^2, 100^2, 1000^2); determines the part of a number using benchmark percents and related fractions (1%, 10%, 25%, $33\frac{1}{3}\%$, 50%, $66\frac{2}{3}\%$, 75%, and 100%) (e.g., 25% of 16; $33\frac{1}{3}\%$ of 330). (IMPORTANT: *The intent of this GSE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:8:6 **Uses a variety of mental computation strategies to solve problems** (e.g., using compatible numbers, applying properties of operations, using mental imagery, using patterns) and to **determine the reasonableness of answers**; and **mentally calculates** benchmark perfect squares and related square roots (e.g., 1^2, 2^2, … , 12^2, 15^2, 20^2, 25^2, 100^2, 1000^2); determines the part of a number using benchmark percents and related fractions (1%, 10%, 25%, $33\frac{1}{3}\%$, 50%, $66\frac{2}{3}\%$, 75%, and 100%) (e.g., 25% of 16; $33\frac{1}{3}\%$ of 330). (IMPORTANT: *The intent of this GSE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)

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Number and Operations		
Grade 6	**Grade 7**	**Grade 8**
M:N&O:6:7 **Makes estimates** in a given situation by identifying when estimation is appropriate, selecting the appropriate method of estimation, determining the level of accuracy needed given the situation, analyzing the effect of the estimation method on the accuracy of results, and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:7:7 **Makes estimates** in a given situation (including tips, discounts, and tax) by identifying when estimation is appropriate, selecting the appropriate method of estimation, determining the level of accuracy needed given the situation, analyzing the effect of the estimation method on the accuracy of results, and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:8:7 **Makes estimates** in a given situation (including tips, discounts, tax, and the value of a non-perfect square root as between two whole numbers) by identifying when estimation is appropriate, selecting the appropriate method of estimation; determining the level of accuracy needed given the situation; analyzing the effect of the estimation method on the accuracy of results; and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)
M:N&O:6:8 **Applies properties of numbers** (odd, even, positive, negative, remainders, divisibility, and prime factorization) and **field properties** (commutative, associative, identity [including the multiplicative property of one, e.g., 1 = 2/2 and 2/2 × ¾ = 6/8, so ¾ = 6/8], distributive, and additive inverses) **to solve problems and to simplify computations**.	M:N&O:7:8 **Applies properties of numbers** (odd, even, positive, negative, remainders, divisibility, and prime factorization) and **field properties** (commutative, associative, identity, distributive, inverses) **to solve problems and to simplify computations**, and **demonstrates conceptual understanding of field properties** as they apply to subsets of the real numbers (e.g., the set of whole numbers does not have additive inverses, the set of integers does not have multiplicative inverses).	M:N&O:8:8 **Applies properties of numbers** (odd, even, positive, negative, remainders, divisibility, and prime factorization) and **field properties** (commutative, associative, identity [including the multiplicative property of one, e.g., $2^0 \times 2^3 = 2^{0+3} = 2^3$, so $2^0 = 1$], distributive, inverses) **to solve problems and to simplify computations**, and **demonstrates conceptual understanding of field properties** as they apply to subsets of real numbers when addition and multiplication are not defined in the traditional ways (e.g., If $a \Delta b = a + b - 1$, is Δ a commutative operation?)

New Hampshire Curriculum Framework Mathematics

Geometry and Measurement		
Purpose: Geometry and the related area of measurement help students represent, describe, and make sense of the world in which they live. Geometry is also a natural place for students to develop their reasoning and justification skills. We live in a three-dimensional world. To interpret, understand, and appreciate that world, students need to develop an understanding of space. In addition, success in mathematics depends, in part, on the development of spatial abilities. Spatial skills include making and interpreting drawings, forming mental images, and visualizing changes. Measurement is the process of assigning a numerical value to an attribute of an object. The study of measurement provides students with techniques and tools they will need to describe and analyze their world. It also provides an opportunity to make connections within mathematics and between mathematics and other curricular areas. High school students must develop more mature insights into the essential role of measurement as a link between the abstractness of mathematics and the concreteness of the real-world. In both areas, geometry and measurement, students need to investigate, experiment, and explore geometric properties using both technology and hands-on materials.		
Grade K	**Grade 1**	**Grade 2**
M:G&M:K:1 **Uses properties, attributes, composition, or decomposition to sort or classify** polygons (triangles, squares, rectangles, rhombi, trapezoids, and hexagons) or objects by using one non-measurable or measurable attribute; and recognizes, names, and builds polygons and circles in the environment.	M:G&M:1:1 **Uses properties, attributes, composition, or decomposition to sort or classify polygons** (triangles, squares, rectangles, rhombi, trapezoids, and hexagons) or objects by a combination of two non-measurable or measurable attributes; and recognizes, names, builds, and draws polygons and circles in the environment.	M:G&M:2:1 **Uses properties, attributes, composition, or decomposition to sort or classify** polygons or objects by a combination of two or more non-measurable or measurable attributes.
M:G&M:K:2 No standard at this grade	M:G&M:1:2 No standard at this grade	M:G&M:2:2 No standard at this grade
M:G&M:K:3 No standard at this grade	M:G&M:1:3 **Given an example of a three-dimensional geometric shape** (rectangular prisms, cylinders, or spheres) finds examples of objects in the environment that are of the same geometric shape (e.g., show a wooden cylinder and students identify common objects of the same shape).	M:G&M:2:3 No standard at this grade
M:G&M:K:4 No standard at this grade	M:G&M:1:4 **Demonstrates conceptual understanding of congruency** by making mirror images and creating shapes that have line symmetry.	M:G&M:2:4 **Demonstrates conceptual understanding of congruency** by composing and decomposing two-dimensional objects using models or explanations (e.g., using triangular pattern blocks to construct a figure congruent to the hexagonal pattern block); and uses line symmetry to demonstrate congruent parts within a shape.
M:G&M:K:5 No standard at this grade	M:G&M:1:5 No standard at this grade	M:G&M:2:5 No standard at this grade
M:G&M:K:6 No standard at this grade	M:G&M:1:6 **Demonstrates conceptual understanding of the length/height of a two-dimensional object** using non-standard units (e.g. comparing objects to trains of small cubes, using iterations of a small unit to measure an object).	M:G&M:2:6 **Demonstrates conceptual understanding of perimeter and area** by using models or manipulatives to surround and cover polygons.

New Hampshire Curriculum Framework Mathematics

Geometry and Measurement		
Grade K	**Grade 1**	**Grade 2**
M:G&M:K:7 **Demonstrates conceptual understanding of measurable attributes** using comparative language to describe and compare attributes of objects (length [longer, shorter], height [taller, shorter], weight [heavier, lighter], temperature [warmer, cooler], and capacity [more, less]); and compares objects visually and with direct comparison.	M:G&M:1:7 **Demonstrates conceptual understanding of measurable attributes** using comparative language to describe and compare attributes of objects (length [longer, shorter], height [taller, shorter], weight [heavier, lighter], temperature [warmer, cooler], and capacity [more, less]); compares objects visually, with direct comparison, and using non-standard units.	M:G&M:2:7 **Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands. Benchmarks in Appendix B.
M:G&M:K:8 **Determines elapsed and accrued time** as it relates to calendar patterns (days of the week, yesterday, today, and tomorrow), the sequence of events in a day; and identifies a clock and calendar as measurement tools (days of week, months of the year).	M:G&M:1:8 **Determines elapsed and accrued time** as it relates to calendar patterns (days of the week, months of the year), the sequence of events in a day; and recognizes an hour and "on the ½ hour".	M:G&M:2:8 No standard at this grade
M:G&M:K:9 **Demonstrates understanding of spatial relationships using location and position** by using positional words to locate and describe where an object is found in the environment.	M:G&M:1:9 **Demonstrates understanding of spatial relationships using location and position** by using positional words (e.g., close by, on the right, underneath, above, beyond) to describe one location in reference to another on a map, in a diagram, and in the environment.	M:G&M:2:9 **Demonstrates understanding of spatial relationships using location and position** by using positional language in two- and three-dimensional situations to describe and interpret relative positions (e.g., above the surface of the desk, below the triangle on the paper); and creates and interprets simple maps and names locations on simple coordinate grids.

New Hampshire Curriculum Framework Mathematics

Geometry and Measurement		
Grade 3	**Grade 4**	**Grade 5**
M:G&M:3:1 **Uses properties or attributes of angles** (number of angles) **or sides** (number of sides or length of sides) or composition or decomposition of shapes **to identify, describe, or distinguish among** triangles, squares, rectangles, rhombi, trapezoids, hexagons, or circles.	M:G&M:4:1 **Uses properties or attributes of angles** (number of angles) **or sides** (number of sides, length of sides, parallelism, or perpendicularity) **to identify, describe, or distinguish among** triangles, squares, rectangles, rhombi, trapezoids, hexagons, or octagons; or classify angles relative to 90° as more than, less than, or equal to.	M:G&M:5:1 **Uses properties or attributes of angles** (right, acute, or obtuse) **or sides** (number of congruent sides, parallelism, or perpendicularity) **to identify, describe, classify, or distinguish among** different types of triangles (right, acute, obtuse, equiangular, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).
M:G&M:3:2 No standard at this grade	M:G&M:4:2 No standard at this grade	M:G&M:5:2 No standard at this grade
M:G&M:3:3 No standard at this grade	M:G&M:4:3 **Uses properties or attributes** (shape of bases or number of lateral faces) **to identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, or spheres).	M:G&M:5:3 **Uses properties or attributes** (shape of bases, number of lateral faces, or number of bases) **to identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones).
M:G&M:3:4 **Demonstrates conceptual understanding of congruency** by matching congruent figures using reflections, translations, and rotations (flips, slides, and turns) (e.g., recognizing when pentominoes are reflections, translations and rotations of each other); composing and decomposing two- and three-dimensional objects using models or explanations (e.g., Given a cube, students use blocks to construct a congruent cube.); and by using line symmetry to demonstrate congruent parts within a shape.	M:G&M:4.4 **Demonstrates conceptual understanding of congruency** by matching congruent figures using reflections, translations, or rotations (flips, slides, or turns), or as the result of composing or decomposing shapes using models or explanations.	M:G&M:5:4 No standard at this grade
M:G&M:3:5 **Demonstrates conceptual understanding of similarity** by identifying similar shapes.	M:G&M:4:5 **Demonstrates conceptual understanding of similarity** by applying scales on maps, or applying characteristics of similar figures (same shape but not necessarily the same size) to identify similar figures, or to solve problems involving similar figures. Describes relationships using models or[sc] explanations.	M:G&M:5:5 **Demonstrates conceptual understanding of similarity** by describing the proportional effect on the linear dimensions of triangles and rectangles when scaling up or down while preserving angle measures, or by solving related problems (including applying scales on maps). Describes effects using models or[sc] explanations.

New Hampshire Curriculum Framework Mathematics

Geometry and Measurement		
Grade 3	**Grade 4**	**Grade 5**
M:G&M:3:6 **Demonstrates conceptual understanding of perimeter of** polygons, and **the area of** rectangles on grids using a variety of models or manipulatives. Expresses all measures using appropriate units.	M:G&M:4:6 **Demonstrates conceptual understanding of perimeter of** polygons, and **the area of** rectangles, polygons or irregular shapes on grids using a variety of models, manipulatives, or formulas. Expresses all measures using appropriate units.	M:G&M:5:6 **Demonstrates conceptual understanding of perimeter** of polygons, and **the area of** rectangles or right triangles through models, manipulatives, or formulas, the area of polygons or irregular figures on grids, and **volume of** rectangular prisms (cubes) using a variety of models, manipulatives, or formulas. Expresses all measures using appropriate units.
M:G&M:3:7 **Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands. Benchmarks in Appendix B.	M:G&M:4:7 **Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands. Benchmarks in Appendix B.	M:G&M:5:7 **Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands. Benchmarks in Appendix B.
M:G&M:3:8 No standard at this grade	M:G&M:4:8 No standard at this grade	M:G&M:5:8 No standard at this grade
M:G&M:3:9 **Demonstrates understanding of spatial relationships using location and position** by interpreting and giving directions from one location to another (e.g., classroom to the gym, from school to home) using positional words; and between locations on a map or coordinate grid (first quadrant) using positional words or compass directions.	M:G&M:4:9 **Demonstrates understanding of spatial relationships using location and position** by interpreting and giving directions between locations on a map or coordinate grid (first quadrant); plotting points in the first quadrant in context (e.g., games, mapping); and finding the horizontal and vertical distances between points on a coordinate grid in the first quadrant.	M:G&M:5:9 **Demonstrates understanding of spatial relationships using location and position** by interpreting and giving directions between locations on a map or coordinate grid (all four quadrants); plotting points in four quadrants in context (e.g., games, mapping, identifying the vertices of polygons as they are reflected, rotated, and translated); and determining horizontal and vertical distances between points on a coordinate grid in the first quadrant.
M:G&M:3:10 **Demonstrates conceptual understanding of spatial reasoning and visualization** by copying, comparing, and drawing models of triangles, squares, rectangles, rhombi, trapezoids, hexagons, and circles; and builds models of rectangular prisms from three-dimensional representations.	M:G&M:4:10 **Demonstrates conceptual understanding of spatial reasoning and visualization** by copying, comparing, and drawing models of triangles, squares, rectangles, rhombi, trapezoids, hexagons, octagons, and circles; and builds models of rectangular prisms from two- or three-dimensional representations.	M:G&M:5:10 **Demonstrates conceptual understanding of spatial reasoning and visualization** by building models of rectangular and triangular prisms, cones, cylinders, and pyramids from two- or three-dimensional representations.

New Hampshire Curriculum Framework Mathematics

Geometry and Measurement		
Grade 6	**Grade 7**	**Grade 8**
M:G&M:6:1 **Uses properties or attributes of angles** (right, acute, or obtuse) **or sides** (number of congruent sides, parallelism, or perpendicularity) **to identify, describe, classify, or distinguish** among different types of triangles (right, acute, obtuse, equiangular, scalene, isosceles, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).	M:G&M:7:1 **Uses properties of angle** relationships resulting from two or three intersecting lines (adjacent angles, vertical angles, straight angles, or angle relationships formed by two non-parallel lines cut by a transversal), or two parallel lines cut by a transversal to solve problems.	M:G&M:8:1 No standard at this grade
M:G&M:6:2 No standard at this grade	M:G&M:7:2 **Applies theorems or relationships** (triangle inequality or sum of the measures of interior angles of regular polygons) to solve problems.	M:G&M:8:2 **Applies the Pythagorean Theorem** to find a missing side of a right triangle, or in problem solving situations.
M:G&M:6:3 **Uses properties or attributes** (shape of bases, number of lateral faces, number of bases, number of edges, or number of vertices) **to identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones).	M:G&M:7:3 No standard at this grade	M:G&M:8:3 No standard at this grade
M:G&M:6:4 **Demonstrates conceptual understanding of congruency** by predicting and describing the transformational steps (reflections, translations, and rotations) needed to show congruence (including the degree of rotation) and as the result of composing and decomposing two- and three-dimensional objects using models or explanations; and using line and rotational symmetry to demonstrate congruent parts within a shape.	M:G&M:7:4 **Applies the concepts of congruency** by solving problems on a coordinate plane involving reflections, translations, or rotations.	M:G&M:8:4 No standard at this grade

New Hampshire Curriculum Framework Mathematics

Geometry and Measurement		
Grade 6	**Grade 7**	**Grade 8**
M:G&M:6:5 **Demonstrates conceptual understanding of similarity** by describing the proportional effect on the linear dimensions of polygons or circles when scaling up or down while preserving the angles of polygons, or by solving related problems (including applying scales on maps). Describes effects using models or[sc] explanations.	M:G&M:7:5 **Applies concepts of similarity** by solving problems involving scaling up or down and their impact on angle measures, linear dimensions and areas of polygons, and circles when the linear dimensions are multiplied by a constant factor. Describes effects using models or[sc] explanations.	M:G&M:8:5 **Applies concepts of similarity** to determine the impact of scaling on the volume or surface area of three-dimensional figures when linear dimensions are multiplied by a constant factor; to determine the length of sides of similar triangles, or to solve problems involving growth and rate.
M:G&M:6:6 **Demonstrates conceptual understanding of perimeter** of polygons, **the area of** quadrilaterals or triangles, and **the volume of** rectangular prisms by using models, formulas, or by solving problems; and **demonstrates understanding of the relationships of circle measures** (radius to diameter and diameter to circumference) by solving related problems. Expresses all measures using appropriate units.	M:G&M:7:6 **Demonstrates conceptual understanding of the area** of circles or the area or perimeter of composite figures (quadrilaterals, triangles, or parts of circles), and the **surface area of** rectangular prisms, **or volume of** rectangular prisms, triangular prisms, or cylinders using models, formulas, or by solving related problems. Expresses all measures using appropriate units.	M:G&M:8:6 **Demonstrates conceptual understanding of surface area or volume by solving problems involving surface area and volume** of rectangular prisms, triangular prisms, cylinders, pyramids, or cones. Expresses all measures using appropriate units.
M:G&M:6:7 **Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands. Benchmarks in Appendix B.	M:G&M:7:7 No standard at this grade	M:G&M:8:7 No standard at this grade

New Hampshire Curriculum Framework Mathematics

Geometry and Measurement		
Grade 6	**Grade 7**	**Grade 8**
M:G&M:6:8 No standard at this grade	M:G&M:7:8 No standard at this grade	M:G&M:8:8 No standard at this grade
M:G&M:6:9 No standard at this grade	M:G&M:7:9 No standard at this grade	M:G&M:8:9 No standard at this grade
M:G&M:6:10 No standard at this grade	M:G&M:7:10 **Demonstrates conceptual understanding of spatial reasoning and visualization** by sketching three-dimensional solids; and draws nets of rectangular and triangular prisms, cylinders, and pyramids and uses the nets as a technique for finding surface area.	M:G&M:8:10 No standard at this grade

New Hampshire Curriculum Framework Mathematics

Functions and Algebra		
Purpose: Algebra is the language through which much of mathematics is communicated. Students in Kindergarten begin to explore algebraic concepts using informal representations (e.g., words, physical models, tables, graphs). In later years students progress to more abstract representations. The study of patterns is one of the central themes of algebraic thinking and leads to an understanding of relations and functions. Students at all grade-levels should recognize, describe, and generalize patterns and build mathematical models to describe, interpret, and predict the behavior of real-world phenomenon. Algebraic processes are important tools that students can use throughout their lives.		
Grade K	**Grade 1**	**Grade 2**
M:F&A:K:1 **I Identifies and extends to specific cases a variety of patterns** (sequences of shapes, sounds, movement, colors, and letters) by extending the pattern to the next one, two or three elements, or by translating AB patterns across formats (e.g., an abb pattern can be represented as snap, clap, clap or red, yellow, yellow) or by identifying number patterns in the environment.	M:F&A:1:1 **Identifies and extends to specific cases a variety of patterns** (repeating and growing [numeric and non-numeric]) represented in models, tables, or sequences by extending the pattern to the next one, two, or three elements, by finding a missing element (e.g., 2, 4, 6, ___, 10), or by translating repeating patterns across formats (e.g., an abb pattern can be represented as snap, clap, clap; or red, yellow, yellow; or 1, 2, 2).	M:F&A:2:1 **Identifies and extends to specific cases a variety of patterns** (linear and non-numeric) represented in models, tables, or sequences by extending the pattern to the next element, or finding a missing element (e.g., 2, 4, 6, ___, 10).
M:F&A:K:2 No standard at this grade	M:F&A:1:2 No standard at this grade	M:F&A:2:2 No standard at this grade
M:F&A:K:3 No standard at this grade	M:F&A:1:3 No standard at this grade	M:F&A:2:3 No standard at this grade
M:F&A:K:4 No standard at this grade	M:F&A:1:4 **Demonstrates conceptual understanding of equality** by finding the value that will make an open sentence true (e.g., $2 + \square = 7$) using models, verbal explanations, or written equations. (limited to one operation and limited to use addition or subtraction)	M:F&A:2:4 **Demonstrates conceptual understanding of equality** by finding the value that will make an open sentence true (e.g., $2 + \square = 7$). (limited to one operation and limited to use addition or subtraction)

New Hampshire Curriculum Framework Mathematics

Functions and Algebra		
Grade 3	**Grade 4**	**Grade 5**
M:F&A:3:1 **Identifies and extends to specific cases a variety of patterns** (linear and non-numeric) represented in models, tables, or sequences by extending the pattern to the next one, two, or three elements, or finding missing elements.	M:F&A:4:1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables or sequences; and writes a rule in words or[sc] symbols to find the next case.	M:F&A:5:1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, or in problem situations; and writes a rule in words or[sc] symbols for finding specific cases of a linear relationship.
M:F&A:3:2 No standard at this grade	M:F&A:4:2 **Demonstrates conceptual understanding of linear relationships** ($y = kx$) **as a constant rate of change** by identifying, describing, or comparing situations that represent constant rates of change.	M:F&A:5:2 **Demonstrates conceptual understanding of linear relationships** ($y = kx$) **as a constant rate of change** by identifying, describing, or comparing situations that represent constant rates of change (e.g., tell a story given a line graph about a trip).
M:F&A:3:3 No standard at this grade	M:F&A:4:3 **Demonstrates conceptual understanding of algebraic expressions** by using letters or symbols to represent unknown quantities to write simple linear algebraic expressions involving any one of the four operations; or by evaluating simple linear algebraic expressions using whole numbers.	M:F&A:5:3 **Demonstrates conceptual understanding of algebraic expressions** by using letters to represent unknown quantities to write linear algebraic expressions involving any two of the four operations; or by evaluating linear algebraic expressions using whole numbers.
M:F&A:3:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions; or by finding the value that will make an open sentence true (e.g., $2 + \square = 7$). (limited to one operation and limited to use addition, subtraction, or multiplication)	M:F&A:4:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions, by simplifying numerical expressions where left to right computations may be modified only by the use of parentheses [e.g., $14 - (2 \times 5)$] (expressions consistent with the parameters of M:F&A:4–3), and by solving one-step linear equations of the form $ax = c$, $x \pm b = c$, where a, b, and c are whole numbers with $a \neq 0$.	M:F&A:5:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions (expressions consistent with the parameters of M:F&A:5–3), by solving one-step linear equations of the form $ax = c$, $x \pm b = c$, or $x/a = c$, where a, b, and c are whole numbers with $a \neq 0$; or by determining which values of a replacement set make the equation (multi-step of the form $ax \pm b = c$ where a, b, and c are whole numbers with $a \neq 0$) a true statement (e.g., $2x + 3 = 11$, $\{x: x = 2, 3, 4, 5\}$).

Functions and Algebra		
Grade 6	**Grade 7**	**Grade 8**
M:F&A:6:1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; or writes a rule in words or symbols for finding specific cases of a linear relationship; or writes a rule in words or[sc] symbols for finding specific cases of a nonlinear relationship; and writes an expression or[sc] equation using words or[sc] symbols to express the **generalization** of a linear relationship (e.g., twice the term number plus 1 or[sc] $2n + 1$).	M:F&A:7:1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; **and generalizes** a linear relationship using words and symbols; generalizes a linear relationship to find a specific case; or writes an expression or[sc] equation using words or[sc] symbols to express the **generalization** of a nonlinear relationship.	M:F&A:8:1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; **and generalizes** a linear relationship (non-recursive explicit equation); generalizes a linear relationship to find a specific case; **generalizes** a nonlinear relationship using words or[sc] symbols; or **generalizes** a common nonlinear relationship to find a specific case.
M:F&A:6:2 **Demonstrates conceptual understanding of linear relationships** ($y = kx$; $y = mx + b$) **as a constant rate of change** by constructing or interpreting graphs of real occurrences and describing the slope of linear relationships (faster, slower, greater, or smaller) in a variety of problem situations; **and describes how change in the value of one variable relates to change in the value of a second variable** in problem situations with constant rates of change.	M:F&A:7:2 **Demonstrates conceptual understanding of linear relationships** ($y = kx$; $y = mx + b$) **as a constant rate of change** by solving problems involving the relationship between slope and rate of change, by describing the meaning of slope in concrete situations, or informally determining the slope of a line from a table or graph; **and distinguishes between constant and varying rates** of change in concrete situations represented in tables or graphs; **or describes how change in the value of one variable relates to change in the value of a second variable** in problem situations with constant rates of change.	M:F&A:8:2 **Demonstrates conceptual understanding of linear relationships** ($y = kx$; $y = mx + b$) **as a constant rate of change** by solving problems involving the relationship between slope and rate of change; informally and formally determining slopes and intercepts represented in graphs, tables, or problem situations; or describing the meaning of slope and intercept in context; **and distinguishes between linear relationships (constant rates of change) and nonlinear relationships (varying rates of change)** represented in tables, graphs, equations, or problem situations; or **describes how change in the value of one variable relates to change in the value of a second variable** in problem situations with constant and varying rates of change.

Functions and Algebra		
Grade 6	**Grade 7**	**Grade 8**
M:F&A:6:3 **Demonstrates conceptual understanding of algebraic expressions** by using letters to represent unknown quantities to write linear algebraic expressions involving any of the four operations and consistent with order of operations expected at this grade level; or by evaluating linear algebraic expressions (including those with more than one variable); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y = 3x - 2$).	M:F&A:7:3 **Demonstrates conceptual understanding of algebraic expressions** by using letters to represent unknown quantities to write algebraic expressions (including those with whole number exponents or more than one variable); or by evaluating algebraic expressions (including those with whole number exponents or more than one variable); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y = 5x^3 - 2$).	M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y = 7\sqrt{x} + 2x$).
M:F&A:6:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions (expressions consistent with the parameters of M:F&A:6–3), solving multi-step linear equations of the form $ax \pm b = c$, where a, b, and c are whole numbers with $a \neq 0$.	M:F&A:7:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving multi-step linear equations of the form $ax \pm b = c$ with $a \neq 0$, $ax \pm b = cx \pm d$ with $a, c \neq 0$, and $(x/a) \pm b = c$ with $a \neq 0$, where a, b, c and d are whole numbers; or by translating a problem-solving situation into an equation consistent with the parameters of the type of equations being solved for this grade level.	M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.

New Hampshire Curriculum Framework Mathematics

Data, Statistics, and Probability		
Purpose: Collecting, organizing, and displaying data, as well as interpreting and analyzing the information to make decisions and predictions, have become very important in our society. Statistical instruction should be carried out in a spirit of investigation and exploration so students can answer and formulate questions about data. Probability should be studied in familiar contexts. Students need to investigate fairness, chances of winning, and uncertainty. Technology should be used as a tool throughout the investigation process.		
Grade K	**Grade 1**	**Grade 2**
M:DSP:K:1 **Interprets a given representation created by the class** (models and tally charts) to answer questions related to the data, or to analyze the data to formulate conclusions using words, diagrams, or verbal/scribed responses to express answers. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:K:2.*)	M:DSP:1:1 **Interprets a given representation created by the class** (models, tally charts, pictographs with one-to-one correspondence, and tables) to answer questions related to the data, or to analyze the data to formulate conclusions using words, diagrams, or verbal/scribed responses to express answers. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:1:2.*)	M:DSP:2:1 **Interprets a given representation** (pictographs with one-to-one correspondence, line plots, tally charts, or tables) to answer questions related to the data, or to analyze the data to formulate conclusions. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:2:2.*)
M:DSP:K:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** more, less, or equal (e.g., Have there been more, less, or the same number of cloudy days compared to sunny days this week?).	M:DSP:1:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** more, less, or equal.	M:DSP:2:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** more, less, or equal.
M:DSP:K:3 No standard at this grade	M:DSP:1:3 No standard at this grade	M:DSP:2:3 No standard at this grade
M:DSP:K:4 No standard at this grade	M:DSP:1:4 No standard at this grade	M:DSP:2:4 **Uses counting techniques to solve problems** involving combinations using a variety of strategies (e.g., student diagrams, organized lists, tables, tree diagrams, or[sc] others); (e.g., How many ways can you make 50 cents using nickels, dimes, and quarters?)

New Hampshire Curriculum Framework Mathematics

Data, Statistics, and Probability		
Grade K	**Grade 1**	**Grade 2**
M:DSP:K:5 No standard at this grade	M:DSP:1:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, groups use experiments** to describes the likelihood or chance of an event (using "more likely," "less likely", or "equally likely").	M:DSP:2:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, uses experiments** to describe the likelihood or chance of an event using "more likely," "less likely," "equally likely," certain or impossible.
M:DSP:K:6 No standard at this grade	M:DSP:1:6 No standard at this grade	M:DSP:2:6 **In response to a teacher or student generated question or hypothesis, groups** decide the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested, and when appropriate makes predictions. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:2:2.*)

New Hampshire Curriculum Framework Mathematics

Data, Statistics, and Probability		
Grade 3	**Grade 4**	**Grade 5**
M:DSP:3:1 **Interprets a given representation** (line plots, tally charts, tables, or bar graphs) to answer questions related to the data, to analyze the data to formulate conclusions, or to make predictions. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:3:2.*)	M:DSP:4:1 **Interprets a given representation** (line plots, tables, bar graphs, pictographs, or circle graphs) to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:4:2.*)	M:DSP:5:1 **Interprets a given representation** (tables, bar graphs, circle graphs, or line graphs) to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:5:2.*)
M:DSP:3:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** most frequent (mode), least frequent, largest, or smallest.	M:DSP:4:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of central tendency (median or mode), or range.	M:DSP:5:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of central tendency (mean, median, or mode) or range to analyze situations, or to solve problems.
M:DSP:3:3 **Organizes and displays data** using tables, tally charts, and bar graphs, to answer questions related to the data, to analyze the data to formulate conclusions, to make predictions, or to solve problems.	M:DSP:4:3 **Organizes and displays data** using tables, line plots, bar graphs, and pictographs to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:4:2.*)	M:DSP:5:3 **Organizes and displays data** using tables, bar graphs, or line graphs to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems.
M:DSP:3:3 **Identifies or describes representations or elements of representations that best display a given set of data or situation**, consistent with the representations required in M:DSP:3:1. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:3:2.*)		M:DSP:5:3 **Identifies or describes representations or elements of representations that best display a given set of data or situation**, consistent with the representations required in M:DSP:5:1. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:5:2.*)

New Hampshire Curriculum Framework Mathematics

Data, Statistics, and Probability		
Grade 3	**Grade 4**	**Grade 5**
M:DSP:3:4 **Uses counting techniques to solve problems** involving combinations and simple permutations using a variety of strategies (e.g., student diagrams, organized lists, tables, tree diagrams, or[sc] others).	M:DSP:4:4 **Uses counting techniques to solve problems** in context involving combinations or simple permutations (e.g., Given a map – Determine the number of paths from point A to point B.) using a variety of strategies (e.g., organized lists, tables, tree diagrams, or[sc] others).	M:DSP:5:4 No standard at this grade
M:DSP:3:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, predicts** the likelihood of an event using "more likely," "less likely," "equally likely," certain, or impossible and tests the prediction through experiments; and determines if a game is fair.	M:DSP:4:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, predicts** the likelihood of an event as a part to whole relationship (e.g., two out of five, zero out of five, five out of five) and tests the prediction through experiments; and determines if a game is fair.	M:DSP:5:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, predicts** the likelihood of an event as a fraction and tests the prediction through experiments; and determines if a game is fair.
M:DSP:3:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the likelihood of the occurrence of an event (using "more likely", "less likely", or "equally likely").	M:DSP:4:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the theoretical probability of an event and expresses the result as part to whole (e.g., two out of five).	M:DSP:5.5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the experimental or theoretical probability of an event and expresses the result as a fraction.
M:DSP:3:6 **In response to a teacher or student generated question or hypothesis, groups** decide the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested, and when appropriate makes predictions. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:3:2.*)	M:DSP:4:6 **In response to a teacher or student generated question or hypothesis, groups** decide the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested, and when appropriate makes predictions; and asks new questions and makes connections to real world situations. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:4:2.*)	M:DSP:5:6 **In response to a teacher or student generated question or hypothesis** decides the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested, and when appropriate makes predictions; and asks new questions and makes connections to real world situations. (IMPORTANT: *Analyzes data consistent with concepts and skills in M;DSP:5:2.*)

New Hampshire Curriculum Framework Mathematics

Data, Statistics, and Probability		
Grade 6	**Grade 7**	**Grade 8**
M:DSP:6:1 **Interprets a given representation** (circle graphs, line graphs, or stem-and-leaf plots) to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:6:2.*)	M;DSP:7:1 **Interprets a given representation** (circle graphs, scatter plots that represent discrete linear relationships, or histograms) to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:7:2.*)	M:DSP:8:1 **Interprets a given representation** (line graphs, scatter plots, histograms, or box-and-whisker plots) to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:8:2.*)
M:DSP:6:2 **Analyzes patterns, trends or distributions in data in a variety of contexts by determining or using** measures of central tendency (mean, median, or mode) or dispersion (range) to analyze situations, or to solve problems.	M:DSP:7:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by solving problems using** measures of central tendency (mean, median, or mode), dispersion (range or variation), or outliers to analyze situations to determine their effect on mean, median, or mode; and evaluates the sample from which the statistics were developed (bias).	M:DSP:8:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, or estimated line of best fit to analyze situations, or to solve problems; and evaluates the sample from which the statistics were developed (bias, random, or non-random).
M:DSP:6:3 **Organizes and displays data** using tables, line graphs, or stem-and-leaf plots to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:6:2.*)	M:DSP:7:3 **Organizes and displays data** using tables, line graphs, scatter plots, and circle graphs to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. M:DSP:7:3 **Identifies or describes representations or elements of representations that best display a given set of data or situation**, consistent with the representations required in M:DSP:7:1. (IMPORTANT: *Analyzes* data *consistent with concepts and skills in M:DSP:6:2.*)	M:DSP:8:3 **Organizes and displays data using** scatter plots to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems; or identifies representations or elements of representations that best display a given set of data or situation, consistent with the representations required in M:DSP:8:1. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:8:2.*)

Data, Statistics, and Probability		
Grade 6	**Grade 7**	**Grade 8**
M:DSP:6:4 **Uses counting techniques to solve problems** in context involving combinations or simple permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or[sc] others).	M:DSP:7:4 **Uses counting techniques to solve problems** in context involving combinations or permutations (e.g., How many different ways can eight students place first, second, and third in a race?) using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or[sc] others).	M:DSP:8:4 **Uses counting techniques to solve problems** in context involving combinations or permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or[sc] others).
M:DSP:6:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, predicts** the theoretical probability of an event and tests the prediction through experiments and simulations; and designs fair games.	M:DSP:7:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, predicts** the theoretical probability of an event and tests the prediction through experiments and simulations; and compares and contrasts theoretical and experimental probabilities.	M:DSP:8:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the experimental or theoretical probability of an event in a problem-solving situation; and **predicts** the theoretical probability of an event and tests the prediction through experiments and simulations; and compares and contrasts theoretical and experimental probabilities.
M:DSP:6:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the experimental or theoretical probability of an event in a problem-solving situation.	M:DSP:7:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the experimental or theoretical probability of an event in a problem-solving situation.	
M:DSP:6:6 **In response to a teacher or student generated question or hypothesis** decides the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested, and when appropriate makes predictions; and asks new questions and makes connections to real world situations. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:6:2.*)	M:DSP:7:6 **In response to a teacher or student generated question or hypothesis** decides the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested while considering the limitations that could affect interpretations; and when appropriate makes predictions; and asks new questions and makes connections to real world situations. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:7:2.*)	M:DSP:8:6 **In response to a teacher or student generated question or hypothesis** decides the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested while considering the limitations that could affect interpretations; and when appropriate makes predictions; and asks new questions and makes connections to real world situations. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:8:2.*)

New Hampshire Curriculum Framework Mathematics

Since it is crucial that process standards (problem-solving, reasoning, proof, communication, connections, and representations) are not seen separate from content standards the process standards have been imbedded throughout the Number and Operations, Geometry and Measurement, Functions and Algebra, and Data, Statistics, and Probability strands (e.g., M:F&A:4:1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables or sequences; and writes a rule in words or[sc] symbols to find the next case.). This mirrors classroom instruction as in most classes, as students are learning content knowledge, instruction is also focusing on improving their abilities in problem solving, reasoning, and communication; furthermore, students are looking for and making appropriate connections, and they are able to understand and use multiple representations of mathematical ideas. Since it is crucial that students are strong in both content and process knowledge, we have included two local process strands. These process strands are in addition to the process standards that are embedded in the content standards and are included to help guide local curriculum, assessment, and instruction. The process standards have been separated by grade-spans (K–2, 3–5, 6–8, and 9–12). Each span should be thought of as building upon the skills and concepts in the previous span.

Problem Solving, Reasoning, and Proof

Purpose: Problem solving should serve as the organizing feature of the mathematics curriculum as well as other areas of study and be applied to everyday activities. Thus, problem solving approaches should be used to investigate and understand new mathematical content, with students working sometimes independently and sometimes in groups. Students should have many experiences in posing and solving problems from their world, from data that are meaningful to them, and from mathematical investigations. Students should build a positive disposition toward problem solving, including the confidence needed to explore unique problems and increasingly complex tasks.

K – 2	3 – 5	6 – 8
M:PRP:2:1 **Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content** and be able to: • Formulate and solve multi-step problems from everyday and mathematical situations. • Solve problems using a variety of strategies (e.g., working backwards, looking for patterns and relationships; guess and check; making tables, charts, or organized lists; solving a simpler version of a problem, drawing a diagram; or creating a model) • Verify and interpret results with respect to the original problem. • Determine if the solution of a problem is reasonable. • Solve problems using manipulatives, graphs, charts, diagrams, and calculators. • Demonstrate that a problem may be solved in more than one way. • Exhibit confidence in their ability to solve problems independently and in groups. • Display increasing perseverance, and persistence in problem solving.	M:PRP:5:1 **Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content** and be able to: • Determine the reasonableness of solutions to real-world problems. • Generalize solutions and apply strategies to new problem situations. • Add to the repertoire of problem-solving strategies (e.g., looking for similar problems) and use those strategies in more sophisticated ways. • Solve problems with multiple solutions, recognize when a problem has no solution, and recognize problems where more information is needed. • Translate results of a computation into solutions that fit the real-world problem (e.g., when a computation shows that one needs 3.2 gallons of paint to paint a room, how much paint do you buy?).	M:PRP:8:1 **Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content** and be able to: Use problem-solving strategies appropriately and effectively for a given situation. • Determine, collect and organize the relevant information needed to solve real-world problems. • Apply integrated problem-solving strategies to solve problems in the physical, natural, and social sciences and in pure mathematics. • Use technology when appropriate to solve problems. • Reflect on solutions and the problem-solving process for a given situation and refine strategies as needed.

New Hampshire Curriculum Framework Mathematics

Problem Solving, Reasoning, and Proof		
K – 2	**3 – 5**	**6 – 8**
M:PRP:2:2 **Students will use mathematical reasoning and proof** and be able to: • Use models, known facts, properties, and relationships to explain their thinking. • Justify solution processes and answers (e.g., "I chose this method to solve the problem because..."). • Draw conclusions using inductive reasoning. • Identify the missing information needed to find a solution to a given story problem. • Use patterns and relationships to analyze mathematical situations (e.g., count by fives).	M:PRP:5:2 **Students will use mathematical reasoning and proof** and be able to: • Draw conclusions and solve problems using elementary deductive reasoning and reasoning by analogy. • Make and defend conjectures and generalizations. • Use models, known facts, properties, and relationships to explain thinking and to justify answers and solution processes. • Recognize the pervasive use and power of reasoning as a part of mathematics.	M:PRP:8:2 **Students will use mathematical reasoning and proof** and be able to: • Draw logical conclusions and make generalizations using deductive and inductive reasoning. • Formulate, test, and justify mathematical conjectures and arguments. • Construct and determine the validity of a mathematical argument or a solution. • Apply mathematical reasoning skills in other disciplines.

New Hampshire Curriculum Framework Mathematics

Communication, Connections, and Representations		
Purpose: Reading, writing, talking, listening, and modeling provide students with the opportunity to develop deeper mathematical understanding and to integrate the language of mathematics into their world. Actively exploring, investigating, describing, and explaining mathematical ideas promote communication which leads to a greater comprehension of mathematical concepts. Representing ideas and connecting the representations to mathematics lies at the heart of understanding mathematics. Representations make mathematical ideas more concrete and available for reflection, and they help students recognize the common mathematical nature of different situations. Students can develop and deepen their understanding of mathematical concepts and relationships as they create, compare, and use various representations. Mathematical topics, ideas, and procedures must be connected to each other and to the students' everyday experiences, both in and out of school. In particular, mathematics must be connected to all other curriculum areas. Mathematical connections will help students become aware of the usefulness of mathematics, serve to bridge the concrete and the abstract, and enable deeper understanding of important ideas.		
K – 2	**3 – 5**	**6 – 8**
M:CCR:2:1 **Students will communicate their understanding of mathematics** and be able to: • Demonstrate mathematical communication through discussion, reading, writing, listening, and responding, individually and in groups. • Discuss relationships between everyday language and mathematical language and symbols (e.g., words that mean something different in mathematics and in everyday life). • Explain conclusions, thought processes, and strategies in problem-solving situations. • Discuss, illustrate, and write about mathematical concepts and relationships. • Draw pictures and use objects to illustrate mathematical concepts.	M:CCR:5:1 **Students will communicate their understanding of mathematics** and be able to: • Discuss mathematical ideas and write convincing arguments. • Understand, explain, analyze, and evaluate mathematical arguments and conclusions presented by others. • Ask clarifying and extending questions related to mathematics they have heard or read about. • Understand and appreciate the economy and power of mathematical symbolism and its role in the development of mathematics. • Demonstrate an understanding of mathematical concepts and relationships through a variety of methods (e.g., writing, graphing, charts, diagrams, number sentences, or symbols). • Use a variety of technologies (e.g., computers, calculators, video, probes) to represent and communicate mathematical ideas.	M:CCR:8:1 **Students will communicate their understanding of mathematics** and be able to: • Articulate ideas clearly and logically in both written and oral form. • Present, share, explain, and justify thinking with others and build upon the ideas of others to solve problems. • Use mathematical symbols and notation. • Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.

New Hampshire Curriculum Framework Mathematics

Communication, Connections, and Representations		
K – 2	**3 – 5**	**6 – 8**
M:CCR:2:2 **Students will create and use representations to communicate mathematical ideas and to solve problems** and be able to: • Create and use age level appropriate representations to organize, record, and communicate mathematical ideas (e.g., students should recognize the relationship among seven counters, seven tally marks, and the symbol 7). • Select, apply, and translate among mathematical representations to solve problems (e.g., representing fractions with circles, with geoboards, and with pattern blocks). • Link different representations. • Use representations to model and interpret physical, social, and mathematical phenomena. • Use conventional and self-generated (invented) representations and connect them. • Realize that any representation is subject to multiple interpretations (e.g., drawings and graphs can be read in a different way).	M:CCR:5:2 **Students will create and use representations to communicate mathematical ideas and to solve problems** and be able to: • Use physical models and diagrams to represent important mathematical ideas (e.g., multiplication). • Use appropriate representations to solve problems or to portray, clarify, or extend a mathematical idea. • Recognize equivalent representations of concepts and procedures and translate among them as appropriate (for example, understand how the addition of whole numbers, fractions, and decimals are related).	M:CCR:8:2 **Students will create and use representations to communicate mathematical ideas and to solve problems** and be able to: • Use models and technology to develop equivalent representations of the same mathematical concept. • Use and create representations to solve problems and organize their thoughts and ideas. • Convert between representations (e.g., a table of values, an equation, and a graph may all be representations of the same function).

New Hampshire Curriculum Framework Mathematics

Communication, Connections, and Representations		
K – 2	**3 – 5**	**6 – 8**
M:CCR:2:3 **Students will recognize, explore, and develop mathematical connections** and be able to: • Link conceptual and procedural knowledge (e.g., they will know that when they "regroup," they are simply changing the representation of the minuend, but not its value). • Recognize and use mathematics in other curriculum areas (e.g., science, social studies). • Recognize and use mathematics in their daily lives (e.g., graphs, tables, or maps). • Identify mathematical situations occurring in literature for children. • Identify examples of geometry in nature, art, and architecture.	M:CCR:5:3 **Students will recognize, explore, and develop mathematical connections** and be able to: • See mathematics as an integrated whole. • Recognize relationships among different topics in mathematics. • Recognize and use mathematics in other curriculum areas and in their daily lives. • Link concepts and procedures. • Use mathematical skills, concepts, and applications in other disciplines (e.g., graphs in social studies, patterns in art, or music and geometry in technology education).	M:CCR:8:3 **Students will recognize, explore, and develop mathematical connections** and be able to: • Connect new mathematical ideas to those already studied and build upon them. • Understand that many real-world applications require an understanding of mathematical concepts (e.g., personal finance, running a business, building a house, following a recipe, or sending a rocket to the moon). • Explain in oral and written form the relationships between a real-world problem and an appropriate mathematical model. • Explain in oral and written form the relationships among various mathematical concepts (e.g., the relationship between exponentiation and multiplication).

Appendix A: M:N&O:2:3

M:N&O:2:3 Demonstrates conceptual understanding of mathematical operations involving addition and subtraction of whole numbers by solving problems involving joining actions, separating actions, part-part whole relationships, and comparison situations. (See Appendix A.)

Classification of word problems: Researchers have identified four basic categories of addition and subtraction problems: problems with joining actions, separating actions, part-part whole relationships, and comparison situations. Table 1 contains some examples to illustrate the distinctions in the categories identified by the researchers, but there may be additional ways to express the same actions, relationships, or situations. For example, the following are additional ways0 to ask questions related to the "Join – Start Unknown" category.

Example 1: "I am thinking of a number that when you add 5 to it, the answer is 13. What number am I thinking of?"

Example 2: John puts a five-pound toy inside an empty wooden box. The box and toy together weigh 7 pounds. How much does the empty box weigh?

In summary, students should have experiences with problem solving in addition and subtraction across a variety of problem types. It is important to remember that any problem situation that fits the equations given and the category can be asked, not just problems as stated in Table 1.

"Teaching students to add and subtract involves providing students with an opportunity to explore a rich set of problems with different semantic structures and to develop a variety of strategies to quantify, represent, calculate, express, and justify results." (Gutstein, E., Romberg, 1995)

Table 1: Classification of Word Problems[1]

Join	(Result Unknown) Connie had 5 marbles. Juan gave her 8 more marbles. How many marbles does Connie have altogether? 5 + 8 = □	(Change unknown) Connie has 5 marbles. How many more marbles does she need to have 13 marbles altogether? 5 + □ = 13	(Start Unknown) Connie has some marbles. Juan gave her 5 more marbles. Now she has 13 marbles. How many marbles did Connie have to start with? □ + 5 = 13
Separate	(Result Unknown) Connie had 13 marbles. She gave 5 marbles to Juan. How many marbles does she have left? 13 – 5 = □	(Change unknown) Connie has 13 marbles. She gave some to Juan. Now she has 5 marbles left. How many marbles did Connie give Juan? 13 – □ = 5	(Start Unknown) Connie has some marbles. She gave 5 to Juan. Now she has 8 marbles left. How many marbles did Connie have to start with? □ – 5 = 8
Part-Part-Whole	(Whole Unknown) Connie has 5 red marbles and 8 blue marbles. How many marbles does Connie have? 5 + 8 = □	(Part Unknown) Connie has 13 marbles. All the marbles are either blue or red. Connie has 5 red marbles. How many blue marbles does Connie have? 13 – 5 = □	
Compare	(Difference Unknown) Connie has 13 marbles. Juan has 5 marbles. How many more marbles does Connie have than Juan? 13 – 5 = □	(Compare Quantity Unknown) Juan has 5 marbles. Connie has 8 more marbles than Juan. How many marbles does Connie have? 5 + 8 = □	(Referent Unknown) Connie has 13 marbles. She has 5 more marbles than Juan. How many marbles does Juan have? 13 – 5 = □

[1] Carpenter, Fennema, Peterson, Chiang, and Loef (1989) cited in Gutstein, E., Romberg, T., *Teaching Children to Add and Subtract*, Journal of Mathematical Behavior, 14, 283-324 (1995).

Appendix B: Measurement Benchmarks

The following is a list of the measurement benchmarks and equivalences that ***can be used*** in problems across the content strands at each grade level to address the expectations in M:G&M:X:7 for the New England Common Assessment Program[2].

M:G&M:X:7 **Uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands.

The type of measure (e.g., length, time, etc.), the unit (e.g., inches, feet, etc.), the degree of accuracy where appropriate (e.g., ½ inch); and equivalences (e.g., 12 inches in a foot) are identified for grades 2 – 8. In addition to measurement benchmarks identified below students will be expected to use the appropriate units when solving problems involving area, volume, surface area, conversions, and rates (e.g., miles per hour, price per pound, pounds per square inch) on the NECAP Assessment.

Measures	Grade 2	Grade 3	Grade 4
Length	**Unit (accuracy):** Inch (to whole inch); Foot (to whole inch); Centimeter (to whole centimeter); Meter (to whole centimeter) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter	**Unit (accuracy):** Inch (to 1/2 inch); Foot (to whole inch); Centimeter (to whole centimeter); Meter (to whole centimeter) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter	**Unit (accuracy):** Inch (to 1/4 inch); Foot; Centimeter (to 0.5 centimeter); Meter (to 0.5 centimeter); Yard; Mile (use in scale questions); Kilometer (use in scale questions) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter; 3 feet in 1 yard; 36 inches in 1 yard
Time	**Unit (accuracy):** Hour (to 15 minute interval) **Equivalencies:** 60 minutes in 1 hour	**Unit (accuracy):** Hour (to 5 minute interval); Day; Year **Equivalencies:** 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year	**Unit (accuracy):** Hour (to 5 minute interval); Day; Year **Equivalencies:** 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year; 60 seconds in 1 minute; 60 minutes in 1 hour
Temperature	**Unit (accuracy):** Degree (to 1 degree)	**Unit (accuracy):** C° and F° (to 1 degree)	**Unit (accuracy):** C° and F° (to 1 degree)
Capacity		**Units (accuracy):** Quart (to whole quart)	**Unit (accuracy):** Quart (to whole quart)
Mass		**Unit (accuracy):** Kilogram (to whole kilogram); Gram (to whole gram)	**Unit (accuracy):** Kilogram (to whole kilogram); Gram (to whole gram)
Weight		**Unit (accuracy):** Pound (to whole pound)	**Unit (accuracy):** Pound (to whole pound)

[2] Contractors will be asked to devise a system to measure the degree to which students use units of measures and make conversions consistently and appropriately when applicable to problems across content strands.

Measures	Grade 5	Grades 6 – 8
Length	**Units (accuracy):** Inch (to 1/8 inch); Foot; Centimeter (to 0.5 centimeter); Meter (to 0.5 centimeter); Yard; Mile (use in scale questions); Kilometer (use in scale questions) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter; 3 feet in 1 yard; 36 inches in 1 yard; 10 millimeters in 1 centimeter	**Units (accuracy):** Inch (to 1/16 inch); Foot; Centimeter (to 1/10 centimeter); Meter (to 1/100 meter); Yard; Mile (use in scale and rate questions); Kilometer (use in scale and rate questions) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter; 3 feet in 1 yard; 36 inches in 1 yard; 10 millimeters in 1 centimeter; 1000 millimeters in 1 meter
Time	**Unit (accuracy):** Hour (to 1 minute); Day; Year **Equivalencies:** 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year; 60 seconds in 1 minute; 60 minutes in 1 hour	**Unit (accuracy):** Hour (to 1 minute); Day; Year **Equivalencies:** 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year; 60 seconds in 1 minute; 60 minutes in 1 hour
Temperature	**Unit (accuracy):** C° and F° (to 1 degree)	**Unit (accuracy):** C° and F° (to 1 degree)
Capacity	**Unit (accuracy):** Quart (to 1 ounce); Gallon; Pint **Equivalencies:** 32 ounces in 1 quart; 4 quarts in 1 gallon; 2 pints in 1 quart	**Unit (accuracy):** Quarts (to 1 ounce); Gallon; Pint; Liter **Equivalencies:** 32 ounces in 1 quart; 4 quarts in 1 gallon; 2 pints in 1 quart; 1000 milliliters in 1 liter
Mass	**Unit (accuracy):** Kilogram; Gram (to whole gram)	**Unit (accuracy):** Kilogram; Gram (to 1/10 gram)
Weight	**Unit (accuracy):** Pound (to 1 ounce) **Equivalencies:** 16 ounces in 1 pound	**Unit (accuracy):** Pound (to 1 ounce) **Equivalencies:** 16 ounces in 1 pound
Angles and Rotation	**Unit (accuracy):** Degree (to 2 degrees)	**Unit (accuracy):** Degree (to 2 degrees) **Equivalencies:** 360° in 1 circle; 90° in 1 right angle

About the Mathematics GSEs

This set of New Hampshire Grade-Span Expectations (GSEs) for high school includes expectations that will be assessed on the state-level assessment and others that will be a local curriculum and assessment option (i.e., guidance for local curriculum and assessment but not assessed on the state assessment). Those GSEs that will be assessed on the state assessment are boxed with bold outlines. Furthermore, these assessment GSEs are common across NH, RI, and VT and will be assessed through the New England Common Assessment Program (NECAP). **The assessment GSEs in this document can be interpreted as describing expectations for the end of grade 10, or the beginning of grade 11.** The local content GSEs were developed in collaboration with the Rhode Island Department of Education. As you review the New Hampshire GSEs in Mathematics the following are important to understand.

1) The grade 8 Grade-Level Expectations (GLEs) are included in this document in order to see how the concepts and skills develop from grade 8 to high school.
2) The GSEs and GLEs are organized into four content strands (Number and Operations; Functions and Algebra; Data, Statistics, and Probability; Geometry and Measurement) and two process strands (Problem-Solving, Reasoning, and Proof; Communications, Representations, and Connections).
3) Since it is crucial that process standards (problem-solving, reasoning, proof, communication, connections, and representations) are not seen as completely separate from content standards, the process standards have been imbedded throughout the content strands (e.g., M:F&A:10:1 **Identifies, extends, and generalizes a variety of patterns** (linear and nonlinear) represented by models, tables, sequences, or graphs in problem solving situations). This mirrors classroom instruction in most classes. As students are learning content knowledge, instruction is focusing on improving their abilities in problem solving, reasoning, and communication. Students should be looking for and making appropriate connections, and should be able to understand and use multiple representations of mathematical ideas. Since it is crucial that students are strong in both content and process knowledge, we have included two local process strands following the content strands. These process strands are in addition to the process standards that are embedded in the content standards and are included to help guide local curriculum, assessment, and instruction. The process standards have been separated by grade-spans (K–2, 3–5, 6–8, and 9–12). The 6–8 and 9–12 spans have been included in this section of the document. Each grade span should be thought of as building upon the skills and concepts in the previous grade span.
4) Each GSE and GLE includes a **bolded** statement called the "stem" which is the same or similar across the grades for a given GSE or GLE. Each stem is meant to communicate the main curricular and instructional focus of the GSE or GLE across the grades.
5) The unbolded text within a GSE or GLE indicates the expectations for that given grade-level or grade-span.
6) The <u>underlined text</u> at grade 8 indicates the concepts and skills that are new to grade 8 from grade 7. (Note: Sometimes nothing is underlined within a GLE. In these situations examine other GLEs across the strand to identify the differences or check the Depth of Knowledge table in the test specifications.)
7) Each GSE is coded for the content strand, grade level, and the GSE "stem" number (e.g., M:F&A:X:3 where X = 10, HS, or AM: The "M" stands for mathematics, the "F&A" stands for the Functions and Algebra strand, the "10" indicates that the standard is a state assessment standard for the end of grade 10 or beginning of grade 11, "HS" indicates a local high school expectation for all students, an "AM" indicates a local expectation for students preparing for advanced mathematics courses (e.g., calculus), and the "3" stands for stem 3 or the 3rd big idea in the Functions and Algebra strand). See the diagram on page 45.
8) Unless otherwise specified the number parameters defined in the Number and Operations strand for a particular grade-level or grade-span apply to all GLEs at that grade-level or all GSEs at that grade-span.
9) All the concepts and skills identified in the assessment GSEs are fair game for assessment purposes. However, while all parts of a GSE may be assessed each year, it is more likely that all parts of a GSE will be assessed over several years.
10) In some places you will see "or^{sc}" ("sc" stands for "student choice"). While, in general, students have choices as to the strategies that they use to solve problems, "or^{sc}" was used to explicitly state to the testing contractor that a particular strategy could not be required. For example, as in GSE M:DSP:10:4: "…using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or^{sc} others)."
11) While the use of dynamic software will not be assessed on the state-level assessment at this time, it is expected that students at the high school level would receive ample opportunity to solve problems using dynamic software at the local level.

Reading the Mathematics GSEs

STEM – Bolded statement communicating main curricular focus and is the same or similar across grades (K-12)

CONTENT AREA: "M" stands for mathematics

STRAND: In this case, "DSP" stands for Data, Statistics, and Probability

GRADE LEVEL: "10" indicates a state assessment standard for the end of grade 10 or beginning of grade 11; "HS" indicates a local high school expectation for all students; "AM" indicates a local expectation for students preparing for an advanced mathematics course (e.g., calculus)

Grade 8	High School	Advanced Mathematics
M(DSP)–8–2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, <u>quartile values</u>, or <u>estimated line of best fit</u> to analyze situations, or to solve problems; and evaluates the sample from which the statistics were developed (bias, <u>random</u>, or <u>non-random</u>).	M(DSP)–HS–2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of dispersion (standard deviation, variance, and percentiles).	M(DSP)–AM–2 **Analyzes and interprets measures of dispersion** (standard deviation, variance, and percentiles) and **central tendency** for the normal distribution; and **interprets** the correlation coefficient and the coefficient of determination in the context of data.
	M(DSP)–10–2 Analyzes patterns, trends, or distributions in data in a variety of contexts by determining, using, or analyzing measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, estimated line of best fit, regression line, or correlation (strong positive, strong negative, or no correlation) to solve problems; and solve problems involving conceptual understanding of the sample from which the statistics were developed.	

<u>UNDERLINING</u> – Indicates concepts and skills that are new to the grade level in the K-8 GLEs

STEM Number: The big ideas in each strand are numbered. In this case, "2" indicates the 2nd big idea in the Data, Statistics, and Probability strand.

BOLD BOX – Indicates the standards to be assessed on the NECAP assessment; all other standards are guidance for local curriculum and assessment

Number and Operations

Purpose: Numbers and operations remain a cornerstone for the study of mathematics in grades K – 12. Students use numbers to quantify sets, identify location, measure, quantify the probability of an event, analyze data, and describe and interpret real-world phenomena. Having students know basic facts and having students compute fluently (i.e., accurately and efficiently) continues to be an important goal in mathematics education. However, knowing basic facts should be incorporated into a rich mathematics curriculum that builds conceptual understanding of these facts.

Through the school years, the amount of time spent on numbers and their operations will decrease and the types of numbers studied will change. As students progress through the elementary grades and into middle school, they will need to develop an in-depth conceptual understanding of fractions, decimals, and percents prior to doing algorithmic computations with these numbers. Conceptual development of integers and meaningful computation with them are also goals for middle grade students. The study of irrational numbers and the real number system will begin in eighth grade and continue through high school. Imaginary and complex numbers are introduced in advanced mathematics. It is important for students to model and represent the different types of numbers they study.

Students cannot appreciate the power of numbers unless they also understand the operations upon those numbers. Students need to recognize which operation(s) to apply to a given problem situation they encounter. They need to know what effect the various operations will have on different types of numbers. They need to know the relationships among the operations and among the operations and their properties. A deep understanding of the operations and their properties will help students make sense of computation algorithms and lead to fluency in computation. A firm understanding of numbers as well as operations and their properties will provide a good foundation for the study of algebra.

Grade 8	High School	Advanced Mathematics
M:N&O:8:1 **Demonstrates conceptual understanding of rational numbers with respect to** absolute values, perfect square and cube roots, and percents as a way of describing change (percent increase and decrease) **using explanations, models, or other representations.**	M:N&O:HS:1 **Demonstrates conceptual understanding of rational numbers** by knowing why a real number is rational if and only if the number's decimal expansion eventually repeats or terminates.	M:N&O:AM:1 **Demonstrates conceptual understanding of the real number system** as an extension of the rational numbers by representing real numbers as infinite decimal expansions (that provide successive rational approximations to the number) and as points on a number line. Determines whether the decimal expansion of a rational number given in fractional form eventually repeats or terminates (without using a calculator).
M:N&O:8:2 **Demonstrates understanding of the relative magnitude of numbers** by ordering or comparing rational numbers, common irrational numbers (e.g., $\sqrt{2}$, π), numbers with whole number or fractional bases and whole number exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality symbols.	M:N&O:HS:2 **Demonstrates understanding of the relative magnitude of real numbers** by solving problems that involve ordering or comparing elements of any subset of the real numbers. M:N&O:10:2 **Demonstrates understanding of the relative magnitude of real numbers** by solving problems involving ordering or comparing rational numbers, common irrational numbers (e.g., $\sqrt{2}$, π), rational bases with integer exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality symbols.	M:N&O:AM:2 No standard at this level
M:N&O:8:3 No standard at this grade	M:N&O:HS:3 No standard at this level	M:N&O:AM:3 No standard at this level

Number and Operations		
Grade 8	**High School**	**Advanced Mathematics**
M:N&O:8:4 **Accurately solves problems involving** proportional reasoning (percent increase or decrease, interest rates, markups, or rates); multiplication or division of integers; and squares, cubes, and taking square or cube roots. (IMPORTANT: *Applies the conventions of order of operations.*)	M:N&O:HS:4 **Accurately solves problems.** • Interprets and computes with rational exponents and their relation to radicals, by hand in simple cases (e.g., $4^{3/2}$), and using a calculator when appropriate. • Interprets and computes in scientific notation with and without a calculator. • Solves compound interest problems using $A = P\left(1+\frac{r}{n}\right)^{nt}$, where n is finite. M:N&O:10:4 **Accurately solves problems involving** rational numbers within mathematics, across content strands, disciplines or contexts (with emphasis on, but not limited to, proportions, percents, ratios, and rates).	M:N&O:AM:4 **Accurately solves problems.** • Solves problems involving scientific notation and assesses the precision of the answer in terms of significant digits. • Solves problems involving complex numbers by adding, multiplying, dividing, and computing conjugates; interprets complex numbers geometrically; and understands complex numbers as an extension of the real numbers (e.g., arising in solutions of polynomial equations). • Manipulates complex numbers using rectangular and polar coordinates. • Finds the nth roots of a complex number using De Moivre's Theorem. • Solves compound interest problems including continuously compounded interest.
M:N&O:8:5 No standard at this grade	M:N&O:HS:5 No standard at this level	M:N&O:AM:5 No standard at this level
M:N&O:8:6 **Uses a variety of mental computation strategies to solve problems** (e.g., using compatible numbers, applying properties of operations, using mental imagery, using patterns) and to **determine the reasonableness of answers**; **mentally calculates** benchmark perfect squares and related square roots (e.g., 1^2, 2^2, … , 12^2, 15^2, 20^2, 25^2, 100^2, 1000^2); determines the part of a number using benchmark percents and related fractions (1%, 10%, 25%, $33\frac{1}{3}\%$, 50%, $66\frac{2}{3}\%$, 75%, and 100%) (e.g., 25% of 16; $33\frac{1}{3}\%$ of 330). (IMPORTANT: *The intent of this GSE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:HS:6 **Uses a variety of mental computation strategies to solve problems** (e.g., using compatible numbers, applying properties of operations, using mental imagery, using patterns) and to **determine the reasonableness of answers.** (IMPORTANT: *The intent of this GSE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:AM:6 No standard at this level

Number and Operations		
Grade 8	**High School**	**Advanced Mathematics**
M:N&O:8:7 **Makes estimates** in a given situation (including tips, discounts, tax, and the value of a non-perfect square root as between two whole numbers) by identifying when estimation is appropriate, selecting the appropriate method of estimation; determining the level of accuracy needed given the situation; analyzing the effect of the estimation method on the accuracy of results; and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (IMPORTANT: *The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.)*	M:N&O:HS:7 **Makes estimates** in a given situation (e.g., tips, discounts, tax, the value of a non-perfect square root or cube root) by identifying when estimation is appropriate, selecting the appropriate method of estimation; determining the level of accuracy needed given the situation; analyzing the effect of the estimation method on the accuracy of results; evaluating the reasonableness of solutions appropriate to GSEs across content strands. (IMPORTANT: *The intent of this GSE is to embed estimation throughout the instructional program, not to teach it as a separate unit.*)	M:N&O:AM:7 No standard at this level
M:N&O:8:8 **Applies properties of numbers** (odd, even, remainders, divisibility, and prime factorization) and **field properties** (commutative, associative, identity [including the multiplicative property of one, e.g., $2^0 \times 2^3 = 2^{0+3} = 2^3$, so $2^0 = 1$], distributive, inverses) **to solve problems and to simplify computations**, and **demonstrates conceptual understanding of field properties** as they apply to subsets of real numbers when addition and multiplication are not defined in the traditional ways (e.g., If $a\Delta b = a + b - 1$, is Δ a commutative operation?)	M:N&O:HS:8 **Applies properties of numbers** and **field properties** (including determining whether a given subset of numbers is closed under a given arithmetic operation) **to solve problems or to simplify computations**; and **compares and contrasts the properties of numbers and number systems**; adds and multiplies numerical matrices with attention to the arithmetic properties of these operations.	M:N&O:AM:8 **Explores field properties** with vectors and matrices; **algebraically/geometrically interpret** vectors, vector addition, and scalar multiplication in the plane; and **solves problems** using matrices (e.g., inverses, identity, determinants, and augmented matrices).

Geometry and Measurement		
Purpose: Geometry and the related area of measurement help students represent, describe, and make sense of the world in which they live. Geometry is also a natural place for students to develop their reasoning and justification skills. We live in a three-dimensional world. To interpret, understand, and appreciate that world, students need to develop an understanding of space. In addition, success in mathematics depends, in part, on the development of spatial abilities. Spatial skills include making and interpreting drawings, forming mental images, and visualizing changes. Measurement is the process of assigning a numerical value to an attribute of an object. The study of measurement provides students with techniques and tools they will need to describe and analyze their world. It also provides an opportunity to make connections within mathematics and between mathematics and other curricular areas. High school students must develop more mature insights into the essential role of measurement as a link between the abstractness of mathematics and the concreteness of the real-world. In both areas, geometry and measurement, students need to investigate, experiment, and explore geometric properties using both technology and hands-on materials.		
Grade 8	**High School**	**Advanced Mathematics**
M:G&M:8:1 **Uses properties of angle** relationships resulting from two or three intersecting lines (adjacent angles, vertical angles, straight angles, or angle relationships formed by two non-parallel lines cut by a transversal), or two parallel lines cut by a transversal to solve problems.	M:G&M:HS:1 No standard at this level	M:G&M:AM:1 No standard at this level
M:G&M:8:2 **Applies the Pythagorean Theorem** to find a missing side of a right triangle, or in problem solving situations.	M:G&M:HS:2 **Creates formal proofs** of propositions (e.g., angles, lines, circles, distance, midpoint and polygons including triangle congruence and similarity). (IMPORTANT: *It is the intent that students are creating formal proofs as articulated in the process standards, independent of the topic being studied. Furthermore, students should not be limited to any particular method of proof, but rather use a variety of strategies and those that work best for them. Some topics may be treated more formally than others.*) M:G&M:10:2 **Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems** involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).	M:G&M:AM:2 **Extends and deepens knowledge and usage of proofs and proof techniques**; and uses geometric models to represent and distinguish between Euclidean and Non-Euclidean Systems.
M:G&M:8:3 No standard at this grade	M:G&M:HS.3 No standard at this level	M:G&M:AM:3 No standard at this level

Geometry and Measurement		
Grade 8	**High School**	**Advanced Mathematics**
M:G&M:8:4 No standard at this grade	M:G&M:HS:4 **Applies the concepts of congruency** by using matrices to represent reflections, translations, and rotations. M:G&M:10:4 **Applies the concepts of congruency by solving problems** on or off a coordinate plane involving reflections, translations, or rotations; or solves problems using congruency involving problems within mathematics or across disciplines or contexts.	M:G&M:AM:4 No standard at this level
M:G&M:8:5 **Applies concepts of similarity** to determine the impact of scaling on the volume or surface area of three-dimensional figures when linear dimensions are multiplied by a constant factor; to determine the length of sides of similar triangles, or to solve problems involving growth and rate.	M:G&M:HS:5 **Applies concepts of similarity** to define the trigonometric functions as ratios of sides of right triangles; **uses the ratios of the sides of special right triangles** (30° - 60° - 90° and 45° - 45° - 90°) to determine the sine, cosine and tangent of 30°, 45°, and 60°; and solves related problems. M:G&M:10:5 **Applies concepts of similarity by solving problems** within mathematics or across disciplines or contexts.	M:G&M:AM:5 No standard at this level
M:G&M:8:6 **Demonstrates conceptual understanding of surface area or volume by solving problems involving surface area and volume** of rectangular prisms, triangular prisms, cylinders, pyramids, or cones. Expresses all measures using appropriate units.	M:G&M:HS:6 **Applies trigonometric formulas** (e.g., Law of Sines, Law of Cosines, $A = \frac{1}{2}ab\sin C$) to find angles, lengths and areas of polygons. M:G&M:10:6 **Solves problems involving perimeter, circumference, or area** of two-dimensional figures (including composite figures) or **surface area or volume** of three-dimensional figures (including composite figures) within mathematics or across disciplines or contexts.	M:G&M:AM:6 **Derives and uses formulas for lengths of arcs and areas of sectors and areas of segments of circles.**

Geometry and Measurement		
Grade 8	**High School**	**Advanced Mathematics**
M:G&M:8:7 No standard at this grade	M:G&M:HS:7 **Applies informal concepts of successive approximation, upper and lower bounds, and limits in measurement situations** (e.g., use successive approximation to find the area of a pond); and **uses measurement conversion strategies** (e.g., unit/dimensional analysis). M:G&M:10:7 **Uses units of measure appropriately and consistently when solving problems across content strands; makes conversions within or across systems and makes decisions concerning an appropriate degree of accuracy in problem situations** involving measurement in other GSEs.	M:G&M:AM:7 **Uses radian measure appropriately** when solving problems; **converts** between radian measure and degree measure; and understands why radian measure is useful.
M:G&M:8:8 No standard at this grade	M:G&M:HS:8 No standard at this level	M:G&M:AM:8 No standard at this level
M:G&M:8:9 No standard at this grade	M:G&M:10:9 **Solves problems on and off the coordinate plane** involving distance, midpoint, perpendicular and parallel lines, or slope.	M:G&M:AM:9 **Solves problems using analytic geometry** (including three-dimensions) **and circular trigonometry** (e.g., find the equation of a circle inscribed in a triangle; find the distance between opposite vertices in a rectangular solid); **explores and interprets the characteristics of conic sections graphically and algebraically** including understanding how different planar slices of a double cone yield different conic sections; knows the characterization of conic sections as loci of points in the plane satisfying certain distance requirements, and uses the distance formula to obtain equations for the conic sections.
M:G&M:8:10 No standard at this grade	M:G&M:HS:10 **Demonstrates conceptual understanding of spatial reasoning and visualization** by sketching or using dynamic geometric software to generate three-dimensional objects from two-dimensional perspectives, or to generate two-dimensional perspectives from three-dimensional objects, and by solving related problems; perform and justify constructions with a compass and straightedge or dynamic geometric software.	M:G&M:AM:10 No standard at this level

Functions and Algebra		
Purpose: Algebra is the language through which much of mathematics is communicated. Students in Kindergarten begin to explore algebraic concepts using informal representations (e.g., words, physical models, tables, graphs). In later years students progress to more abstract representations. The study of patterns is one of the central themes of algebraic thinking and leads to an understanding of relations and functions. Students at all grade-levels should recognize, describe, and generalize patterns and build mathematical models to describe, interpret, and predict the behavior of real-world phenomenon. Algebraic processes are important tools that students can use throughout their lives.		
Grade 8	**High School**	**Advanced Mathematics**
M:F&A:8:1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; **and generalizes** a linear relationship (non-recursive explicit equation); generalizes a linear relationship to find a specific case; **generalizes** a nonlinear relationship using words or[sc] symbols; or **generalizes** a common nonlinear relationship to find a specific case.	M:F&A:HS:1 **Identifies arithmetic and geometric sequences** and finds the nth term; then **uses the generalization** to find a specific term. M:F&A:10:1 **Identifies, extends, and generalizes a variety of patterns** (linear and nonlinear) represented by models, tables, sequences, or graphs in problem solving situations.	M:F&A:AM:1 Computes partial sums of infinite arithmetic and geometric sequences, determines when an infinite geometric series converges, and finds its sum. Connects arithmetic and geometric sequences to linear and exponential functions, respectively. Works between recursive and explicit representations.

Functions and Algebra		
Grade 8	**High School**	**Advanced Mathematics**
M:F&A:8:2 **Demonstrates conceptual understanding of linear relationships** ($y = kx$; $y = mx + b$) **as a constant rate of change** by solving problems involving the relationship between slope and rate of change; informally and formally determining slopes and intercepts represented in graphs, tables, or problem situations; or describing the meaning of slope and intercept in context; **and distinguishes between linear relationships (constant rates of change) and nonlinear relationships (varying rates of change)** represented in tables, graphs, equations, or problem situations; or **describes how change in the value of one variable relates to change in the value of a second variable** in problem situations with constant and varying rates of change.	M:F&A:HS:2 **Demonstrates conceptual understanding of linear and nonlinear functions and relations.** • Analyzes characteristics of classes of functions (polynomial, rational, and exponential) to include domain, range, intercepts, increasing and decreasing intervals and rates of change. • Understands one-to-one (injective) functions and that a function that is one-to-one has a converse that is also a function; and finds inverses algebraically and graphically. • Graphs polynomial, rational and exponential functions, including vertical and horizontal shifts, stretches, and compressions as well as reflections across vertical and horizontal axes. • Applies knowledge of functions to interpret and understand situations, design mathematical models, and solve problems in mathematics as well as in the natural and social sciences. M:F&A:10:2 **Demonstrates conceptual understanding of linear and nonlinear functions and relations** (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).	M:F&A:AM:2 **Demonstrates conceptual understanding of linear and nonlinear functions and relations.** • Understands functions and relations from a set-theoretic perspective, and operations on functions including composition. • Analyzes characteristics of classes of functions and inverse functions (exponential, logarithmic, trigonometric) to include domain, range, intercepts, increasing and decreasing intervals and rates of change, periodicity, end behavior, maximum and minimum values, continuity, and asymptotes; graphs classes of functions; and understands domain restrictions and their effects on functions. • Analyzes properties of functions including onto (surjectivity), critical points and inflection points. Determine graphically and analytically whether a function is even, odd or neither. • Analyzes informally the idea of continuity and limits.

Functions and Algebra		
Grade 8	**High School**	**Advanced Mathematics**
M:F&A:8:3 **Demonstrates conceptual understanding of algebraic expressions** by evaluating and simplifying algebraic expressions (including those with square roots, whole number exponents, or rational numbers); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y = 7\sqrt{x} + 2x$).	M:F&A:HS:3 **Demonstrates conceptual understanding of algebraic expressions.** • Manipulates, evaluates, and simplifies algebraic and numerical expressions. • Adds, subtracts, multiplies and divides polynomials and rational expressions. • Factors quadratic and higher degree polynomials. • Understands properties of logarithms and converts between logarithmic and exponential forms. • Manipulates, evaluates, and simplifies expressions involving rational exponents and radicals and converts between expressions with rational exponents and expressions with radicals. • Understands the effect of simplifying rational expressions on the domain of the related functions (e.g., $x^2/x = x$ for $x \neq 0$).	M:F&A:AM:3 **Demonstrates conceptual understanding of algebraic expressions.** • Simplifies complex fractions. • Uses the Remainder Theorem, the Factor Theorem and Rational Root Theorem for polynomials. • Knows the Fundamental Theorem of Algebra and that non-constant polynomials always factor into linear factors over the complex numbers. • Understands the difference between factoring polynomials over integer, rational, real, and complex numbers.
	M:F&A:10:3 **Demonstrates conceptual understanding of algebraic expressions** by solving problems involving algebraic expressions, by simplifying expressions (e.g., simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions.	

Functions and Algebra		
Grade 8	**High School**	**Advanced Mathematics**
M:F&A:8:4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving formulas for a variable requiring one transformation (e.g., $d = rt$; $d/r = t$); by solving multi-step linear equations with integer coefficients; by showing that two expressions are or are not equivalent by applying commutative, associative, or distributive properties, order of operations, or substitution; and by informally solving problems involving systems of linear equations in a context.	M:F&A:HS:4 **Demonstrates conceptual understanding of equality.** • Factors, completes the square, uses the quadratic formula, and graphs quadratic functions to solve quadratic equations. • Solves equations involving polynomial, rational, and radical expressions. Graphs and interprets the solutions. • Understands extraneous solutions. • Finds approximate solutions to equations by graphing each side as a function using technology. Understands that any equation in x can be interpreted as the equation $f(x) = g(x)$ and interpret the solutions of the equation as the x-value(s) of the intersection point(s) of the graphs of $y = f(x)$ and $y = g(x)$. • Solves 2×2 and 3×3 systems of linear equations and graphically interprets the solutions. • Solves systems of linear and quadratic inequalities. • Solves systems of equations involving nonlinear expressions and graphically interprets the solutions. • Translates problem situations into inequalities; and solves linear and non-linear inequalities (symbolically and graphically). M:F&A:10:4 **Demonstrates conceptual understanding of equality** by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.	M:F&A:AM:4 **Demonstrates conceptual understanding of equality.** • Solves equations and verifies/proves identities involving trigonometric expressions. • Solves equations involving exponential and logarithmic expressions; graphs and interprets the solutions. • Uses matrices or determinants to solve systems of equations with or without technology. • Knows and applies the Intermediate Value Theorem to find exact or approximate solutions of equations or zeros of continuous functions.

Data, Statistics, and Probability		
Purpose: Collecting, organizing, and displaying data, as well as interpreting and analyzing the information to make decisions and predictions, have become very important in our society. Statistical instruction should be carried out in a spirit of investigation and exploration so students can answer and formulate questions about data. Probability should be studied in familiar contexts. Students need to investigate fairness, chances of winning, and uncertainty. Technology should be used as a tool throughout the investigation process.		
Grade 8	**High School**	**Advanced Mathematics**
M:DSP:8:1 **Interprets a given representation** (line graphs, scatter plots, histograms, or box-and-whisker plots) to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:8:2.*)	M:DSP:HS:1 **Interprets a given representation(s)** (e.g., regression function including linear, quadratic, and exponential) to analyze the data to make inferences and to formulate, justify, and critique conclusions. (IMPORTANT: *Analyze data consistent with concepts and skills in M:DSP:HS:2*). M:DSP:10:1 **Interprets a given representation(s)** (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts) to make observations, to answer questions, to analyze the data to formulate or justify conclusions, critique conclusions, make predictions, or to solve problems within mathematics or across disciplines or contexts (e.g., media, workplace, social and environmental situations). (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:10:2.*)	M:DSP:AM:1 No standard at this level

Data, Statistics, and Probability		
Grade 8	**High School**	**Advanced Mathematics**
M:DSP:8:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, or estimated line of best fit to analyze situations, or to solve problems; and evaluates the sample from which the statistics were developed (bias, random, or non-random).	M:DSP:HS:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of dispersion (standard deviation, variance, and percentiles). M:DSP:10:2 **Analyzes patterns, trends, or distributions in data in a variety of contexts** by determining, using, or analyzing measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, estimated line of best fit, regression line, or correlation (strong positive, strong negative, or no correlation) to solve problems; and solve problems involving conceptual understanding of the sample from which the statistics were developed.	M:DSP:AM:2 **Analyzes and interprets measures of dispersion** (standard deviation, variance, and percentiles) and **central tendency** for the normal distribution; and **interprets** the correlation coefficient and the coefficient of determination in the context of data.
M:DSP:8:3 **Organizes and displays data using** scatter plots to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems; or identifies representations or elements of representations that best display a given set of data or situation, consistent with the representations required in M:DSP:8:1. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:8:2.*)	M:DSP:HS:3 **Organizes and displays one- and two-variable data using a variety of representations** (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts, linear, quadratic, and exponential regression functions) to analyze the data to formulate or justify conclusions, make predictions, or to solve problems with or without using technology. M:DSP:10:3 **Identifies or describes representations or elements of representations that best display a given set of data or situation**, consistent with the representations required in M:DSP:10:1.	M:DSP:AM:3 **Uses technology to explore** the method of least squares and median-median for linear regression.

Data, Statistics, and Probability		
Grade 8	**High School**	**Advanced Mathematics**
M:DSP:8:4 **Uses counting techniques to solve problems** in context involving combinations or permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or[sc] others).	M:DSP:HS:4 **Uses counting techniques to solve problems** in context involving combination or permutations using a variety of strategies (e.g., nCr, nPr, or n!); and finds unions, intersections, and complements of sets. M:DSP:10:4 **Uses counting techniques to solve problems** in context involving combinations or permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or[sc] others).	M:DSP:AM:4 No standard at this level
M:DSP:8:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the experimental or theoretical probability of an event in a problem-solving situation; and **predicts** the theoretical probability of an event and tests the prediction through experiments and simulations; compares and contrasts theoretical and experimental probabilities; finds the odds of an event and understands the relationship between probability and odds.	M:DSP:HS:5 **For a probability event in which the sample space may or may not contain equally likely outcomes, predicts** the theoretical probability of an event and tests the prediction through experiments and simulations; compares and contrasts theoretical and experimental probabilities; finds the odds of an event and understands the relationship between probability and odds. M:DSP:10:5 **Solves problems involving experimental or theoretical probability.**	M:DSP:AM:5 **Solves probability problems** (e.g., by applying concepts of counting, random variables, independence/dependence of events, and conditional probability).

Data, Statistics, and Probability		
Grade 8	**High School**	**Advanced Mathematics**
M:DSP:8:6 **In response to a teacher or student generated question or hypothesis** decides the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested while considering the limitations that could affect interpretations; and when appropriate makes predictions; and asks new questions and makes connections to real-world situations. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:8:2.*)	M:DSP:HS:6 **In response to a teacher or student generated question or hypothesis** decides the most effective method (e.g., survey, observation, research, experimentation) and sampling techniques (e.g., random sample, stratified random sample) to collect the data necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the questions or hypotheses being tested while considering the limitations of the data that could effect interpretations; and when appropriate makes predications, asks new questions, or makes connections to real-world situations. (IMPORTANT: *Analyzes data consistent with concepts and skills in M:DSP:10:2.*)	M:DSP:AM:6 No standard at this level

New Hampshire Curriculum Framework Mathematics

Since it is crucial that process standards (problem-solving, reasoning, proof, communication, connections, and representations) are not seen as completely separate from content standards, the process standards have been imbedded throughout the content strands (e.g., M:F&A:10:1 **Identifies, extends, and generalizes a variety of patterns** (linear and nonlinear) represented by models, tables, sequences, or graphs in problem solving situations). This mirrors classroom instruction in most classes. As students are learning content knowledge, instruction is focusing on improving their abilities in problem solving, reasoning, and communication. Students should be looking for and making appropriate connections, and should be able to understand and use multiple representations of mathematical ideas. Since it is crucial that students are strong in both content and process knowledge, we have included two local process strands following the content strands. These process strands are in addition to the process standards that are embedded in the content standards and are included to help guide local curriculum, assessment, and instruction. The process standards have been separated by grade-spans (K–2, 3–5, 6–8, and 9–12). The 6–8 and 9–12 spans have been included in this section. Each grade span should be thought of as building upon the skills and concepts in the previous grade span.

Problem Solving, Reasoning, and Proof

Purpose: Problem solving should serve as the organizing feature of the mathematics curriculum (as well as other areas of study) and be applied to everyday activities. Thus, problem solving approaches should be used to investigate and understand new mathematical content, with students working sometimes independently and sometimes in groups. Students should have many experiences in posing and solving problems from their world using data that are meaningful to them and performing mathematical investigations. Students should build a positive disposition toward problem solving, including the confidence needed to explore unique problems and increasingly complex tasks.

6 – 8	High School
M:PRP:8:1 **Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content** and be able to: • Use problem-solving strategies appropriately and effectively for a given situation. • Determine, collect and organize the relevant information needed to solve real-world problems. • Apply integrated problem-solving strategies to solve problems in the physical, natural and social sciences, and in pure mathematics. • Use technology when appropriate to solve problems. • Reflect on solutions and the problem-solving process for a given situation and refine strategies as needed.	M:PRP:HS:1 **Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content** and be able to: • Expand the repertoire of problem-solving strategies and use those strategies in more sophisticated ways. • Use technology whenever appropriate to solve real-world problems (e.g., personal finance, wages, banking and credit, home improvement problems, measurement, taxes, business situations, purchasing, and transportation). • Formulate and redefine problem situations as needed to arrive at appropriate conclusions.
M:PRP:8:2 **Students will use mathematical reasoning and proof** and be able to: • Draw logical conclusions and make generalizations using deductive and inductive reasoning. • Formulate, test, and justify mathematical conjectures and arguments. • Construct and determine the validity of a mathematical argument or a solution. • Apply mathematical reasoning skills in other disciplines.	M:PRP:HS:2 **Students will use mathematical reasoning and proof** and be able to: • Expand the repertoire of proof techniques and use those techniques in more sophisticated ways. • Use informal and formal reasoning and proof to explain and justify conclusions. • Formalize mathematical arguments through the use of deductive reasoning. • Use the principle of mathematical induction. • Use reasoning and proof throughout classroom discussions independent of the mathematical topic being studied. • Recognize how reasoning and proof influence the structure of mathematics.

Communication, Connections, and Representations	
Purpose: Reading, writing, talking, listening, and modeling provide students with the opportunity to develop deeper mathematical understanding and to integrate the language of mathematics into their world. Actively exploring, investigating, describing, and explaining mathematical ideas promote communication which leads to a greater comprehension of mathematical concepts. Representing ideas and connecting the representations to mathematics lies at the heart of understanding mathematics. Representations make mathematical ideas more concrete and available for reflection, and they help students recognize the common mathematical nature of different situations. Students can develop and deepen their understanding of mathematical concepts and relationships as they create, compare, and use various representations. Mathematical topics, ideas, and procedures must be connected to each other and to the students' everyday experiences, both in and out of school. In particular, mathematics must be connected to all other curriculum areas. Mathematical connections will help students become aware of the usefulness of mathematics, serve to bridge the concrete and the abstract, and enable deeper understanding of important ideas.	
6 – 8	**High School**
M:CCR:8:1 **Students will communicate their understanding of mathematics** and be able to: • Articulate ideas clearly and logically in both written and oral form. • Present, share, explain, and justify thinking with others and build upon the ideas of others to solve problems. • Use mathematical symbols and notation. • Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.	M:CCR:HS:1 **Students will communicate their understanding of mathematics** and be able to: • Explain and justify their thinking and develop increasingly sophisticated questions for given problem-situations. • Critique and follow the logic of arguments presented within mathematics and across disciplines.
M:CCR:8:2 **Students will create and use representations to communicate mathematical ideas and to solve problems** and be able to: • Use models and technology to develop equivalent representations of the same mathematical concept. • Use and create representations to solve problems and organize their thoughts and ideas. • Convert between representations (e.g., a table of values, an equation, and a graph may all be representations of the same function).	M:CCR:HS:2 **Students will create and use representations to communicate mathematical ideas and to solve problems** and be able to: • Choose appropriate representations and mathematical language (e.g., spreadsheets, geometric models, algebraic symbols, tables, graphs, matrices) to present ideas clearly and logically for a given situation. • See a common structure in mathematical phenomena that come from very different contexts (e.g., the sum of the first n odd natural numbers, the areas of square gardens, and the distance traveled by a vehicle that starts at rest and accelerates at a constant rate can be represented by functions of the form $f(x) = ax^2$). • Find representations that model essential features of a mathematical situation (e.g., cost of postage can be modeled by a step-function). • Use representations as a primary means for expressing and understanding more abstract mathematical concepts.

Communication, Connections, and Representations	
6 – 8	**High School**
M:CCR:8:3 **Students will recognize, explore, and develop mathematical connections** and be able to: • Connect new mathematical ideas to those already studied and build upon them. • Understand that many real-world applications require an understanding of mathematical concepts (e.g., personal finance, running a business, building a house, following a recipe, or sending a rocket to the moon). • Explain in oral and written form the relationships between a real-world problem and an appropriate mathematical model. • Explain in oral and written form the relationships among various mathematical concepts (e.g., the relationship between exponentiation and multiplication).	M:CCR:HS:3 **Students will recognize, explore, and develop mathematical connections** and be able to: • Explain in oral or written form how mathematics connects to other disciplines, to daily life, careers, and society (e.g., geometry in art and literature, data analysis in social studies, and exponential growth in finance). • Explain multiple approaches that lead to equivalent results when solving problems.

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New Hampshire Curriculum Framework

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The *1995 K-12 Mathematics Curriculum Framework* was revised in 2000. The publishing of the document was put on hold as the *No Child Left Behind Act* was being prepared for release. *No Child Left Behind* requires states to develop grade-level expectations in mathematics and the revised version of the *1995 K-12 Mathematics Curriculum Framework* was organized by grades spans. This revised document was the foundation for the development of the GLEs and GSEs. The following people contributed to the developed of the revised version of the *1995 K-12 Mathematics Curriculum Framework* in 2000. Affiliations listed are those that the individuals held at the time of serving on the committees.

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New Hampshire Curriculum Framework

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Cover Photo
The cover photo was contributed by Joanie Flurey and is a picture of her Middle School at Parkside seventh grade class in Manchester, NH.

Exhibit A

SCOPE OF SERVICES

Measured Progress, Inc. will provide the following services to the New Hampshire Department of Education from the date of Governor and Council approval until June 30, 2011:

Scope of Work

1. Program Management

   a. The contractor will ensure that the timing of assessments and the release of the results will fulfill the goals of the New England Common Assessment Program. New Hampshire, Maine, Rhode Island, and Vermont intend for the assessments to be administered during a three-week block of time during October of each year such that the results, during operational years, can be returned to schools by January of the same school year.

   b. The contractor, after finalizing the annual project plan and schedule presented in their proposal with New Hampshire, Maine, Rhode Island, and Vermont will adhere to these schedules and provide weekly updates documenting the prior weeks' activities and describing the activities planned for the upcoming weeks.

   c. The contractor will support six one-day and four two-day project management team meetings on-site each year.

   d. The contractor will support regular (minimum of semi-monthly) conference calls with the states' project management team each year.

2. Technical and Policy Issues

   a. The contractor will attend the semi-annual two-day meetings of the states' joint Technical Advisory Committee. The contractor will be represented at the meeting by the program director, program lead psychometrician, and one additional staff member (based on the planned meeting agenda). The contractor may bring additional staff to the meeting with the approval of the states.

   b. The contractor will attend a meeting with individual state education leadership (e.g., commissioner, state board of education) one time per state per year. The contractor will be represented by the program director and senior management.

3. Item Development

   a. The contractor will follow the general item development process described on pp. B-16 to B-47 of the proposal.

   b. The contractor will develop all items according to the reading, writing, and mathematics test specification documents and carefully code all items to the reading, writing, and mathematics Grade-Level and Grade-Span Expectations.

c. The contractor will follow the test designs for reading for grades 3 through 8 & 11, writing for grades 5, 8, and 11, and mathematics for grades 3 through 8 & 11 that are included with the contract document as Attachment B.

d. The contractor will use nine (9) matrix-sampled test forms for grades 3 through 8 in reading and six (6) matrix-sampled test forms for grades 3 through 8 in mathematics in each operational year of the assessment. Forms 1, 2, and 3 of mathematics will be repeated as forms 7, 8, and 9 so that both content areas will have the same number of test forms. However, beginning with the October 2009 test administration, the field test positions in forms 7, 8, and 9 will be populated with unique field test items each year of the contract ending with the October 2013 test administration.

e. Grades 5 & 8 writing will have 8 field test forms administered in October 2009. That field test will yield 5 operational common test forms that will be pre-equated. Beginning with the October 2010 test administration, one of these test forms will be used each year of the contract through the October 2013 test administration.

f. The contractor will use eight (8) matrix-sampled test forms for grade 11 in reading, writing, and mathematics in each operational year of the assessment beginning in October 2009 and ending in October 2013.

g. The assessment will contain the following item types: multiple-choice and constructed-response items for reading, multiple-choice, short-answer (1pt), short answer (2pt), and constructed-response items for mathematics, and multiple-choice, constructed-response, and extended-response items for writing.

h. The contractor will work with New Hampshire, Maine, Rhode Island, and Vermont to establish and utilize item review committees. The contractor will support one two-day meeting in the spring of each year at a suitable location in one of the three states. The meeting location will be determined annually by the NECAP management group. The contractor will be responsible for all facility costs associated with the operation of the meeting. The contractor will also be responsible for all committee member reimbursement costs. The contractor will follow approved procedures for the replacement of items and passages found objectionable by the state.

i. The contractor will work with New Hampshire, Maine, Rhode Island, and Vermont to establish and utilize bias and sensitivity review committees. The contractor will support two two-day meetings each year at a suitable location in one of the three states. A fall meeting will be conducted to review potential reading passages. A spring meeting will be conducted to review potential field test items, passages, and graphics. The meeting locations will rotate annually among the states. The contractor will responsible for all facility costs associated with the operation of the meetings. The contractor will also be responsible for all committee member reimbursement costs. The contractor will follow approved procedures for the replacement of items and passages found objectionable by the state.

j. The contractor will provide New Hampshire, Maine, Rhode Island, and Vermont Department of Education staff an on-line view only access to the IABS (item bank system) for the purpose of accessing

NECAP items and statistics beginning with the 2009-2010 item development cycle. Prior to the 2009-2010 item development cycle the contractor will provide hard copy printouts of items and statistics in response to requests from each state.

4. Test Construction

   a. New Hampshire, Maine, Rhode Island, and Vermont will have the final approval of all of the items selected for the New England Common Assessment Program.

   b. The contractor will conduct analyses necessary to demonstrate alignment of the test forms with the grade-level and grade-span expectations and test specifications.

   c. The contractor will conduct analyses and produce documentation describing and summarizing the results of the test construction process for each NECAP test.

   d. The contractor will continue following the current design as approved by New Hampshire, Maine, Rhode Island, and Vermont for the production of the student test booklets and student answer documents.

   e. The contractor, in collaboration with New Hampshire, Maine, Rhode Island, and Vermont, will develop methods to accommodate students with disabilities (not including those participating in the alternate assessment) to participate in the regular assessment. The accommodations will include, but are not limited to, Braille versions, large-print versions, and additional testing time.

   f. The contractor will provide math reference sheets and rulers for students in grades 3 through 8 and 11. The contractor will also provide mathematics tool kits (punch outs) for students in grades 3, 4, and 5 and protractors for students in grades 5, 6, 7, 8, & 11.

5. Test Administration

   a. New Hampshire will provide the contractor with statewide enrollment counts, as well as a database of participating districts and schools by August 1 of each contract year. The contractor will provide a web-based enrollment system and toll free customer support to assist schools in updating school information prior to test administration.

   b. Based on enrollment data provided by New Hampshire and collected via the web-based enrollment system, the contractor will be responsible for determining which schools will need accommodated materials and types and quantities of materials needed.

   c. New Hampshire will provide the contractor with a student label file by August 15 each year. The contractor will print and ship the student labels with the assessment material shipments to schools. The contractor will also allow schools to order additional student labels via a web-based system up until the first week of the testing window. The contractor will then print and ship the additional labels to schools in time for the schools to apply them onto the student answer booklets prior to returning the assessment materials to the contractor.

   d. The contractor, in collaboration with New Hampshire, Maine, Rhode Island, and Vermont, will produce an online survey that will be available to schools during the test administration window in October 2009

to assist in determining if schools have the required infrastructure and resources available to allow students to respond to the extended writing prompts via computer. In October 2010, the contractor will conduct a small-scale pilot allowing students to respond to the extended writing prompts via computer with 6 grade/school combinations in each state. The schools will be chosen from a list of schools who qualify for the pilot based on their responses to the survey and will be selected by the contractor in consultation with New Hampshire, Maine, Rhode Island, and Vermont.

e. The contractor will package all of the assessment materials and distribute them to each school via UPS in early September each year. The test coordinator at each school will be responsible for distributing the assessment material to the appropriate test administrators as well as collecting the completed and unused assessment materials for return shipping to the contractor. The contractor is responsible for both shipping and return-shipping costs for all assessment materials.

f. The contractor will produce test coordinator and administrator manuals as well as ancillary documents that provide schools with explicit instructions for the handling, distribution, administration, collection, and return of test materials to the contractor.

g. The contractor, in collaboration with New Hampshire, Maine, Rhode Island, and Vermont, will produce principal/test coordinator, test administrator, and student questionnaires that will be included in the assessment materials shipment to schools.

h. The contractor will be responsible for conducting test administration workshops in all four states approximately one (1) month prior to the test administration window. The contractor will provide program management staff to assist with the facilitation of the workshops. The contractor will work in collaboration with New Hampshire, Maine, Rhode Island, and Vermont to plan and prepare the presentation and materials for the workshops. Three (3) half-day workshops will be conducted in each state for a total of twelve (12) across the four states.

i. The contractor will be responsible for accounting for the return of all secure assessment materials. The contractor will provide New Hampshire with a discrepancy report itemizing outstanding secure materials upon completion of the return process.

j. The contractor will provide secure storage for all of the assessment material for a minimum of 12 months after the reports are returned to schools.

k. The contractor will provide schools a web-based system for principals to access (using a secure user name and password) to complete a principal certification of proper test administration form.

l. The contractor will provide toll-free telephone support to schools beginning two weeks prior to the start of the testing window and ending two weeks after the conclusion of the testing window.

6. Scanning/Imaging and Scoring

a. The contractor will be responsible for the scanning/imaging of student answer documents to capture all of the multiple choice and open-ended responses for the assessment program.

b. The contactor will follow the quality control procedures as described in the proposal on pp. B-87 to B-93 to ensure the accuracy of the scanned data.

c. The contractor will follow the scoring and training procedures outlined in the proposal on pp. B-100 to B-125.

d. The contractor, in collaboration with New Hampshire, Maine, Rhode Island, and Vermont, will develop scoring rubrics, sets of training student responses, and anchor student responses for all assessment items that are not directly scored by machine.

e. The contractor will score all common and matrix (non-field test) items, of whatever item-type. The contractor will score all multiple choice field test items and approximately 1200-1500 student responses for each non-multiple choice field test item included in the operational test forms each year.

f. All extended-response writing responses will be scored by at least two readers. All reading and mathematics short-answer and constructed-response items will be scored by a single reader with a two percent read behind.

g. Representatives from New Hampshire, Maine, Rhode Island, and Vermont will have the option of being present at all scorer training and scoring sessions including all those that occur in New Hampshire, or any other scoring sites operated by the contractor.

7. Data Analysis

a. The contractor will follow the data preparation and quality control procedures described on pp. B-127 to B-130 of the proposal.

b. The contractor will continue to calibrate all of the common and matrix-sampled items using Item Response Theory (IRT). The three-parameter logistic (3PL) model will be used for dichotomous items (multiple-choice and short-answer) and the graded-response model (GRM) will be used for the polytomous items (constructed- and extended-response).

c. The contractor will continue to use the common scale (X00 through X80, where X is grade level) that was adopted for reporting scaled scores and achievement levels in reading, writing, and mathematics for students, schools, districts, and states.

d. The contractor, in consultation with New Hampshire, Maine, Rhode Island, and Vermont, and the appropriate technical advisory panel(s), will determine analyses that could be conducted to evaluate student performance longitudinally from grade to grade or year to year to support gains-based or value-added interpretations. The contractor will then partner with the Center for Advanced Studies in Measurement and Assessment (CASMA) to provide a series of studies to investigate the interpretability across grades of the NECAP scale. Student Reports (see item 8d of this scope of work) will be modified based on a four state NECAP management review of the analyses.

e. The contractor will follow procedures for conducting year-to-year equating for the New England Common Assessment Program. The general approach to be followed is outlined in the contractor's

proposal on pp. B-135 to B-138.

f. The contractor will follow procedures for conducting form-to-form with-in year equating for the New England Common Assessment Program. The general approach to be followed is outlined in the contractor's proposal on pp. B-138 to B-139.

g. The contractor will follow the procedures for developing and reporting item and test statistics described on pp. B-139 to B-145.

8. Reporting

a. The contractor will conduct all analyses required to produce student, school, district and state results and other information included in published reports of results.

b. The contractor will conduct a standards validation meeting after the first operational writing assessment of grades 5 & 8 in October 2010 prior to reporting results in January 2011.

c. The contractor will negotiate a mutually agreed upon reporting schedule with New Hampshire, Maine, Rhode Island, and Vermont that will allow for the states to provide student demographic and testing data to the contractor to be used for reporting the assessment results. The schedule will be devised so as to reduce as much as possible the time between testing and reporting.

d. The contractor will provide the following reports in paper and/or electronic formats as indicated for the New England Common Assessment Program beginning with the fall 2009 administration and continuing through the last operational assessment in the fall of 2013:

- *Student Report* containing performance level results, scaled score, etc. (1 in color and 1 in black/white) for each tested student (paper)
- *Item Analysis Reports* containing individual student-level results at each content area and grade level, and item-level results for released items for schools (electronic)
- *District-Level Student-Level data files* containing all student-level information regarding performance (scaled scores and achievement levels), demographic information and student responses to released items at each grade for schools within the district (electronic)
- *School Results Reports* at each grade level containing aggregated school results, subscore results, subgroup results, as well as corresponding district and state results (electronic)
- *District Results Reports* at each grade level containing aggregated district results, subscore results, subgroup results, as well as corresponding state results (electronic)
- *State Results Reports* at each grade level containing aggregated statewide results, subscore results, and subgroup results (electronic)
- *School Summary Reports* at each grade level containing aggregated participation, performance level, and scaled score results for each tested grade within a school (electronic)

- *District Summary Reports* at each grade level containing aggregated participation, performance level, and scaled score results for each tested grade within a district (electronic)
- *State Summary Reports* at each grade level containing aggregated participation, performance level, and scaled score results for each tested grade within a state (electronic)

e. The contractor will provide all of the electronic reports described in 8.c. via a web-based delivery system. This system will also provide end users with the capability to disaggregate and analyze data that are contained in the electronic reports via a reporting portal.

f. The contractor will be responsible for printing, packaging, and distributing 2 (two) paper copies of *Student Reports* to schools.

g. In 2009-10, the contractor will return student responses to the common writing prompt on CD to each tested grade 11 school. These CD's will be shipped to schools as part of the *Student Reports* shipment in January of 2010. In the remaining years of this contract through 2014, the contractor will return students responses to the common writing prompt on CD to each tested school for grades 5, 8, and 11. These CD's will be shipped to schools as part of the *Student Reports* shipment in January of each year.

h. The contractor will provide each state with student-level data files that contain demographic information, raw item responses, scored item responses, questionnaire responses (as appropriate), raw score totals, scaled scores, and performance levels for every student tested in their state.

i. The contractor will produce interpretive materials that clearly and effectively communicate information about the New England Common Assessment Program to parents, schools, and districts. The interpretive materials will be provided in electronic format for posting on each state's Department of Education website.

j. A portion of the common items will be released from each assessment for reporting and professional development purposes. Following the selection of the released items, the contractor will produce materials that will include the actual test items, item documentation mapping the items to the Grade-Level and Grade-Span Expectations, scoring materials, and sample student responses for posting on the Department's website. Specific numbers of items and passages to be released each year will be decided upon by New Hampshire, Maine, Rhode Island, and Vermont in consultation with the contractor. The majority of the items will remain secure for future use in subsequent NECAP assessments.

k. The contractor, in consultation with New Hampshire, Maine, Rhode Island, and Vermont, and the appropriate technical advisory panel(s), will produce a comprehensive Technical Report following each year's testing and reporting cycle that can serve as the document of record for the year's testing activities. The contractor will follow the general procedures described on pp. B-154 and B-155 as described in the proposal. The contractor will provide the Technical Report in electronic format for posting on each state's Department of Education website.

l. The contractor will be responsible for conducting reporting workshops in all three states with-in approximately one (1) month following the release of results. The contractor will provide program

management staff to assist with the facilitation of the workshops. The contractor will work in collaboration with New Hampshire, Maine, Rhode Island, and Vermont to plan and prepare the presentation and materials for the workshops. Five (5) half-day workshops will be conducted in each state for a total of fifteen (15) across the three states at sites that accommodate video-conferencing to other sites.

m. The contractor will provide toll-free telephone support related to interpreting the results to educators beginning two weeks prior to, during, and two weeks following the release of results.

n. The contractor will retrieve and deliver images of student answer documents and/or actual hard copy of the students test material. The contractor, in consultation with New Hampshire, Maine, Rhode Island, and Vermont, will determine an agreed upon protocol for requesting this service. The contractor did not charge for this service in the proposal budget. However, if the number of requests becomes over burdensome, negotiations will be expected to take place to establish an acceptable fee.

Exhibit B

BUDGET

Budget (through June 30, 2011)

	FY2010	FY2011
Program Management	$ 194,255	$ 197,169
Item Development	$ 252,649	$ 255,176
Test Construction	$ 509,645	$ 496,096
Administration	$ 289,651	$ 291,968
Scanning/Imaging/Scoring	$1,089,224	$1,120,812
Analysis	$ 86,818	$ 104,962
Reporting	$ 82,415	$ 90,878
Overhead and Fees	$ 531,564	$ 540,510
Total	**$3,036,221**	**$3,097,571**

Limitation on Price: Upon mutual agreement between the state contracting officer and the contractor, line items in this budget may be adjusted one to another but in no case shall the total budget exceed the price limitation of $6,133,792.

Funding Source: Funding for this contract is 43% General Funds and 57% Federal Funds from the following accounts:

010-056-3260-612 (object code 0942)	FY10:$1,305,575	FY11: $1,331,956
010-056-6422-102 (object code 0731)	FY10: $1,730,646	FY11: $1,765,615

Method of Payment: Payment is to be made monthly on the basis of invoices which are supported by a summary of activities that have taken place in accordance with the terms of the contract, along with a detailed listing of expenses incurred (see following tentative payment schedule). If otherwise correct and acceptable, payment will be made for 100% of the expenditures listed. Invoices and reports shall be submitted to:

Tim Kurtz
Administrator, Assessment
Department of Education
101 Pleasant St.
Concord, NH 03301

EXHIBIT C

Subject to Governor and Council approval, authorize the Department of Education to exercise a renewal option on this contract for up to four additional fiscal years, subject to the contractor's acceptable performance of the terms therein and pending legislative approval for the next 2 biennium budgets.

The parties to this Agreement acknowledge that concomitant with the execution of this Agreement, Measured Progress is entering into separate agreements with the State of New Hampshire, the State of Maine, the State of Rhode Island, and the State of Vermont ("Separate Agreements"). The parties to this agreement acknowledge and agree that the Separate Agreements, and performance of all parties under them, are material to Measured Progress's obligation under this Agreement. Therefore, in the event that any of the four States (New Hampshire, Maine, Rhode Island, and Vermont) entering into agreements described herein with Measured Progress, fails to perform or terminates its agreement prior to its expiration date said therein, Measured Progress shall have the sole and unfettered right to terminate all, none, or any combination of the said agreements and to be paid by each state under agreement, the amounts due for work performed by Measured Progress to date. Upon the termination, of any of the three Agreements, Measured Progress may, as an alternative to termination, renegotiate its agreement with any, all or none of the remaining states but is in no way obligated to do so. Any notice required by this paragraph will be deemed timely if served on the persons described in this Agreement and not less than 15 days before the action disclosed therein shall take place.

The Parties to these agreements agree to this liquidated damage provision in the event that delivery of late or inaccurate test materials or reports, caused by the negligence of Measured Progress, materially compromise the administration or validity and reliability of the tests or reports. For the purpose of liquidated damages, test materials are the test and answer booklets, listed in Section 5 e, Test Administration and the reports as listed in Section 8 d., Reporting, of Exhibit A (Scope of Services) of the contract.

Late delivery is a shipment of such test materials or reports, two or more days after the date specified in the Proposal or the Annual Project Plan & Schedule ("APPS") as adjusted. The APPS will include dates for materials to be delivered to the States to be reviewed and approved, approval dates for the States, dates for the States school districts, or schools, to provide demographic, enrollment, or other data to be used in administering the NECAP program, and delivery dates for Measured Progress to ship test materials and reports. The APPS will be adjusted on a day-for-day basis for each day that approvals, delivery of program data, or the return of test materials, as described in NECAP manuals, is late.

The number of days that inaccurate reports are outstanding will start on the day that a State or Measured Progress informs the other Party or Parties, in writing, that a material inaccuracy has been discovered on a published report, and end on the day corrected reports are issued. Reports are considered published when they are delivered to school districts, issued in part in press releases approved by all Parties, or issued to State employees not employed in the Departments of Education. Reports or Test Materials are not considered outstanding for

liquidated damages purposes while they are in approval or quality control review periods by the States or Measured Progress. Further, liquidated damages are not due if the material inaccuracy or delay is caused, in part, by inaccurate data supplied by a State, school district, or school.

The liquidated damages penalty for each day late or for each day a materially inaccurate set of reports is outstanding, will be $1,000 per day, (one thousand dollars per day).

Liquidated damages for any contract year, is limited to a maximum of 4% (four percent) of that year's annual contract value for the respective State or States.

English Language Arts

K–12

Introduction

The *Standards for English Language Arts K–12* are the culmination of an extended, broad-based effort to fulfill the charge issued by the states to create the next generation of English language arts (ELA) standards. Its companion document, *Standards for Literacy in History and Science 6–12*, extends the same principle to communication skills in other content areas. The present work, led by the Council of Chief State School Officers (CCSSO) and the National Governors Association (NGA), builds on the foundation laid by states in their decades-long work on crafting high-quality education standards. The *Standards* also draw upon the most important international models as well as research and input from numerous sources, including scholars, assessment developers, professional organizations, and educators from kindergarten through college. In their design and content, the *Standards* represent a synthesis of the best elements of standards-related work to date and an important advance over that previous work.

As specified by CCSSO and NGA, the *Standards* are (1) research and evidence based, (2) aligned with college and work expectations, (3) rigorous, and (4) internationally benchmarked. A particular standard was to be included in the document only when the best available evidence indicated that its mastery was essential for students to be college and career ready in a twenty-first-century, globally competitive society. As new and better evidence emerges, the *Standards* will be revised accordingly.

The *Standards* are an extension of a prior initiative led by CCSSO and NGA to develop college and career readiness (CCR) standards in reading, writing, and speaking and listening as well as in mathematics. The CCR Reading, Writing, and Speaking and Listening Standards, released in draft form in September 2009, served as a touchstone for the present work. While the format, structure, content, and purpose of that earlier document differ in some ways from this document, the basic aims and concepts are clearly connected. The main difference is that while the earlier CCR document defined a goal toward which education efforts should aim—college and career readiness for all students—the current document describes the progressive development of skills and understandings across the grades necessary for all students to reach that goal. Just as feedback on the September 2009 CCR draft has greatly influenced the design and development of the K–12 standards, so too will the response to the K–12 standards help guide subsequent revisions to the CCR standards. In their final forms, both documents—CCR and K–12—will be tightly aligned and mutually supporting.

While the *Standards* treat college and career readiness for all students as the end point—an ambitious goal in its own right—many students will reach this point before the end of high school. For them, advanced work in literature, composition, language, history, science, and so on should be available. It is beyond the scope of the *Standards* to describe what such advanced work should consist of, but it needs to provide the next logical step up from the college and career readiness baseline established here.

As a natural outgrowth of meeting the charge to define college and career readiness, the *Standards* also lay out a vision of what it means to be a literate person in the twenty-first century. Indeed, the skills and understandings students must demonstrate have broad applicability outside of the classroom or workplace. The *Standards* insist upon the sort of close, attentive reading that is at the heart of understanding and appreciating the aesthetics of literature. They require the sort of critical reading that is necessary to sift carefully through the staggering amount of information available today in print and online. They demand the sort of wide, deep, and thoughtful engagement with high-quality literary and informational text that builds knowledge, enlarges experience, and broadens world views. They mandate the sort of cogent reasoning and use of evidence that is essential to both private deliberation and responsible citizenship in a democratic republic. In short, they promote the development of skills in reading, writing, speaking, and listening that are the foundation for any creative and purposeful expression in language.

Key design considerations

A blend of cross-cutting and specific standards

The Reading, Writing, and Speaking and Listening strands include two levels of standards. The cross-cutting Core Standards are the same across the two *Standards* documents, their commonality emphasizing the broad responsibility within the school for meeting the standards and also facilitating schoolwide professional development. Then there are specific Standards that are unique to a given content area, which respects the particular demands of reading, writing, speaking, and listening in ELA and in other disciplines.

A focus on results rather than means

The *Standards* define what all students must learn, not everything that teachers are allowed to teach. By focusing on required achievements, the *Standards* leave room for teachers, curriculum developers, and states to determine how those goals should be reached and what additional topics should be addressed. The *Standards* require, for example, that all students be able to produce writing in a variety of situations, including those that allow time for revision. The *Standards* do not, however, specify a particular writing process that students must use (although certain elements common to process-writing approaches, particularly revision, are embedded in the requirements). Teachers are thus freed—and obligated—to provide students with whatever tools and knowledge their professional judgment and experience identify as most helpful for those assignments that allow for multiple drafts. Similarly, the *Standards*, with their emphasis on observable outcomes, do not enumerate various metacognitive strategies that students may need to use to monitor and direct their thinking and learning.

Shared responsibility for literacy

The *Standards for English Language Arts K–12* and the *Standards for Literacy in History and Science 6–12* together establish the requirement that instruction in reading, writing, speaking, listening, and language use be a shared responsibility. The *Standards* present reading instruction in K–5 as fully integrative, including a rich blend of narratives, drama, poetry, and informational text. ELA-specific instruction in grades 6 and above includes fiction, poetry, and drama but also a particular form of informational text: literary exposition and argument (e.g., speeches, essays, and historical documents with significant cultural importance and literary merit). Teachers in other content areas must use their unique disciplinary expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language use in their respective field. Progress toward college and career readiness and building a rich knowledge base require that at least half of the reading students do must focus on history, science and related disciplines. This distributed approach honors the unique place of English language arts instruction in literacy development while ensuring that students have communication skills tailored to the demands of other disciplines. It also reflects the reality that students must communicate effectively in a wide range of disciplines, not just ELA.

Grade bands to describe growth, grades to focus instruction

Evidence consulted in creating the *Standards* suggests that beyond the earliest grades, major developments in students' literacy skills typically occur across spans of grades rather than within individual grades. This document stays true to that evidence by organizing standards after grade 3 into multiyear bands (grades 4–5, 6–8, 9–10, and 11–CCR). At the same time, the work of educating students does proceed on a day-to-day, year-to-year basis. Any standards document must therefore provide guidance to educators on what each year's instruction and assessment should look like. To make the grade specific focuses for instruction clear, after the descriptions of the standards in each area of ELA, we provide a one page summary of the grade specific focuses for each grade from fourth grade onwards, including how the grade specific focus in each area relates to the grade band requirements. The Standards offer that focus through several grade-specific elements:

- Single-grade standards in many areas of kindergarten and grades 1, 2, and 3
- Text complexity expectations in Reading, beginning at grade 2
- Areas of focus in Writing, beginning at grade 4

- Areas of focus in the Conventions section of Language Development, beginning at grade 4

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Research and media skills integrated into the standards as a whole

To be ready to meet the challenges of the twenty-first century, students need a mix of the communication skills that have served literate people for millennia and new competencies necessary in an information- and media-saturated world. To be ready for college, workforce training, and life in a technological society, students need the ability to gather, comprehend, evaluate, synthesize, report on, and create a high volume and extensive range of print and nonprint texts in media forms old and new. Just as the need to research and to consume and produce media are embedded into every element of today's curriculum, so too are the associated skills and understandings embedded throughout the *Standards* rather than treated separately. Web links to sample media texts are included selectively among the reading text exemplars in Appendix B to reinforce the point that print and online materials can be used together instructionally to enhance students' understanding.

An integrated model of English language arts

Although the *Standards* divide the English language arts into Reading, Writing, Speaking and Listening, and Language Development strands for conceptual purposes, the processes of communication are in theory and practice an undivided whole. As illustrated in the graphic that introduces each grade or grade band and as embodied in the content of the standards themselves, reading, writing, speaking, listening, and language development are tightly interrelated and often reciprocal.

Central features of the document

Reading and Literature: Text complexity and the growth of comprehension

As students advance through the grades, they must be able to handle independently texts of steadily increasing complexity and be able to gain more from what they read. Beginning formally at grade 2, the *Standards* specify what proportion of texts students read should be within grade band and, at some grades, above grade band. (Additional material in Appendix A of the *Standards* defines and explains text complexity in more detail.) Whatever texts they are reading, students must also show a steadily increasing ability to discern more from and make fuller use of text. This means, for example, finding and making an increasing number of connections among ideas and between texts; considering a wider range of textual evidence; and becoming more sensitive to inconsistencies, ambiguities, and poor reasoning in texts. The *Standards* place growing demands on students' comprehension at each higher grade or grade band to ensure that all students are college- and career-ready readers no later than the end of high school.

Writing and Research: Text types, grade-level focuses, and research

While some writing skills, such as the ability to reflect audience, purpose, and task in what one writes, are important for many types of writing, others are more properly part of writing in specific text types: narrative, informative and explanatory text, and argument. Beginning at grade 4, the *Standards* specify the sorts of writing over extended and shorter timeframes that students in each grade must be able to produce in response to sources. Although conducting research calls upon reading, speaking, listening, and language skills, writing is typically central to analyzing information and presenting findings. The *Standards* pair writing and research to signal that close connection.

Speaking and Listening: Flexible communication

Including but not limited to skills necessary for formal presentations, the Speaking and Listening strand requires students to develop a range of broadly useful oral communication and interpersonal skills: listening attentively, participating productively, exchanging information, and speaking effectively. Students must learn to sift through and evaluate multiple points of view; listen thoughtfully in order to build on and constructively question the ideas of others while contributing their own ideas; and, where appropriate, reach agreement and common goals through teamwork.

Language Development: Conventions and vocabulary

The Conventions standards in the Language Development strand include the essential "rules" of formal written and spoken English, but they also approach language as a matter of craft and informed choice among alternatives. Thus, standards pertaining to grammar and usage, mechanics, and the fundamentals of language and writing are accompanied by standards on word choice and style. The Vocabulary standards focus both on understanding words and their nuances and on acquiring new words through conversation and reading and by being taught them directly. Rather than require that students use one particular skill or another to determine a word's meaning, the Vocabulary standards insist only that students get the proper meaning, with the means (context, word analysis, and so on) to be chosen flexibly based on the situation.

Appendices

The *Standards* include a range of supporting materials that help explain and enrich the main document:

- Appendix A contains a model of text complexity, including both qualitative and quantitative measures of how easy or hard a text is to read, as well as supplementary statements about instruction in writing, language conventions, and vocabulary
- Appendix B consists of text exemplars at all grades/bands to illustrate appropriate complexity and quality in the text types required by the Reading standards
- Appendix C consists of annotated writing samples to show how grade- or grade-band-appropriate writing embodies the relevant Writing standards

January 2010

DRAFT

Student Practices in Reading, Writing, Speaking, Listening, and Language Use

The following Student Practices in reading, writing, speaking, listening, and language use undergird and help unify the rest of the *Standards*. The Student Practices are not themselves standards: every idea introduced here is subsequently represented in one or more places within the larger document. They are, rather, the "premises"—broad statements about the nature of college and career readiness in reading, writing, speaking, listening, and language use—that underlie the individual standards and cut across the various sections of the document.

* * *

As students progress toward being college and career ready, they exhibit with increasing fullness and regularity the following capacities in their reading, writing, speaking, listening, and language use:

1. They demonstrate independence as readers, writers, speakers, listeners, and language users.

Students can, without significant scaffolding or support, comprehend and evaluate complex text across a range of types and disciplines, and they can construct effective arguments and clearly convey intricate or multifaceted information. Likewise, students are independently able to discern a speaker's key points as well as ask questions, build on others' ideas, and articulate their own ideas. They apply language conventions without prompting. On their own, they determine the meaning of words in context and acquire and use new words.

2. They build strong content knowledge.

Students build a base of knowledge across a wide range of subject matter by engaging with works of quality and substance. They demonstrate their ability to become proficient in new areas through research and study. They read purposefully and listen attentively to gain both general knowledge and the discipline-specific expertise needed to comprehend subject matter and solve problems in different fields. They refine their knowledge and share it through substantive writing and speaking.

3. They respond to the varying demands of audience, task, purpose, and discipline.

Students consider their reading, writing, speaking, listening, and language use in relation to the contextual factors of audience, task, purpose, and discipline. They appreciate nuances, such as how the composition and familiarity of the audience should affect tone and how the connotations of words affect meaning. They also know that different disciplines call for different types of evidence (e.g., documentary evidence in history, experimental evidence in the sciences).

4. They comprehend as well as critique.

Students are engaged and open-minded—but skeptical—readers and listeners. They work diligently to understand precisely what an author or speaker is saying, but they also question an author's or speaker's assumptions and assess the veracity of claims.

5. They privilege evidence.

Students cite specific evidence when offering an oral or written interpretation of a text. They use relevant evidence when supporting their own points in writing and speaking, making their reasoning clear to the reader or listener, and they constructively evaluate others' use of evidence.

6. They care about precision.

Students are mindful of the impact of specific words and details, and they consider what would be achieved by different choices. Students pay especially close attention when precision matters most, such as in the case of reviewing significant data, making important distinctions, or analyzing a key moment in the action of a play or novel.

7. They craft and look for structure.

Students attend to structure when organizing their own writing and speaking as well as when seeking to understand the work of others. They understand and make use of the ways of presenting information typical of different disciplines. They observe, for example, how authors of literary works craft the structure to unfold events and depict the setting.

8. They use technology strategically and capably.

Students employ technology thoughtfully to enhance their reading, writing, speaking, listening, and language use. They tailor their searches online to acquire useful information efficiently, and they integrate what they learn using technology with what they learn offline. They are familiar with the strengths and limitations of various technological tools and mediums and can select and use those best suited to their communication goals.

9. They come to understand other perspectives and cultures.

Students appreciate that the twenty-first-century classroom and workplace are diverse settings in which people from often widely divergent backgrounds must learn and work together. They actively seek to understand other perspectives and cultures through reading and listening. They do not simply adopt other points of view as their own but rather evaluate them critically and constructively. Literature can play a special role in expanding students' horizons in this way: through reading great classic and contemporary works, students can vicariously inhabit worlds and experiences much different than their own.

CCSSI DRAFT

English Language Learners

The *Standards* articulate rigorous grade-level expectations in the areas of speaking, listening, reading and writing to prepare students to be college and career ready. English language learners (ELLs) must be held to the same high standards expected of students who are already proficient in English. However, because these students are acquiring English language proficiency and content area knowledge concurrently, some students will require additional time and all will require appropriate instructional support and aligned assessments.

ELLs are a heterogeneous group with differences in ethnic background, first language, socio-economic status, quality of prior schooling, and levels of English language proficiency. Effectively educating these students requires adjusting instruction and assessment in ways that consider these factors. For example ELLs who are literate in a first language that shares cognates with English can apply first-language vocabulary knowledge when reading in English; likewise ELLs with high levels of schooling can bring to bear conceptual knowledge developed in their first language when reading in a second language. On the other hand, ELLs with limited or interrupted schooling will need to acquire background knowledge prerequisite to educational tasks at hand. As they become acculturated to US schools, ELLs who are newcomers will need sufficiently scaffolded instruction and assessments to make sense of content delivered in a second language and display this content knowledge.

While some ELLs are economically and educationally advantaged, this is not the case for many of these students. Moreover, once in the U.S., the majority of ELLs attend high poverty schools with high percentages of other ELLs. These schools often lack the resources and capacity needed to help ELLs reach high academic standards. However, schools and districts can be assisted in providing a positive learning environment that capitalizes on the linguistic and cultural diversity of the student body.

To help ELLs meet high academic standards in reading, writing, speaking, listening and language use it is essential that ELLs have access to:

- The requisite coursework to prepare them for post-secondary education or the workplace;
- Coursework that is made comprehensible for students learning content in a second language, through specific pedagogical techniques and additional resources;
- Teachers, as well as school-level and district personnel, who are well prepared and qualified to support English-language learners;
- Well designed opportunities for classroom discourse and interaction to enable ELLs to develop communicative strengths in language arts
- Speakers of English who know the language well enough to provide the ELLs with models and support; and
- Ongoing assessment and feedback to guide learning.

It is also worth noting that instruction for these students is additionally guided by language proficiency standards that language arts teachers can use in conjunction with the English language arts standards to help ELLs become fully proficient and literate in English.

Access for Students with Disabilities

The *Standards* articulate rigorous expectations in the areas of reading, writing, speaking, listening, and language use in order to prepare students to be college and career ready. These standards identify the knowledge and skills students must acquire in order to be successful. Research shows that students with disabilities are capable of high levels of learning and should not be limited by low expectations and watered down curriculum. The vast majority of this population of students, including students with intellectual impairments,[1] *can* achieve proficiency when they receive high-level instruction and accommodations. It is imperative that these highly capable students—regardless of their disability—are held to the same expectations articulated in the Core Standards as other students.

However, *how* these high standards are taught is of the utmost importance in reaching students with special needs. When acquiring the knowledge and skills represented in the Core Standards, students with disabilities may need accommodations[2] or—in exceptional cases—modified goals, incorporated in an individualized education program (IEP),[3] to help them access information or demonstrate their knowledge. In instances when a standard asks students to perform actions they are physically incapable of, students will need to be presented with alternative options to demonstrate similar knowledge and skills within the range of their abilities. Accommodations based on individual needs allow students of all disability levels to learn within the framework of the *Standards*.

Meeting English Language Arts (ELA) Standards

Reading, writing, speaking, listening, and language use standards—given the nature of the standards themselves—often require accommodations for students with disabilities. For example, a standard that calls for "listening" should be interpreted to include reading sign language. "Speaking" should be read broadly to include "communication" or "self-expression." "Reading" should allow for students' use of Braille, screen reader technology, or other assistive devices to demonstrate comprehension skills. In a similar vein, "writing" should not preclude the use of a scribe, computer, or speech-to-text technology. With appropriate accommodations and support, students with all levels of disabilities can participate in the general education curriculum and achieve grade-level proficiency with regard to the ELA content and skills articulated in the *Standards*.

In short, while the *Standards* set and retain high expectations for all students, they may need to be translated and occasionally modified to apply appropriately to students with disabilities, including all levels of intellectual impairment. Promoting a culture of high expectations for all students is a fundamental goal of the *Standards*. Achieving this goal requires the inclusion of students with disabilities.

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[1] Less than two percent of the population of all students and less than 20% of the population of students with disabilities.

[2] See the Council of Chief State School Officers, (2003). *Training District and State Personnel on Accommodations: A Study of State Practices, Challenges, and Resources* at http://www.ccsso.org/publications/details.cfm?PublicationID=221 for further explanation and evidence around accommodations.

[3] According to the Individuals with Disabilities Act (IDEA), an IEP includes appropriate accommodations that are necessary to measure the individual achievement and functional performance of a child.

How to Read This Document

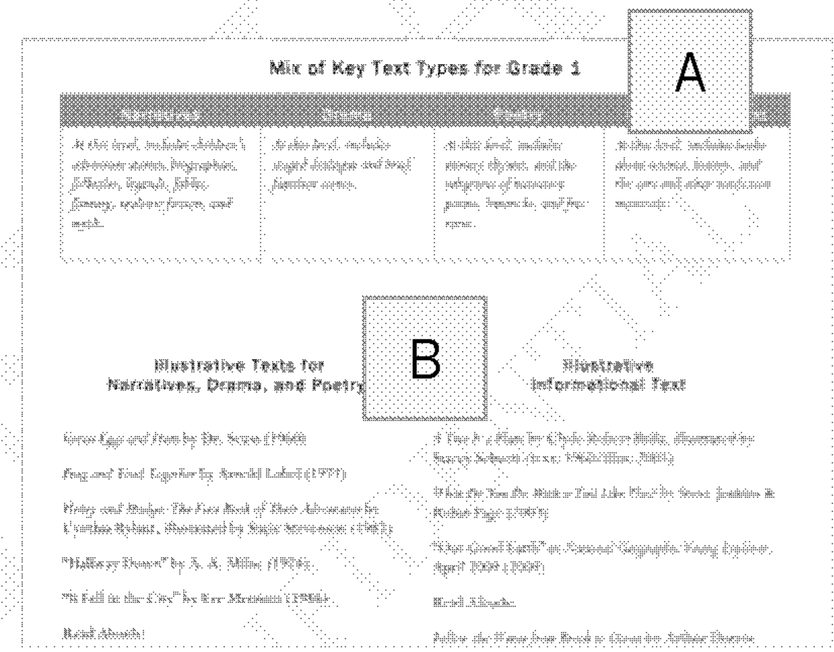
The *Standards* are divided into an ELA-specific document (*Standards for English Language Arts K–12*) and a literacy document for history and science (*Standards for Literacy in History and Science 6–12*). The ELA document includes standards for and examples of history and science reading in K–5.

The ELA-specific document is organized by grade (kindergarten and grades 1, 2, and 3) and grade band (grades 4–5, 6–8, 9–10, and 11–CCR). The *Standards for Literacy in History and Science* are organized by grade band (grades 4–5, 6–8, 9–10, and 11–CCR). Each grade/band is divided into strands—Reading, Writing, Speaking and Listening, and Language Development.

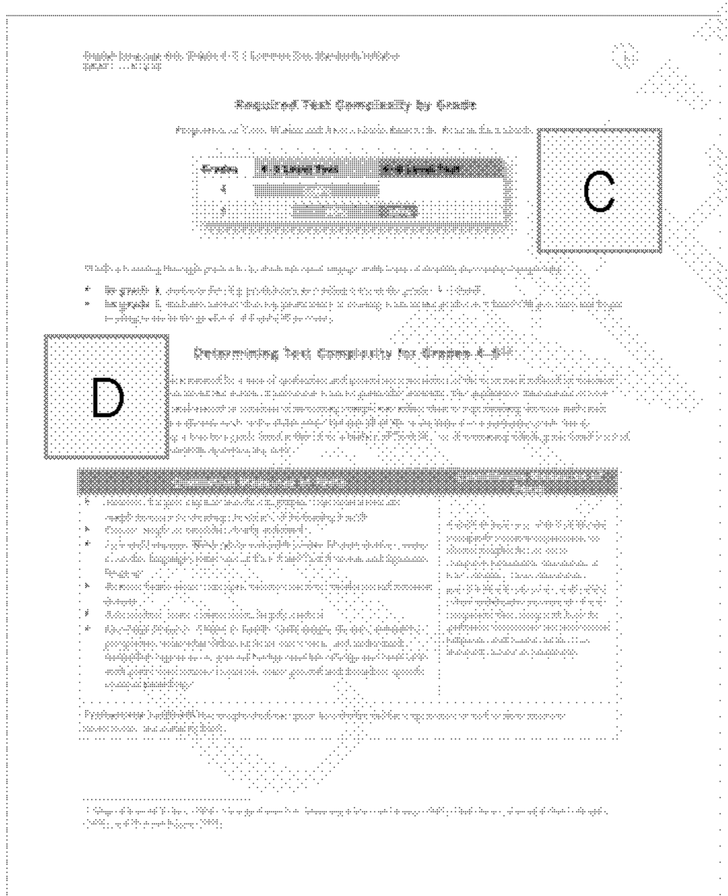
While all strands contain standards statements, each strand also has its own specific features.

Reading and Literature (ELA)/Reading (History/Science)

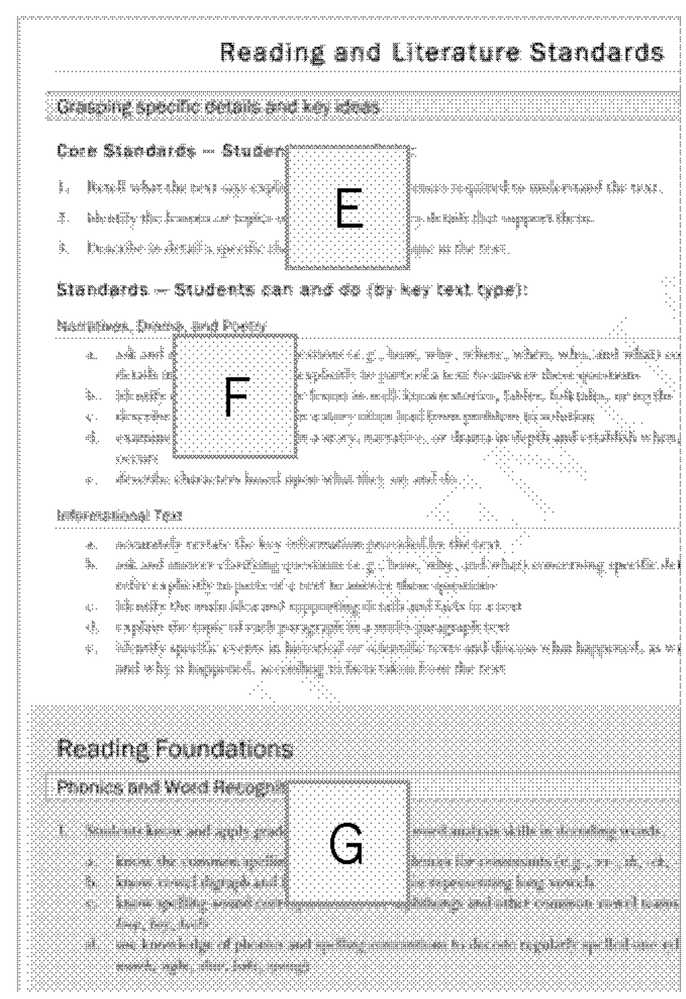
Kindergarten and grade 1 begin with the **mix of key text types (A)**, which identifies the genres and subgenres of reading material appropriate for each grade. This is followed by a list of **illustrative texts (B)** in the key text types. This list is suggestive of the sorts of texts appropriate for the grade in terms of complexity and quality; excerpts appear in Appendix B.



Grades 2, 3, 4–5, 6–8, 9–10, and 11–CCR include this information immediately after a graphic specifying **required text complexity by grade (C)**—in brief, the proportion of texts within and above grade band that students must read each year. (For example, 70% of the texts that grade 3 students read should come from the grades 2–3 text complexity band, while the other 30% should come from the grades 4–5 band.) An overview of the method for **determining text complexity (D)** in the particular grade band follows. (A fuller treatment is provided in Appendix A.)

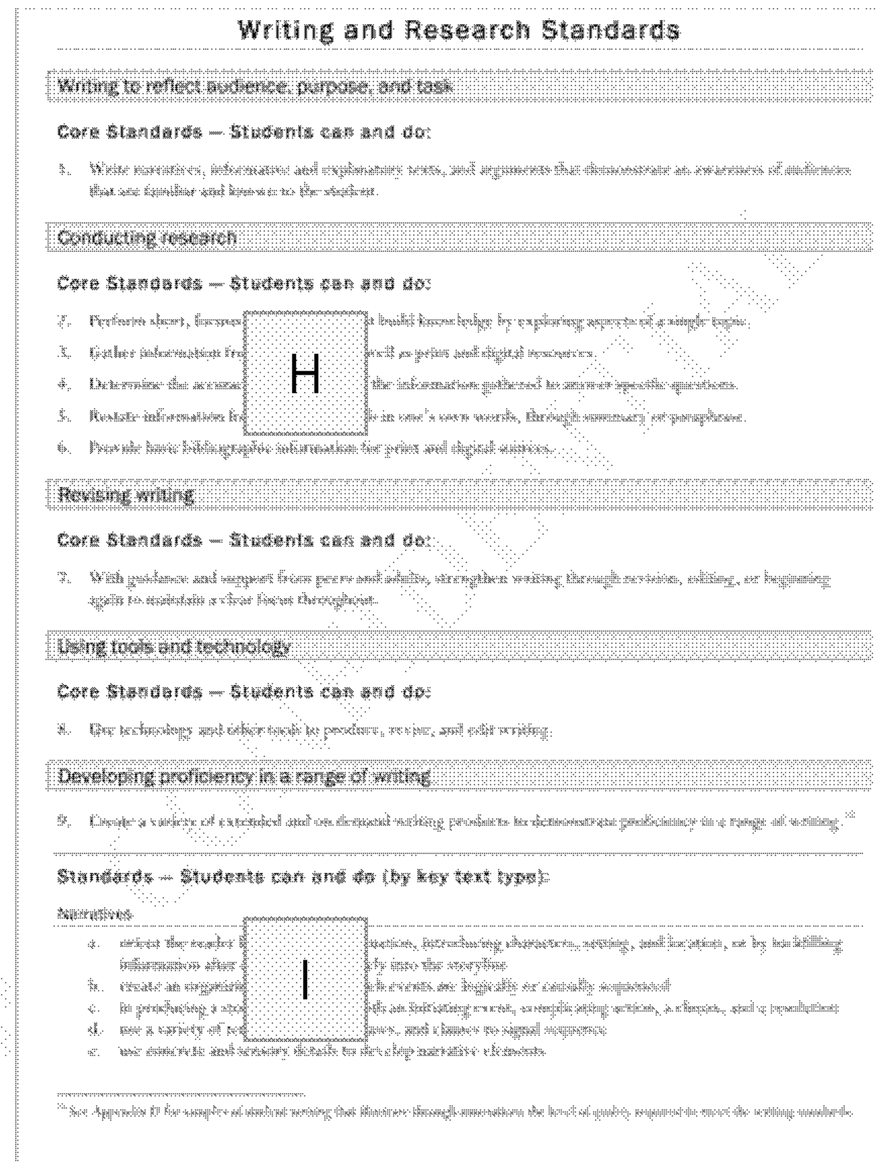


All grades/bands organize standards under a number of boxed subheadings (e.g., "Grasping specific details and key ideas"). The standards at all grade levels are divided into cross-cutting **Core Standards (E)**, which are numbered and applicable to many types of reading, and more specific **Standards (F)**, which are lettered and organized by text type (e.g., "Narratives, Drama, and Poetry"). Kindergarten and grades 1, 2, and 3 also include boxed sections of **reading foundations (G)**, which enumerate basic concepts of print and other foundational skills in reading that very young students must acquire.



Writing and Research

Cross-cutting **Core Standards (H)**, which are numbered and apply to many types of writing, are organized under a number of boxed subheadings (e.g., "Writing to reflect audience, purpose, and task"). **Standards (I)** specific to writing in particular text types—narrative, informative and explanatory text, and argument—are lettered and follow in a separate section. In kindergarten through grade 5, writing arguments takes the form of opinion writing, hence the parenthetical notation next to "Arguments" in those grades/bands.

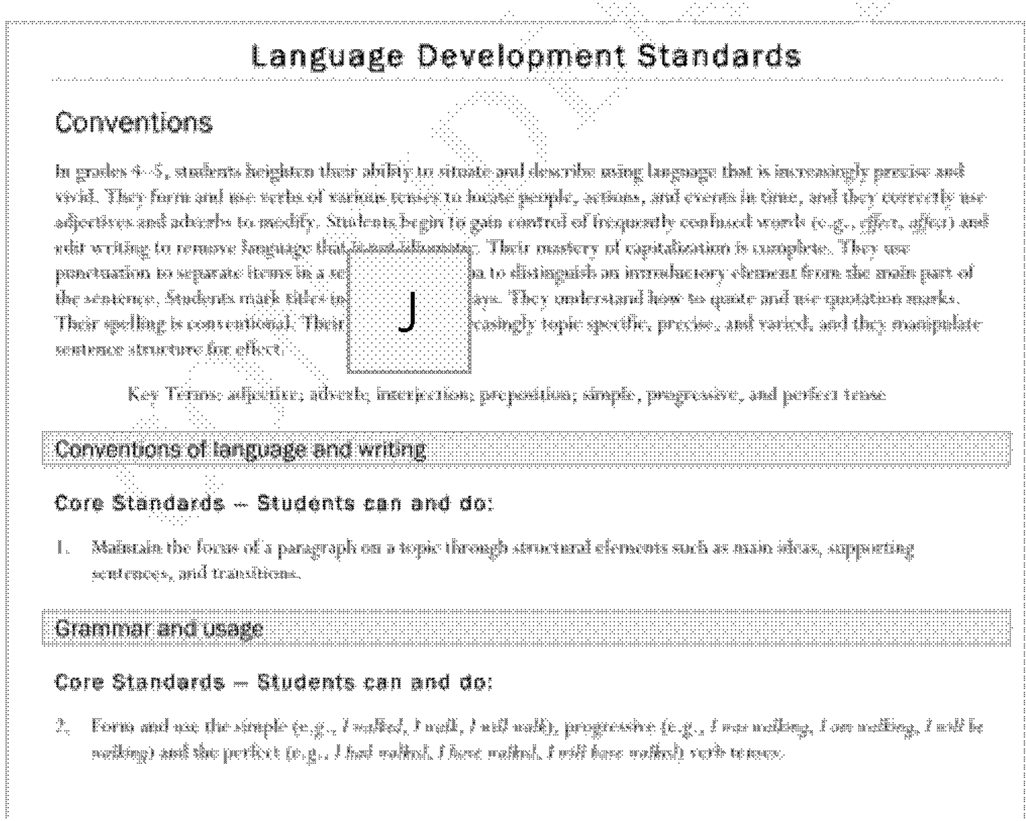


Speaking and Listening

Cross-cutting **Core Standards**, which are numbered and apply to speaking and listening in many situations, are grouped with lettered **Standards**, which set requirements for speaking and listening in key communication (e.g., "Presentation of Ideas and Information").

Language Development

This strand is organized differently in the ELA and history/science documents. The ELA strand comprises two full sections: Conventions and Vocabulary. Each section includes numbered **Core Standards** organized under a number of boxed subheadings (e.g., "Mechanics") and introduced by a brief summative paragraph and list of **key terms (J)** intended to be taught explicitly in grade-appropriate ways. ELA Vocabulary consists of three subsections—determining the meaning of words, understanding the nuances of words, and acquiring vocabulary—under each of which numbered Core Standards appear. Language Development in the history/science document consists of the summative paragraphs for Conventions and all of the Vocabulary section found in ELA except for nuances in word meaning.

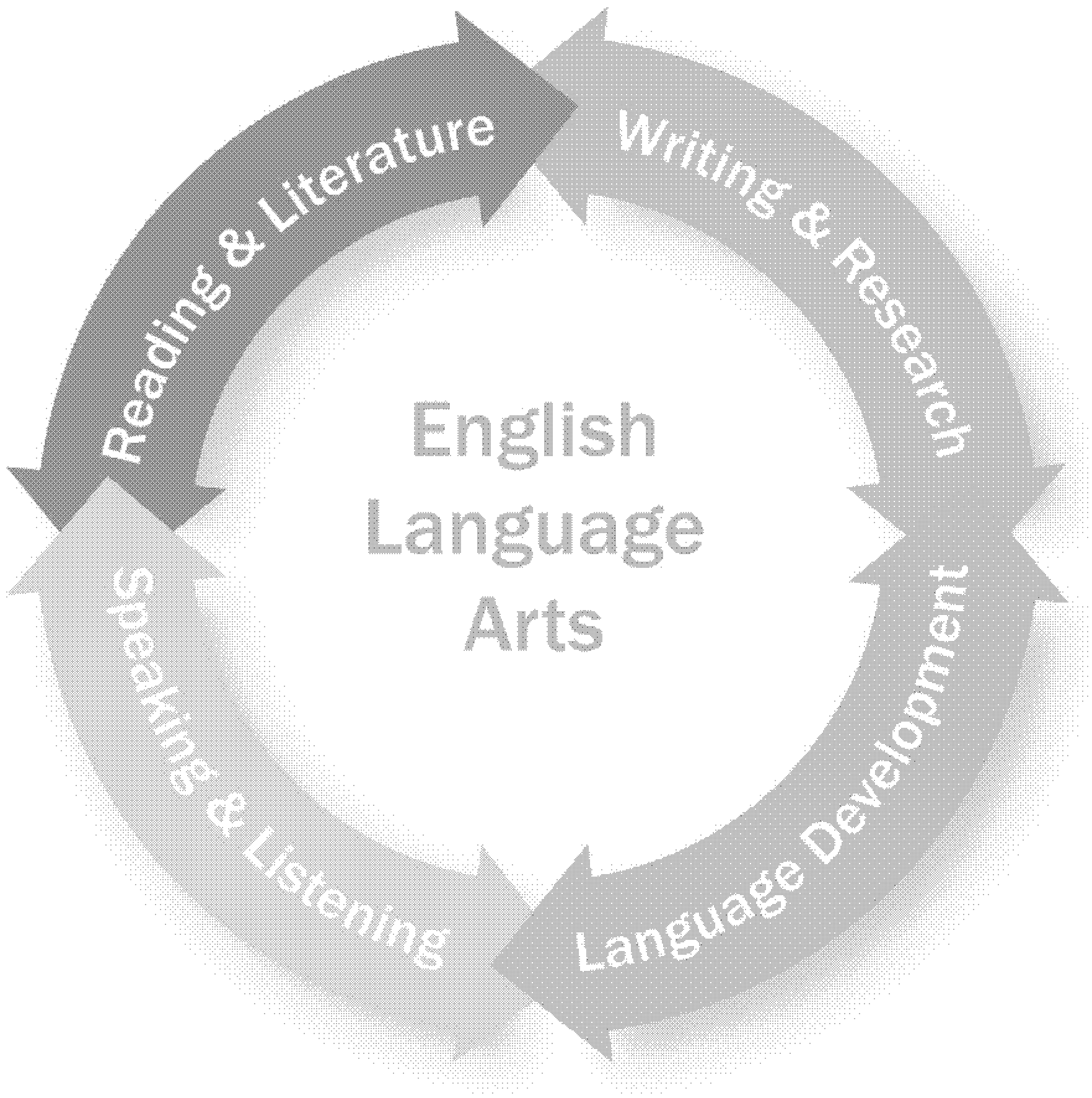


Focus for Instruction

Beginning with grade 4, a page summarizing grade-level responsibility, including grade-specific areas of focus, is provided to help distinguish responsibilities within multiyear bands.

English Language Arts

Kindergarten



Mix of Key Text Types for Kindergarten

Narratives	Drama	Poetry	Informational Text
At this level, includes children's adventure stories, biographies, folktales, legends, fables, fantasy, realistic fiction, and myth.	*At this level, includes staged dialogue and brief familiar scenes.*	*At this level, includes nursery rhymes and the subgenres of narrative poems, limericks, and free verse.*	*At this level, includes books about science, history, and the arts and other nonfiction materials.*

Illustrative Texts for Narratives, Drama, and Poetry[4]

Are You My Mother? by P.D. Eastman (1960)

Put Me in the Zoo by Robert Lopshire (1960)

"Mix a Pancake" by Christina Rosetti (1986)

Wouldn't You?" by John Ciardi (1986)

Illustrative Informational Texts

My Five Senses by Aliki (1962)

Read Alouds:

Amazing Whales! by Sarah L. Thomson (2005)

The Year at Maple Hill Farm by Alice and Martin Provensen (1978)

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[4] See Appendix B for other texts illustrative of Kindergarten-Grade 1 text complexity. This list includes read-alouds.

Reading and Literature Standards[5]

Grasping specific details and key ideas

Core Standards — Students can and do:

1. Retell key details and information drawn from the text.
2. Explain the subject of the text or the problem the characters face.
3. Answer questions about characters and events that take place in the text.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. retell the beginnings, middles, and endings of stories
b. ask and answer questions about details of a text
c. identify the problems that characters face in a story and the lessons learned
d. identify the feelings of characters and the reasons for their actions
e. differentiate between realistic and fantastical elements within a story

Informational Text

a. restate key information (e.g., events, subject, ideas) from a text
b. ask and answer questions about details of a text

Reading Foundations

Print Concepts

1. Students demonstrate understanding of the organization and basic features of print.

a. identify basic features and conventions of books and other written texts (e.g., front cover, back cover, title, author)
b. understand that print is left to right, top to bottom, and page by page
c. understand that words are separated by spaces in print
d. recognize and name all upper- and lowercase letters of the alphabet

Linguistic Awareness

2. Students gain awareness of spoken words, syllables, and phonemes.

a. recognize, recite, and produce rhyming words
b. count, pronounce, blend, and segment syllables in spoken words
c. recognize, blend, and segment onset and rimes of spoken words [*/g/ - /oat/; /bl/ - /ock/)*
d. count or place tokens for individual words in spoken phrases or simple sentences
e. orally blend and segment individual phonemes in simple, one-syllable words
f. demonstrate phonemic awareness by isolating and pronouncing the initial and final phonemes (sounds) in three-phoneme /CVC/ words without consonant blends (e.g., */road/*, */save/*, */ham/*)
g. add or substitute individual phonemes in simple, one-syllable words to make new words (e.g., */at/* → */sat/* → */mat/* → */map/*)

[5] The expectation is that students can fulfill these standards with texts they read independently as well as texts that are read aloud to them.

Observing craft and structure

Core Standards — Students can and do:

4. Identify the meanings of words and phrases as they are used in the text.
5. Identify important parts or sections of texts.
6. Compare and contrast characters or events from different stories.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. identify words and phrases that suggest feelings or appeal to the senses
b. identify similarities in beginning and ending sounds of words in children's poems and songs
c. identify parts of a story and parts of a poem as well as sections of informational picture books and tell how they are different
d. identify common characteristics of folktales and fairy tales, including their use of rhyme, rhythm, and repetition
e. participate (e.g., react, speculate, read along, act out) when familiar texts are read aloud
f. compare and contrast characters or events from different stories written by the same author or written about similar subjects

Informational Text

a. identify basic text features and what they mean, including titles and subtitles, table of contents, and chapters

Reading Foundations, continued

Phonics and Word Recognition

3. Students know and apply grade-level phonics and word analysis skills in decoding words.
   a. demonstrate basic knowledge of letter-sound correspondences by producing the primary or most frequent sound for each consonant
   b. identify which letters represent the five major vowels and know the long and short sound of each
   c. blend letter-sounds to decode short-vowel CVC words (e.g., *cat*, *mop*, *sun*)
   d. read at least 25 very high frequency words by sight (e.g., *of*, *to*, *he*, *she*, *is*, *do*, *does*)

Developing Fluency

4. Students read with sufficient accuracy and fluency to support comprehension.
   a. read rebus and preprimer texts with purpose and understanding
   b. demonstrate increased accuracy and fluency on successive readings of a text

Integrating information and evaluating evidence

Core Standards — Students can and do:

7. Use text illustrations to predict or confirm what the text is about.
8. Identify words in a text that link ideas and events together.
9. Identify who is telling a story or providing information in the text.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. use pictures, illustrations, and context to make predictions about and confirm story content
b. identify words in a story that link events together (e.g., *first/second, then, next, before/after, later, finally*)
c. identify who is the speaker in a story or poem

Informational Text

a. identify words that link ideas together (e.g., *also, in addition, for example, but*)
b. identify the author and sources of information when provided by the text

Developing habits for reading text

Core Standards — Students can and do:

10. Begin to read independently and/or with a partner, sustaining effort necessary to build understanding.

Writing and Research Standards

Writing to reflect audience, purpose, and task

Core Standards — Students can and do:

1. Write narratives, informative and explanatory texts, and opinions that communicate to a familiar, known audience.

Conducting research

Core Standards — Students can and do:

2. Gather information from experiences or provided text sources.

Revising writing

Core Standards — Students can and do:

3. With specific guidance, add details to strengthen writing through revision.

Using tools and technology

Core Standards — Students can and do:

4. Gain familiarity with technology and other tools to produce, revise, and edit writing.

Standards — Students can and do (by key text type):[6]

Narratives

a. establish a situation in time and/or place
b. recount several loosely linked actions in a short, familiar event, controlling for chronological order
c. provide a reaction to what happened

Informative and Explanatory Texts

a. establish the topic in a title or first sentence
b. supply facts and information relevant to the topic

Arguments (opinions)

a. introduce the topic directly, or use the title of a book when writing about a text
b. express preferences or opinions (e.g., *My favorite book is . . .*) relevant to the topic
c. provide a reason for preference or opinion (e.g., *It reminded me of when I met my friend Carlos*)
d. use linking words that express causality (e.g., *I like . . . because . . .*)

Speaking and Listening Standards

Listening closely and participating productively

Core Standards — Students can and do:

1. Participate productively in group activities requiring speaking and listening.
2. Listen closely to and sustain attention on texts read aloud as well as other sources of information presented orally, visually, or multi-modally and confirm understanding by restating the information and answering pertinent questions.

Standards — Students can and do (by key communication type):

Classroom discussions and participating productively

a. initiate and participate in conversations with peers and adults through multiple exchanges, attending to the comments of others
b. confirm understanding by restating information or answering questions about what has been discussed
c. ask questions to get information, ask for help, or clarify something that is not understood
d. follow norms for conversation, such as listening to others and taking turns to speak

Exchanging information and speaking effectively

Core Standards — Students can and do:

[6] See Appendix D for samples of student writing that illustrate through annotations the level of quality required to meet the writing standards.

3. Share experiences and ideas that demonstrate an awareness of their listeners.
4. Speak audibly and clearly.

Standards — Students can and do (by key communication type):

Presentation of ideas and information

a. describe people, places, things, and events with relevant facts and examples
b. recite or read aloud poems, rhymes, songs, and stories, speaking clearly at an understandable pace

Language Development Standards

Conventions

In kindergarten, students learn to form letters and words in print and to relate sounds (phonemes) to one or more letters. They understand the notion of a sentence, that a sentence performs one of a few basic functions (make a statement, ask a question, or issue a command), and that end punctuation can signal the sentence's function or intensity. With prompting and assistance, they form and expand basic sentences in order to express thoughts, beginning the sentence with a capital letter. Students have a sense of what a noun is, of what singular and plural nouns are, and of how plural nouns are often formed. They also know how to use the most frequently occurring prepositions.

Key Terms: exclamation point, capital/uppercase and lowercase letter, singular and plural noun, period, punctuation, question mark, sentence

Conventions of language and writing

Core Standards — Students can and do:

1. Print all upper- and lowercase letters.
2. Write a letter or letters for each consonant and short-vowel sound (phoneme).

Grammar and usage

Core Standards — Students can and do:

3. Produce and expand complete sentences in shared writing and language activities.
4. Use and understand question words (e.g., *what*, *where*, *when*, *who*, *which*, *how*).
5. Form regular plural nouns by adding /s/ or /es/ (e.g., *dog*, *dogs*; *wish*, *wishes*; *baby*, *babies*).
6. Demonstrate understanding of the most frequently occurring prepositions (e.g., *to/from*, *in/out*, *on/off*, *for*, *of*, *by*, *with*).

Mechanics

Core Standards — Students can and do:

7. Capitalize the first word in a sentence and the pronoun *I*.
8. Identify end punctuation, including periods, question marks, and exclamation points.

9. Spell simple words phonetically using knowledge of sound-letter relationships.

Vocabulary

Key to students' vocabulary development is building rich and flexible word knowledge marked by multiple connections that link a word to similar words and to contexts and experiences that are related to that word—as compared to simply a definition. In kindergarten, students learn about words in terms of like versus unlike and "similar but not quite the same," using objects and movements as aids. They learn to use descriptive language to distinguish one object from another and order and position words to describe sequences and spatial relationships. They acquire new words through interactive language use, including informal talk, discussion, listening to and responding to texts read aloud as well as by being taught the words directly.

Determining the meaning of words

Core Standards — Students can and do:

1. Sort common objects into categories (e.g., shapes, foods).

Understanding the nuances of words (denotations and connotations)

Core Standards — Students can and do:

2. Act out the meaning of verbs describing the same general action (e.g., *walk*, *march*, *strut*, *prance*) to gain a sense of their different meanings.
3. Demonstrate understanding of common adjectives by relating them to their opposites (antonyms).
4. Use common adjectives to distinguish objects (e.g., the *small blue* square, the *shy white* rabbit).

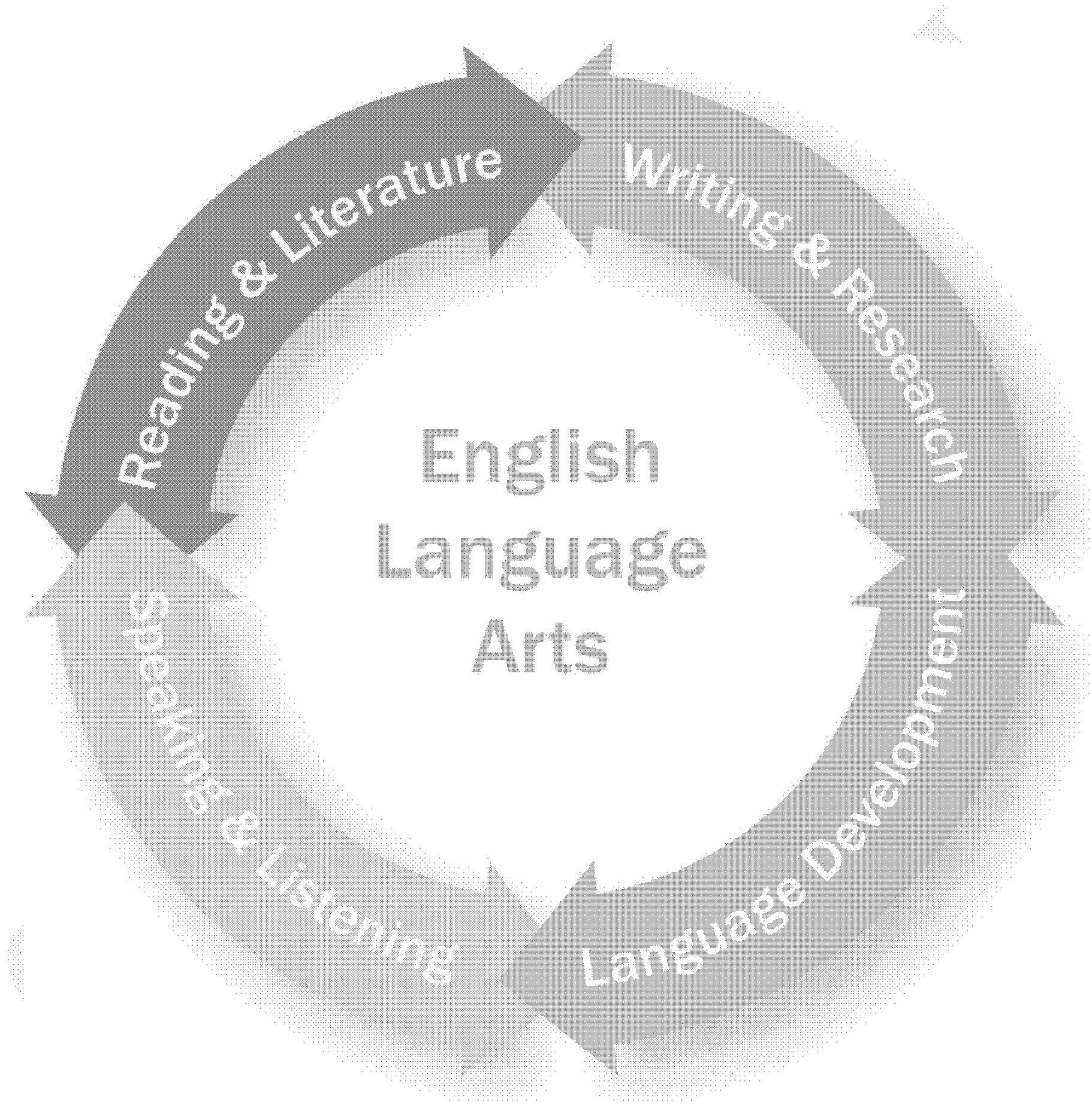
Acquiring vocabulary

Core Standards — Students can and do:

5. Demonstrate meaning of new vocabulary taught directly and gained through conversations and hearing texts read aloud.
6. Demonstrate understanding of words that express order and position (e.g., *first*, *middle*, *last*; *before*, *after*; *under*, *over*).

English Language Arts

Grade 1



Mix of Key Text Types for Grade 1

Narratives	Drama	Poetry	Informational Text
At this level, includes children's adventure stories, biographies, folktales, legends, fables, fantasy, realistic fiction, and myth.	*At this level, includes staged dialogue and brief, familiar scenes.*	*At this level, includes nursery rhymes and the subgenres of narrative poems, limericks, and free verse.*	*At this level, includes books about science, history, and the arts and other nonfiction materials.*

Illustrative Texts for Narratives, Drama, and Poetry[7]

Green Eggs and Ham by Dr. Seuss (1960)

Frog and Toad Together by Arnold Lobel (1971)

Henry and Mudge: The First Book of Their Adventures by Cynthia Rylant, illustrated by Suçie Stevenson (1987)

"Halfway Down" by A. A. Milne (1924)

"It Fell in the City" by Eve Merriam (1986)

Read alouds:

Little House in the Big Woods by Laura Ingalls Wilder, illustrated by Garth Williams (1932)

Zin! Zin! Zin! a Violin by Lloyd Moss, illustrated by Marjorie Priceman (1995)

Illustrative Informational Texts

A Tree Is a Plant by Clyde Robert Bulla, illustrated by Stacey Schuett (text: 1960/illus: 2001)

What Do You Do With a Tail Like This? by Steve Jenkins & Robin Page (2003)

"Our Good Earth" in *National Geographic Young Explorer*, April (2009)

Read alouds:

Follow the Water from Brook to Ocean by Arthur Dorros (1991)

Living Sunlight: How Plants Bring the Earth to Life by Molly Bang & Penny Chisholm, illustrated by Molly Bang (2009)

[7] See Appendix C for other texts illustrative of Kindergarten-Grade 1 text complexity. This list includes read-alouds.

Reading and Literature Standards[8]

Grasping specific details and key ideas

Core Standards — Students can and do:

1. Retell key details and information drawn from the text.
2. Explain the subject of the text or the problem the characters face.
3. Answer questions about characters and events that take place in the text.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. retell the beginnings, middles, and endings of stories
b. ask and answer questions about details of a text
c. identify the problems that characters face in a story and the lessons learned
d. identify the feelings of characters and the reasons for their actions
e. differentiate between realistic and fantastical elements within a story

Informational Text

a. restate key information (e.g., events, subject, ideas) from a text
b. ask and answer questions about details of a text

Reading Foundations

Linguistic Awareness

1. Students gain awareness of spoken words, syllables, and phonemes.
   a. aurally distinguish long from short vowel sounds in spoken single-syllable words (e.g., */tap/* vs. */tape/*; */sock/* vs. */soak/*; */sit/* vs. */sight/*)
   b. produce single-syllable words by orally blending phonemes, including consonant blends (e.g., */cats/*, */black/*, */blast/*)
   c. isolate and pronounce initial, medial vowel, and final phonemes (sounds) in single-syllable words (e.g., ***f**ast*, *f**a**st*, *fas**t***)
   d. orally segment single-syllable words into their complete sequence of individual phonemes

[8] The expectation is that students can fulfill these standards with texts they read independently as well as texts that are read aloud to them.

Observing craft and structure

Core Standards — Students can and do:

4. Identify the meanings of words and phrases as they are used in the text.
5. Identify important parts or sections of texts.
6. Compare and contrast characters or events from different stories.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. identify words and phrases that suggest feelings or appeal to the senses
b. identify similarities in beginning and ending sounds of words in children's poems and songs
c. identify parts of a story and parts of a poem as well as sections of informational picture books and tell how they are different
d. identify common characteristics of folktales and fairy tales, including their use of rhyme, rhythm, and repetition
e. participate (e.g., react, speculate, read along, act out) when familiar texts are read aloud
f. compare and contrast characters or events from different stories written by the same author or written about similar subjects

Informational Text

a. identify basic text features and what they mean, including titles and subtitles, table of contents, and chapters

Reading Foundations, continued

Phonics and Word Recognition

2. Students know and apply grade-level phonics and word analysis skills in decoding words.

a. know the common spelling-sound correspondences for consonants (e.g., *wr-*, *sh*, *-ck*, *-ll*)
b. know vowel digraph and final-*e* conventions for representing long vowels
c. know spelling-sound correspondences for diphthongs and other common vowel teams (e.g., *loud*, *cow*, *look*, *loop*, *boy*, *boil*)
d. use knowledge of phonics and spelling conventions to decode regularly spelled one-syllable words (e.g., *sick*, *march*, *sight*, *slice*, *bake*, *spring*)
e. understand that every syllable must have a vowel sound and use that knowledge to determine the number of syllables in a word
f. decode two-syllable words following basic patterns (e.g., *rabbit*, *magnet*, *napkin*, *pickle*, *butter*)
g. read words with inflectional endings (e.g., *-s*, *-es*, *ies*, *-ed*, *ied*, *-ing*, *-er*, *-est*)
h. use phonics to decode visually new words when reading
i. recognize grade-appropriate, irregularly spelled words by sight

Integrating information and evaluating evidence

Core Standards — Students can and do:

7. Use text illustrations to predict or confirm what the text is about.
8. Identify words in a text that link ideas and events together.
9. Identify who is telling a story or providing information in the text.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. use pictures, illustrations, and context to make predictions about and confirm story content
b. identify words in a story that link events together (e.g., *first/second, then, next, before/after, later, finally*)
c. identify who is the speaker in a story or poem

Informational Text

a. identify words that link ideas together (e.g., *also, in addition, for example, but*)
b. identify the author and sources of information when provided by the text

Developing habits for reading text

Core Standards — Students can and do:

10. Begin to read independently and/or with a partner, sustaining effort necessary to build understanding.

Reading Foundations, continued

Developing Fluency

3. Students read with sufficient accuracy and fluency to support comprehension.

a. demonstrate increased accuracy, fluency, and expression on successive readings of a text
b. use context to confirm or self-correct word recognition and understanding, rereading as necessary
c. read aloud, alone, or with a partner at least 15 minutes each day, in school or out

Writing and Research Standards

Writing to reflect audience, purpose, and task

Core Standards — Students can and do:

1. Write narratives, informative and explanatory texts, and opinions that communicate to a familiar, known audience.

Conducting research

Core Standards — Students can and do:

2. Gather information from experiences or provided text sources.

Revising writing

Core Standards — Students can and do:

3. With specific guidance, add details to strengthen writing through revision.

Using tools and technology

Core Standards — Students can and do:

4. Gain familiarity with technology and other tools to produce, revise, and edit writing.

Standards — Students can and do (by key text type):[9]

Narratives

a. establish a situation in time and/or place that is appropriate for the sequence of events to follow
b. develop appropriately sequenced actions within one or more events using linking words, phrases, or clauses to signal chronological ordering
c. provide a reaction to what happened
d. include dialogue if appropriate, and some details
e. provide a sense of closure and/or a reflective statement

Informative and Explanatory Texts

a. include some sort of beginning to establish the topic (beyond using the title of the piece)
b. supply facts and information relevant to the topic
c. use simple additive linking words (e.g., *and*, *first*, *second*) to create connections between the facts
d. provide examples relevant to the topic
e. provide a sense of closure

Arguments (opinions)

a. introduce the topic or book directly, or use the title of the book as an introduction
b. state opinions (e.g., *My best friend is . . .*) relevant to the topic
c. provide reasons for opinions and details to support them

[9] See Appendix C for samples of student writing that illustrate through annotations the level of quality required to meet the writing standards.

d. use linking words that express causality (e.g., *I like . . . because . . .*)
e. refer to the content of the text when writing about literature

Speaking and Listening Standards

Listening closely and participating productively

Core Standards — Students can and do:

1. Participate productively in group activities requiring speaking and listening.
2. Listen closely to and sustain attention on texts read aloud as well as other sources of information presented orally, visually, or multi-modally and confirm understanding by restating the information and answering pertinent questions.

Standards — Students can and do (by key communication type):

Classroom discussions and participating productively

a. initiate and participate in conversations with peers and adults through multiple exchanges, attending to the comments of others
b. confirm understanding by restating information or answering questions about what has been discussed
c. ask questions to get information, ask for help, or clarify something that is not understood
d. follow norms for conversation, such as listening to others and taking turns to speak

Exchanging information and speaking effectively

Core Standards — Students can and do:

3. Share experiences and ideas that demonstrate an awareness of their listeners.
4. Speak audibly and clearly.

Standards — Students can and do (by key communication type):

Presentation of ideas and information

a. describe people, places, things, and events with relevant facts and examples
b. recite or read aloud poems, rhymes, songs, and stories, speaking clearly at an understandable pace

Language Development Standards

Conventions

In grade 1, students gain increasing skill and independence in sentence formation and development. They have a sense of what a verb is and that its form changes to signal different time periods (past, present, and future). Their repertoire of prepositions continues to expand, and they use pronouns with regularity. Students capitalize names, places, and dates. They use end punctuation as well as commas in dates and in simple series of words. Their range of word-formation and spelling strategies grows.

Key Terms: comma, pronoun, verb

Grammar and usage

Core Standards — Students can and do:

1. Produce and expand complete sentences in response to questions and prompts.
2. Use subject, object, and possessive pronouns (e.g., *I*, *me*, *my*; *they*, *them*, *their*).
3. Use verbs to convey a sense of past, present, and future in writing and speaking (e.g., *Today I walk home*; *Yesterday I walked home*; *Tomorrow I will walk home*).
4. Demonstrate understanding of frequently occurring prepositions (e.g., *during*, *beyond*, *toward*).

Mechanics

Core Standards — Students can and do:

5. Capitalize names, places, and dates.
6. Use end punctuation for sentences, including periods, question marks, and exclamation points.
7. Use commas in dates and to separate single words in a series.
8. Form new words through addition, deletion, and substitution of sound and letters (e.g., *an* → *man* → *mat* → *mast* → *must* → *rust* → *crust*).
9. Use conventional spelling for words with common spelling patterns and common irregular words.
10. Use phonetic spellings for untaught words, drawing on phonemic awareness and spelling conventions.

Vocabulary

Key to students' vocabulary development is building rich and flexible word knowledge marked by multiple connections that link a word to similar words and to contexts and experiences that are related to that word—as compared to simply a definition. In grade 1, students begin to sort words themselves into categories rather than the objects that they name. They are able to define familiar words (e.g., *duck*) in a two-step process of identifying a category (bird) to which it belongs and naming one or more attributes that distinguish this category member from others (able to swim). Students grasp that many words they know can mean different things depending on how the word is used, and they make distinctions between and among closely related verbs and adjectives in terms of manner and intensity. They acquire new words through interactive language use, including informal talk, discussion, listening to and responding to texts read aloud as well as by being taught the words direct.

Determining the meaning of words

Core Standards — Students can and do:

1. Sort words into categories (e.g., colors, clothing).
2. Define words by category and by one or more key attributes (e.g., a *duck* is a bird that swims; a *tiger* is a large cat with stripes).
3. Demonstrate understanding of the concept of multiple-meaning words (e.g., *match*, *kind*, *play*) by identifying various meanings of some grade-appropriate examples of such words.

Understanding the nuances of words (denotations and connotations)

Core Standards — Students can and do:

4. Define, choose, or act out the meaning of closely related verbs that differ in manner (e.g., *look*, *peek*, *glance*, *stare*, *glare*, *scowl*; *speak*, *shout*, *mumble*, *whine*, *whimper*, *murmur*).
5. Distinguish among closely related adjectives that differ in intensity (e.g., *large*, *gigantic*; *hot*, *scalding*; *tasty*, *delicious*; *quiet*, *silent*).

Acquiring vocabulary

Core Standards — Students can and do:

6. Acquire and use new vocabulary taught directly and gained through conversations and hearing texts read aloud.

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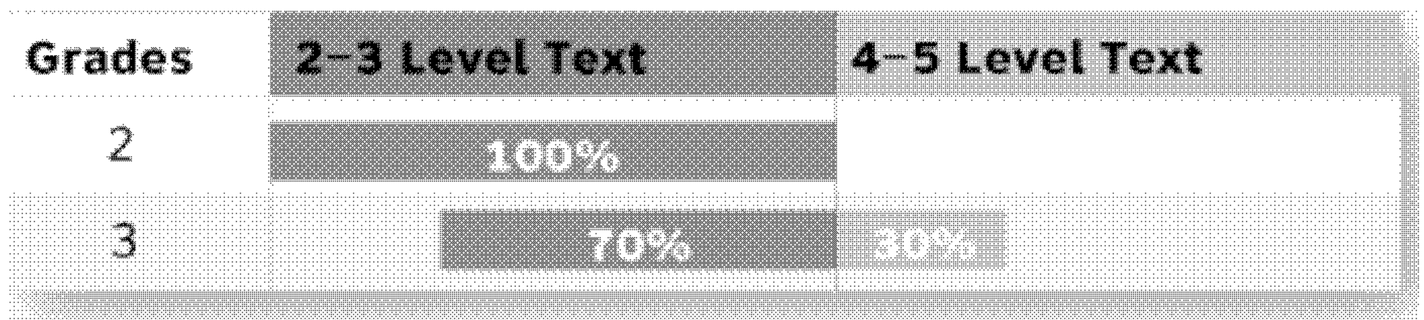
English Language Arts

Grade 2

Required Text Complexity by Grade

Proportion of Texts Within and Above Grade Band to be Read in Each Grade



While advancing through the grades, students must engage with texts of steadily increasing complexity.

- **In grade 2**, students focus on reading texts in the 2–3 grade band level with scaffolding likely required for texts at the high end of the range.

Determining Text Complexity for Grades 2–3

Text complexity is determined by a mix of qualitative and quantitative measures of the text itself refined by teachers professional judgment about the match of particular texts to particular students. The qualitative dimensions of text complexity are best understood as continua of increasing complexity rather than as representing discrete and easily defined stages. Most authentic texts will exhibit some but not all of the traits linked to a particular grade band; qualitatively assigning a text to a grade band is therefore a matter of "best fit," or determining which grade band's set of descriptors most accurately describes the text.

Qualitative Measures of Texts[10]	Quantitative Measures of Texts
• *Structure:* Explicit, simple, conventional; simple graphic representations are supplementary to meaning; texts are relatively short • *Purpose:* Single; explicitly stated • *Style and Language:* Familiar, accessible, plain; few literary devices; mostly clear, everyday language; limited use of Tier 2 and 3 words and figurative language • *Richness:* A few ideas/concepts; concrete; low information density • *Relationships:* A few connections; explicit • *Knowledge Demands:* Ability to handle simple themes and fantastical elements as well as draw upon common, everyday experiences; general background knowledge and familiarity with genre conventions required; some everyday and general content knowledge	A study is underway with Coh-Metrix, a nonprofit research organization, to identify roughly five to seven computer-measurable dimensions of text cohesion. These dimensions, paired with a Lexile score, will yield a robust quantitative assessment of text complexity that, along with both the qualitative dimensions and professional judgment, will round out the Core Standards model of complexity.
Professional Judgment that weighs students' prior knowledge and life experiences as well as their interests, motivations, and maturity level.	

[10] Adapted from ACT, Inc., (2005); Carnegie Council on Advancing Adolescent Literacy (2010); Chall, Bissex, Conrad, & Harris-Sharples (1996); and Hess and Biggam (2004)

Mix of Key Text Types for Grade 2

Narratives	Drama	Poetry	Informational Text
At this level, includes children's adventure stories, biographies, folktales, legends, fables, fantasy, realistic fiction, and myth.	*At this level, includes staged dialogue, scenes, and brie, familiar scenes.*	*At this level, includes nursery rhymes and the subgenres of narrative poems, limericks, and free verse.*	*At this level, includes books about science, history, and the arts and other nonfiction materials.*

Illustrative Texts for Narratives, Drama, and Poetry[11]

Crow Boy by Taro Yashima (1955)

The Stories Julian Tells by Ann Cameron (1981)

Tops and Bottoms by Janet Stevens (1995)

"Grandpa's Stories" by Langston Hughes (1958)

"Weather" by Eve Merriam (1969)

Read alouds:

The Cricket in Times Square by George Selden, illustrated by Garth Williams (1960)

"Fireflies" by Paul Fleischman, illustrated by Eric Beddows (1988)

Illustrative Informational Texts

Maps & Globes by Jack Knowlton, pictures by Harriet Barton (1985)

Sunshine Makes the Seasons by Franklyn M. Branley (1985)

From Seed to Plant by Gail Gibbons (1991)

Boy, Were We Wrong About Dinosaurs by Kathleen V. Kudlinski, illustrated by S.D. Schindler (2005)

[11] See Appendix B for other texts illustrative of Grades 2-3 text complexity.

Reading and Literature Standards

Grasping specific details and key ideas

Core Standards — Students can and do:

1. Retell what the text says explicitly and make inferences required to understand the text.
2. Identify the lessons or topics of the text and the key details that support them.
3. Describe in detail a specific character, event, or topic in the text.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. ask and answer clarifying questions (e.g., how, why, where, when, who, and what) concerning specific details in the text and refer explicitly to parts of a text to answer these questions
b. identify or infer the moral or lesson in well-known stories, fables, folktales, or myths
c. describe how major events in a story often lead from problem to solution
d. examine a specific incident in a story, narrative, or drama in depth and establish when, where, and why it occurs
e. describe characters based upon what they say and do

Informational Text

a. accurately restate the key information provided by the text
b. ask and answer clarifying questions (e.g., how, why, and what) concerning specific details in the text and refer explicitly to parts of a text to answer these questions
c. identify the main idea and supporting details and facts in a text
d. explain the topic of each paragraph in a multi-paragraph text
e. identify specific events in historical or scientific texts and discuss what happened, as well as where, when, and why it happened, according to facts taken from the text

Reading Foundations

Phonics and Word Recognition

1. Students know and apply grade-level phonics and word analysis skills in decoding words.
   a. know the common spelling-sound correspondences for consonants (e.g., *wr-*, *sh*, *-ck*, *-ll*)
   b. know vowel digraph and final-*e* conventions for representing long vowels
   c. know spelling-sound correspondences for diphthongs and other common vowel teams (e.g., *loud*, *cow*, *look*, *loop*, *boy*, *boil*)
   d. use knowledge of phonics and spelling conventions to decode regularly spelled one-syllable words (e.g., *sick*, *march*, *sight*, *slice*, *bake*, *spring*)

Observing craft and structure

Core Standards — Students can and do:

4. Explain the meanings of words and phrases as they are used in the text.
5. Gain familiarity with different ways of presenting stories and information in text.
6. Compare and contrast different versions of the same story or informational texts on the same subject.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. recognize sensory details and how they are used to describe events, feelings, and objects
b. describe the different ways poets use rhyme, rhythm, and sensory images to convey a topic or message
c. identify repetitions in phrases, refrains, or sounds in poems and songs
d. describe story elements, including characters, setting, the problem, and how it is resolved
e. discuss stories written by the same author about similar characters or compare different versions of similar well-known tales and myths from various cultures

Informational Text

a. locate key words, facts, or other details using features of texts (e.g., captions, headings, glossaries, indexes, electronic menus, and icons)
b. distinguish between writing that is based on real events and writing that is based on fantasy or fictional events
c. combine information from two different parts of a text and identify how they are related (e.g., chronology, causation)
d. after reading two passages on the same subject, combine the information to more fully describe a topic

Reading Foundations, continued

Developing Fluency

2. Students read with sufficient accuracy and fluency to support comprehension.

a. demonstrate increased accuracy, fluency, and expression on successive readings of a text
b. use context to confirm or self-correct word recognition and understanding, rereading as necessary
c. read alone or with a partner at least 20 minutes each day, in school or out

Integrating information and evaluating evidence

Core Standards — Students can and do:

7. Locate and use information from graphs, illustrations, and electronic sources.
8. Identify and understand words and phrases that indicate logical relationships.
9. Identify who is telling the story or providing information at any given point in the text.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. efficiently navigate stories in print and electronic text and explain how images and illustrations connect to and clarify the content
b. identify who is telling the story or who is speaking in a drama

Informational Text

a. use information from visual elements of print and electronic texts (e.g., graphs, maps, charts, illustrations, photographs, diagrams) and explain how they help a reader understand the text
b. identify words (e.g., *such as*, *because*, *therefore*, *in order to*, *since*) that logically connect ideas in sentences and paragraphs

Developing habits for reading complex text

Core Standards — Students can and do:

10. Develop the habit of reading independently and productively, sustaining concentration and stamina to read increasingly demanding text.

Writing and Research Standards

Writing to reflect audience, purpose, and task

Core Standards — Students can and do:

1. Write narratives, informative and explanatory texts, and opinions that communicate to a familiar, known audience.

Conducting research

Core Standards — Students can and do:

2. Gather information from experiences or provided text sources.

Revising writing

Core Standards — Students can and do:

3. With specific guidance, strengthen writing through revision.

Using tools and technology

Core Standards — Students can and do:

4. Gain familiarity with technology and other tools to produce, revise, and edit writing.

Standards — Students can and do (by key text type):[12]

Narratives

a. establish a situation in time and/or place that is appropriate for the sequence of events to follow
b. recount a single well-elaborated event or sequence of events, managing chronological sequence with temporal words, phrases, and clauses
c. tell what the narrator thought or felt
d. include dialogue if appropriate and specific details
e. provide closure through reaction, commentary, or summation

Informative and Explanatory Texts

a. produce a brief introduction
b. create an organizational structure that presents similar information together, frequently patterned after chapter book headings or picture books
c. use adequate and specific facts and definitions to develop points
d. use linking words, such as *also*, *another*, *and*, and *more*, to connect ideas within categories of information, and headers to signal groupings
e. include a concluding sentence or section

Arguments (opinions)

a. introduce the topic or book(s) directly
b. state opinion(s) relative to the topic
c. provide reasons for opinions and details to support them
d. create a list-like structure for organization
e. use words to link and organize opinions and reason(s) (e.g., *because*, *another*, *and*, *also*)
f. refer to the text(s) when writing about literature
g. close with a concluding statement or recommendation

Speaking and Listening Standards

Listening closely and participating productively

Core Standards — Students can and do:

1. Participate productively in small groups and as a class, engaging in a series of oral exchanges about texts and topics.

[12] See Appendix C for samples of student writing that illustrate through annotations the level of quality required to meet the writing standards.

2. Sustain concentration on information presented orally, visually, or multi-modally and confirm understanding by paraphrasing the information.

Standards — Students can and do (by key communication type):

Classroom discussions and participating productively

a. engage in conversations on familiar topics
b. paraphrase the key information or ideas of others presented orally or through other media
c. inquire about oral or visual presentations to deepen understanding or clarify comprehension
d. link additions to conversation to the previous remarks of others
e. participate productively by listening politely to the ideas of others, taking turns speaking, and extending their ideas in light of discussions

Exchanging information and speaking effectively

Core Standards — Students can and do:

3. Share experiences and ideas, thinking about the needs of their listeners.

4. Speak audibly and clearly at an understandable pace.

Standards — Students can and do (by key communication type):

Presentation of ideas and information

a. recount stories or experiences with descriptive details by answering who, what, where, when, how, and why questions about them
b. report on a topic, including appropriate facts and details
c. use appropriate tone to express ideas, feelings, and needs clearly
d. recite or read aloud poems, rhymes, songs, and stories, speaking clearly at an understandable pace

Language Development Standards

Conventions

In grade 2, students create sentences of expanding length and complexity, though their control over these sentences is likely to be imperfect. Their command of noun and verb formation extends to common irregular forms. Students capitalize correctly in most situations. Their use of punctuation has grown to include commas in greetings and closings of letters as well as apostrophes to form contractions and to signal possession. Their spelling is increasingly conventional, and they now consult references, such as beginning dictionaries, to aid them when needed.

Key Terms: apostrophe, contraction, regular and irregular nouns and verb, possessive

Grammar and usage

Core Standards — Students can and do:

1. Generate and expand sentences with embedded, dependent, or conjoined clauses (e.g., *After we came home from school, I fed the gerbil and my sister cleaned the cage*).

2. Form common irregular plural nouns (e.g., *feet*, *children*, *teeth*, *mice*, *fish*, *women*).

3. Form the past tense of common irregular verbs (e.g., *sat*, *hid*, *told*).

Mechanics

Core Standards — Students can and do:

4. Capitalize holidays, product names, geographic names, and important words in titles.
5. Use commas in greetings and closings of letters.
6. Use apostrophes to punctuate contractions and to form common possessives.
7. Use conventional spelling for high-frequency and other studied words.
8. Generalize learned spelling patterns when writing words (e.g., *cage* → *badge*; *boy* → *boil*; *paper* → *copper*).
9. Use spelling rules for adding suffixes to base words (e.g., *sitting*, *smiled*, *cries*, *happiness*).
10. Consult reference materials, including beginning dictionaries, to check and correct spellings.

Vocabulary

In grade 2, students use a repertoire of strategies for dealing with unknown words. They can analyze the word itself, consider how it is used, consult reference materials, use the components of a compound word as clues to the word's meaning, or employ some combination of these strategies to determine or clarify word meanings. They figure out which meaning of a multiple-meaning word is most likely intended in a particular circumstance, and they differentiate among the connotations of related verbs and adjectives. They acquire new words through interactive language use, including informal talk, discussion, reading and responding to text as well as by being taught the words directly.

Determining the meaning of words

Core Standards — Students can and do:

1. Determine or clarify the meaning of an unknown word by using one or more of the following strategies:
   - identifying its base word when it has affixes (e.g., *happiness*, *finally*, *grimy*, *busily*)
   - determining how it is used in a sentence when reading, including whether it names or describes a thing or an action
   - consulting reference materials, including glossaries and beginning dictionaries, both print and digital
2. Determine the relevant meaning of multiple-meaning words by using context.
3. Explain the meaning of grade-appropriate compound words (e.g., *birdhouse*, *lighthouse*, *housefly*; *bookshelf*, *notebook*, *bookmark*).

Understanding the nuances of words (denotations and connotations)

Core Standards — Students can and do:

4. Distinguish among related verbs (e.g., *toss*, *throw*, *hurl*) to gain a sense of their shadings of meaning.
5. Distinguish among related adjectives (e.g., *thin*, *slender*, *skinny*, *scrawny*; *irritated*, *mad*, *angry*, *furious*) to gain a sense of their shadings of meaning.

Acquiring vocabulary

Core Standards — Students can and do:

6. Acquire and use new vocabulary taught directly and gained through reading and conversations.

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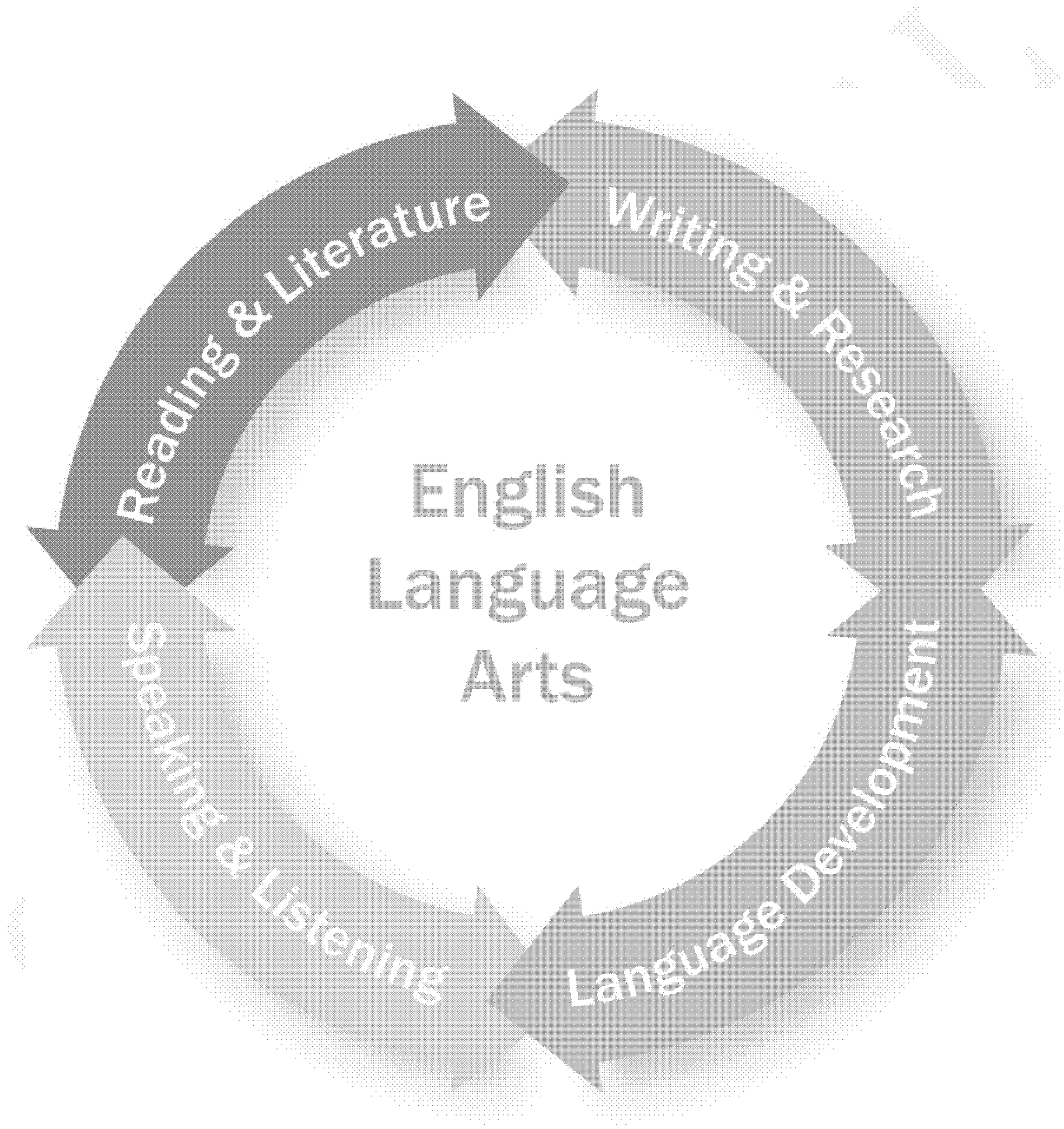
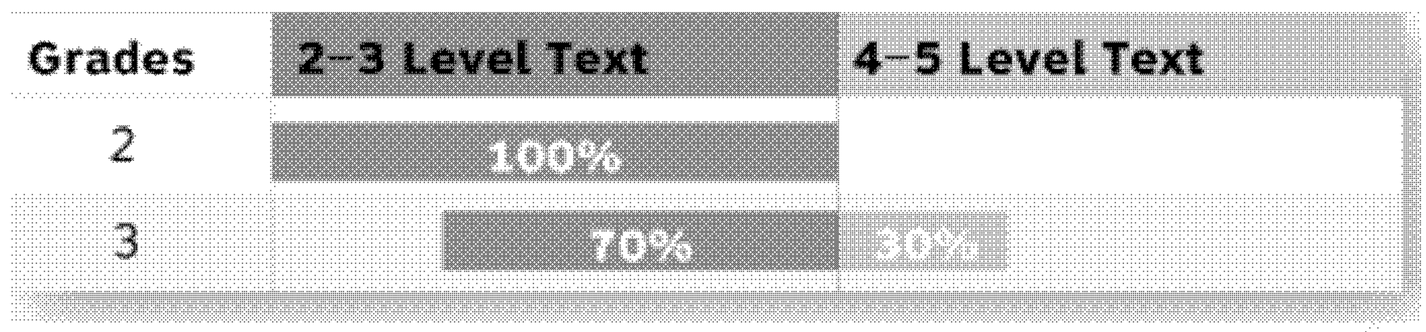
English Language Arts

Grade 3



Required Text Complexity by Grade

Proportion of Texts Within and Above Grade Band to be Read in Each Grade



While advancing through the grades, students must engage with texts of steadily increasing complexity.

- **In grade 3**, students focus on reading texts in the 2–3 grade band level text (70 percent) independently and are introduced to texts in the 4–5 grade band level as "stretch" texts (30 percent), which will likely require scaffolding.

Determining Text Complexity for Grades 2–3

Text complexity is determined by a mix of qualitative and quantitative measures of the text itself refined by teachers' professional judgment about the match of particular texts to particular students. The qualitative dimensions of text complexity are best understood as continua of increasing complexity rather than as representing discrete and easily defined stages. Most authentic texts will exhibit some but not all of the traits linked to a particular grade band; qualitatively assigning a text to a grade band is therefore a matter of "best fit," or determining which grade band's set of descriptors most accurately describes the text.

Qualitative Measures of Texts[13]	Quantitative Measures of Texts
• *Structure:* Explicit, simple, conventional; simple graphic representations are supplementary to meaning; texts are relatively short • *Purpose:* Single; explicitly stated • *Style and Language:* Familiar, accessible, plain; few literary devices; mostly clear, everyday language; limited use of Tier 2 and 3 words and figurative language • *Richness:* A few ideas/concepts; concrete; low information density • *Relationships:* A few connections; explicit • *Knowledge Demands:* Ability to handle simple themes and fantastical elements as well as draw upon common, everyday experiences; general background knowledge and familiarity with genre conventions required; some everyday and general content knowledge	A study is underway with Coh-Metrix, a nonprofit research organization, to identify roughly five to seven computer-measurable dimensions of text cohesion. These dimensions, paired with a Lexile score, will yield a robust quantitative assessment of text complexity that, along with both the qualitative dimensions and professional judgment, will round out the Core Standards model of complexity.
Professional Judgment that weighs students' prior knowledge and life experiences as well as their interests, motivations, and maturity level.	

[13] Adapted from ACT, Inc., (2005); Carnegie Council on Advancing Adolescent Literacy (2010); Chall, Bissex, Conrad, & Harris-Sharples (1996); and Hess and Biggam (2004)

Mix of Key Text Types for Grade 3

Narratives	Drama	Poetry	Informational Text
At this level, includes children's adventure stories, biographies, folktales, legends, fables, fantasy, realistic fiction, and myth.	*At this level, includes staged dialogue, scenes, and brief familiar scenes.*	*At this level, includes nursery rhymes, and the subgenres of narrative poems, limericks, and free verse.*	*At this level, includes books about science, history, and the arts and other nonfiction materials.*

Illustrative Texts for Narratives, Drama, and Poetry[14]

My Father's Dragon by Ruth Stiles Gannett, illustrated by Ruth Chrisman Gannett (1948)

Sarah, Plain and Tall by Patricia MacLachlan (1985)

The One-Eyed Giant (Book One of Tales from the Odyssey) by Mary Pope Osborne (2002)

"Knoxville, Tennessee" by Nikki Giovanni (1968)

"Eating While Reading" by Gary Soto (1995)

Read Alouds:

"How the Camel Got His Hump" in *Just So Stories* by Rudyard Kipling (1902)

Illustrative Informational Text

A Medieval Feast by Aliki (1983)

So You Want to Be President? by Judith St.George, illustrated by David Small (2000)

Bat Loves the Night by Nicola Davies, illustrated by Sarah Fox-Davies (2008)

Moonshot: The Flight of Apollo 11 by Brian Floca (2009)

[14] See Appendix B for other texts illustrative of Grades 2-3 text complexity.

Reading and Literature Standards

Grasping specific details and key ideas

Core Standards — Students can and do:

1. Retell what the text says explicitly and make inferences required to understand the text.
2. Identify lessons or topics of the text and the key details that support them.
3. Describe in detail a specific character, event, or topic in the text.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. ask and answer clarifying questions (e.g., how, why, where, when, who, and what) concerning specific details in the text and refer explicitly to parts of a text to answer these questions
b. identify or infer the moral or lesson in well-known stories, fables, folktales, or myths
c. describe how major events in a story often lead from problem to solution
d. examine a specific incident in a story, narrative, or drama in depth, and establish when, where, and why it occurs
e. describe characters based upon what they say and do

Informational Text

a. accurately restate key information provided by the text
b. ask and answer clarifying questions (e.g., how, why, and what) concerning specific details in the text and refer explicitly to parts of a text to answer these questions
c. identify the main idea and supporting details and facts in a text
d. explain the topic of each paragraph in a multi-paragraph text
e. identify specific events in historical or scientific texts and discuss what happened, as well as where, when, and why it happened, according to facts taken from the text

Reading Foundations

Phonics and Word Recognition

1. Students know and apply grade-level phonics and word analysis skills in decoding words.
   a. identify and know the meaning of the most common prefixes and derivational suffixes (e.g., *un-*, *re-*, *mis-*, *-ful*, *-tion*, *-able)*
   b. decode regularly spelled single-syllable and multi-syllable words (e.g., *vocabulary*, *refrigerator*, *terrible*, *frightening*)
   c. read grade-appropriate irregularly spelled words by sight
   d. use phonics and word analysis to identify visually new words when reading

Observing craft and structure

Core Standards — Students can and do:

4. Explain the meanings of words and phrases as they are used in the text.
5. Gain familiarity with different ways of presenting stories and information in text.
6. Compare and contrast different versions of the same story or informational texts on the same subject.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. recognize sensory details and how they are used to describe events, feelings, and objects
b. describe the different ways poets use rhyme, rhythm, and sensory images to convey a topic or message
c. identify repetitions in phrases, refrains, or sounds in poems and songs
d. describe story elements, including characters, setting, the problem, and how it is resolved
e. discuss stories written by the same author about similar characters or compare different versions of similar well-known tales and myths from various cultures

Informational Text

a. locate key words, facts, or other details using features of texts (e.g., captions, headings, glossaries, indexes, electronic menus, and icons)
b. distinguish between writing that is based on real events and writing that is based on fantasy or fictional events
c. combine information from two different parts of a text and identify how they are related (e.g., chronology, causation)
d. after reading two passages on the same subject, combine the information to more fully describe a topic

Integrating information and evaluating evidence

Core Standards — Students can and do:

7. Locate and use information from graphs, illustrations, and electronic sources.
8. Identify and understand words and phrases that indicate logical relationships.
9. Identify who is telling the story or providing information at any given point in the text.

Reading Foundations, continued

Developing Fluency

2. Students read with sufficient accuracy and fluency to support comprehension.
   a. demonstrate increased accuracy, fluency, and expression on successive readings of a text
   b. use context to confirm or self-correct word recognition and understanding, rereading as necessary
   c. read at least 20 minutes each day, in school or out

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. efficiently navigate stories in print and electronic text and explain how images and illustrations connect to and clarify the content
b. identify who is telling the story or who is speaking in a drama

Informational Text

a. use information from visual elements of print and electronic texts (e.g., graphs, maps, charts, illustrations, photographs, diagrams) and explain how they help a reader understand the text
b. identify words (e.g., *such as*, *because*, *therefore*, *in order to*, *since*) that logically connect ideas in sentences and paragraphs

Developing habits for reading complex text

Core Standards — Students can and do:

10. Develop the habit of reading independently and productively, sustaining concentration and stamina to read increasingly demanding text.

Writing and Research Standards

Writing to reflect audience, purpose, and task

Core Standards — Students can and do:

1. Write narratives, informative and explanatory texts, and opinions that communicate to a familiar, known audience.

Conducting research

Core Standards — Students can and do:

2. Gather information from experiences or provided text sources.

Revising writing

Core Standards — Students can and do:

3. With specific guidance, strengthen writing through revision.

Using tools and technology

Core Standards — Students can and do:

4. Gain familiarity with technology and other tools to produce, revise, and edit writing.

Standards — Students can and do (by key text type):[15]

Narratives

a. set the time, indicate a location, introduce characters, or enter immediately into the story line to engage the reader
b. recount a single, well-elaborated event or a sequence of events that unfold naturally using temporal words, phrases, and clauses
c. tell what the narrator thought or felt
d. develop a focus, provide pacing, and include only relevant information
e. develop a character through the description of external behavior
f. provide descriptive details
g. employ dialogue and other narrative strategies
h. provide a satisfying conclusion that is reflective and/or that effectively ties up loose ends

Informative and Explanatory Texts

a. produce an introduction that names the topic and provides at least one general detail about it
b. create an organizational structure that presents similar information together, frequently patterned after chapter book headings or picture books
c. use adequate, relevant, and specific facts and definitions to develop points
d. logically categorize details and facts drawn from personal experience and other sources
e. use linking words, such as *also*, *another*, *and*, and *more*, to connect ideas within categories of information, and use headers to signal groupings
f. include only appropriate information
g. include a concluding sentence or section

Arguments (opinions)

a. introduce the topic or book(s) directly, and attempt to capture the reader's interest
b. state an opinion relative to the topic (e.g., *This is a good book* or *John is a good friend*)
c. provide facts and details to support the opinion
d. create a list-like organizing structure that provides reasons for the opinion
e. use appropriate words to link and organize opinions and reason(s) (e.g., *because*, *another*, *and*, *also*)
f. refer to the text(s) when writing about literature
g. provide a concluding statement, reflection, and/or recommendation

[15] See Appendix C for samples of student writing that illustrate through annotations the level of quality required to meet the writing standards.

Speaking and Listening Standards

Listening critically and participating productively

Core Standards — Students can and do:

1. Participate productively in small groups and as a class, engaging in a series of oral exchanges about texts and topics.
2. Sustain concentration on information presented orally, visually, or multi-modally and confirm understanding by paraphrasing the information.

Standards — Students can and do (by key communication type):

Classroom discussions and participating productively

a. engage in conversations on familiar topics
b. paraphrase the key information or ideas of others presented orally or through other media
c. inquire about oral or visual presentations to deepen understanding or clarify comprehension
d. link additions to conversation to the previous remarks of others
e. participate productively by listening politely to the ideas of others, taking turns speaking, and extending their ideas in light of discussions

Exchanging information and speaking effectively

Core Standards — Students can and do:

3. Share experiences and ideas, thinking about the needs of their listeners.
4. Speak audibly and clearly at an understandable pace.

Standards — Students can and do (by key communication type):

Presentation of ideas and information

a. recount stories or experiences with descriptive details by answering who, what, where, when, how, and why questions about them
b. report on a topic, including appropriate facts and details
c. use appropriate tone to express ideas, feelings, and needs clearly
d. recite or read aloud poems, rhymes, songs, and stories, speaking clearly at an understandable pace

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Language Development Standards

Conventions

By grade 3, students have learned the foundations of written and spoken language, including letter, word, and sentence formation and crucial forms of punctuation. They ensure agreement between subject and verb and between pronoun and antecedent in simple situations. Students use quotation marks to indicate dialogue. They know most of the conventions of spelling and consult references to look up words when they still have difficulty. They use precise everyday language to describe and begin to consider the effects of word choice in writing and speaking.

> Key Terms: subject-verb and pronoun-antecedent agreement, comma splice, fragment, run-on, quotation mark

Conventions of language and writing

Core Standards — Students can and do:

1. Group related ideas into a paragraph.

Grammar and usage

Core Standards — Students can and do:

2. Generate complete sentences, avoiding fragments, comma splices, and run-ons.*
3. Ensure subject-verb and pronoun-antecedent agreement.*

Mechanics

Core Standards — Students can and do:

4. Use quotation marks in dialogue.
5. Use spelling patterns and generalizations (e.g., word families, position-based spellings, syllable patterns, ending rules, meaningful word parts) in writing regular words.
6. Consult reference materials, including dictionaries, to check and correct spellings.

Word choice and style

Core Standards — Students can and do:

7. Use precise everyday language.
8. Choose words for effect.*[16]

[16] Conventions standards noted with an asterisk (*) need to be revisited by students in subsequent grades. See Appendix A for a full listing.

Vocabulary

Key to students' vocabulary development is building rich and flexible word knowledge marked by multiple connections that link a word to similar words and to contexts and experiences that are related to that word—as compared to simply a definition. In grade 3, students use their repertoire of strategies to determine and clarify the meaning of unknown and multiple-meaning words. They know that words are sometimes used in nonliteral ways and can use that knowledge to help them understand common idioms. They learn and can paraphrase many common idioms and sayings. They recognize that words have nuances in meaning and rely on context and background knowledge to sort among related words that describe abstract concepts. They acquire new words through interactive language use, including informal talk, discussion, reading and responding to text as well as by being taught the words directly.

Determining the meaning of words

Core Standards — Students can and do:

1. Determine or clarify the meaning of an unknown word by using one or more of the following strategies:
   - using prefixes and suffixes when it is a multimorpheme word (e.g., *thoughtless*, *recycle*, *unforgettable*)
   - determining how it is used in a sentence when reading
   - consulting reference materials, including glossaries and dictionaries, both print and digital
2. Determine the meaning of multiple-meaning words by using context.
3. Distinguish between literal and nonliteral uses of language.
4. Paraphrase the meaning of common idioms and sayings.

Understanding the nuances of words (denotations and connotations)

Core Standards — Students can and do:

5. Distinguish among related words that describe states of mind, degrees of certainty, or other abstract concepts (e.g., *knew*, *believed*, *suspected*, *heard*, *wondered*).

Acquiring vocabulary

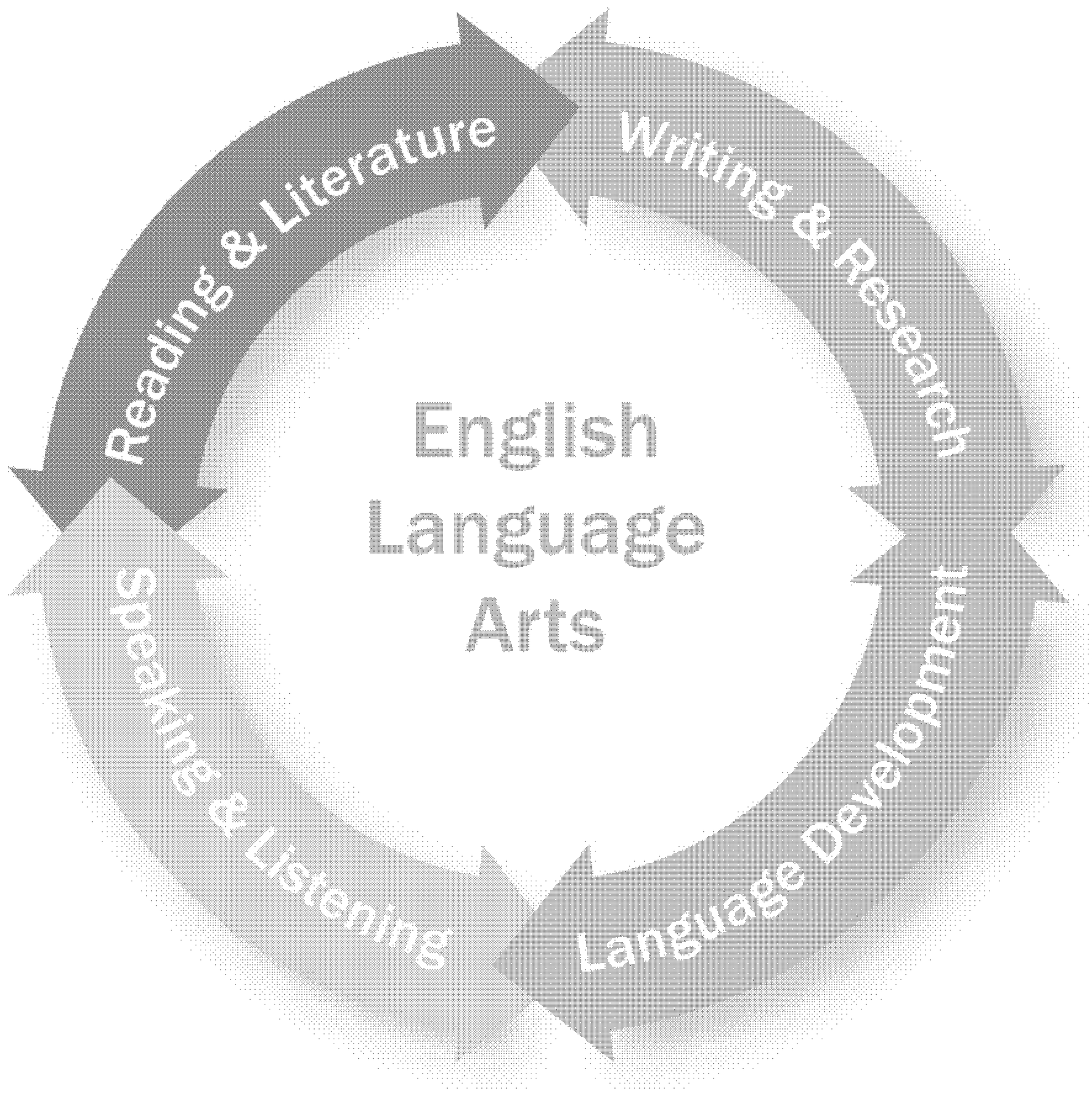
Core Standards — Students can and do:

6. Acquire and use new vocabulary taught directly and gained through reading and conversations.

CCSS DRAFT

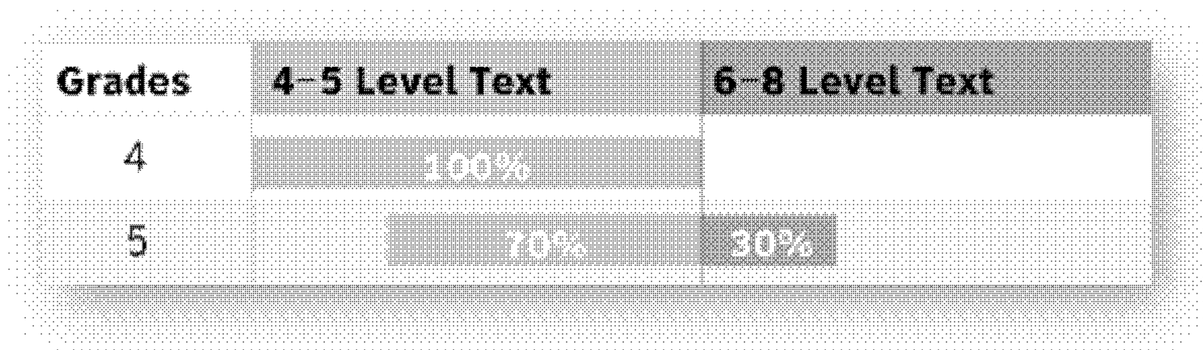
English Language Arts

Grades 4–5



Required Text Complexity by Grade

Proportion of Texts Within and Above Grade Band to be Read in Each Grade



While advancing through grades 4–5, students must engage with texts of steadily increasing complexity.

- **In grade 4**, students focus on reading texts in the 4–5 grade band level with scaffolding likely required for texts at the high end of the range.
- **In grade 5**, students focus on reading in the 4–5 grade band level (70 percent) independently and are introduced to texts in the 6–8 grade band level as "stretch" texts (30 percent), which will likely require scaffolding.

Determining Text Complexity for Grades 4–5[17]

Text complexity is determined by a mix of qualitative and quantitative measures of the text itself refined by teachers' professional judgment about the match of particular texts to particular students. The qualitative dimensions of text complexity are best understood as continua of increasing complexity rather than as representing discrete and easily defined stages. Most authentic texts will exhibit some but not all of the traits linked to a particular grade band; qualitatively assigning a text to a grade band is therefore a matter of "best fit," or determining which grade band's set of descriptors most accurately describes the text.

Qualitative Measures of Texts	Quantitative Measures of Texts
• *Structure:* Largely explicit and direct; graphic representations are supplementary to meaning; texts are of increasing length • *Purpose:* Single or twofold; clearly indicated • *Style and Language:* Moderately accessible; some literary devices; some everyday language; some use of Tier 2 and Tier 3 words and figurative language • *Richness:* Some ideas/concepts; mostly concrete; moderate information density • *Relationships:* Some connections; largely explicit • *Knowledge Demands:* Ability to handle fairly simple themes, consider a perspective somewhat different from one's own, and understand unfamiliar experiences; general background knowledge and familiarity with genre conventions required; some general and discipline-specific content knowledge	A study is underway with Coh-Metrix, a nonprofit research organization, to identify roughly five to seven computer-measurable dimensions of text cohesion. These dimensions, paired with a Lexile score, will yield a robust quantitative assessment of text complexity that, along with both the qualitative dimensions and professional judgment, will round out the Core Standards model of complexity.
Professional Judgment that weighs students' prior knowledge and life experiences as well as their interests, motivations, and maturity level.	

[17] Adapted from ACT, Inc., (2005); Carnegie Council on Advancing Adolescent Literacy (2010); Chall, Bissex, Conrad, & Harris-Sharples (1996); and Hess and Biggam (2004)

Mix of Key Text Types for Grades 4–5

Narratives	Drama	Poetry	Informational Text
At this level, includes children's adventure stories, biographies, folktales, legends, fables, fantasy, realistic fiction, and myth.	*At this level, includes staged dialogue and brief familiar scenes.*	*At this level, includes nursery rhymes, and the subgenres of narrative poems, limericks, and free verse.*	*At this level, includes books about science, history, and the arts and other nonfiction materials and digital media sources on a range of topics.*

Illustrative Texts for Narratives, Drama, and Poetry[18]	Illustrative Informational Texts
Alice in Wonderland by Lewis Carroll (1865) *The Little Prince* by Antoine de Saint-Exupery (1943) *Bud, Not Buddy* by Christopher Paul Curtis (1999) "The Echoing Green" from *Songs of Innocence* by William Blake (1789) "Casey at the Bat" by Ernest Lawrence Thayer (1888) "Words Free As Confetti" by Pat Mora (1996) *Where the Mountain Meets the Moon* by Grace Lin (2009)	*Discovering Mars* by Melvin Berger (1992) *Hurricanes: Earth's Mightiest Storms* by Patricia Lauber (1996) "Ancient Mound Builders" by E. Barrie Kavash from *Cobblestone* (2003) *Volcanoes* by Seymour Simon (2006) "Kenya's Long Dry Season" by Nellie Gonzalez Cutler from *Time for Kids* (2009) "Seeing Eye to Eye" by Leslie Hall from *National Geographic Explorer* (2009)

[18] See Appendix B for other texts illustrative of Grades 4-5 text complexity.

Reading and Literature Standards

Grasping specific details and key ideas

Core Standards — Students can and do:

1. Determine what the text says explicitly and make inferences required for understanding; explain how those inferences stem from the text.
2. Articulate the main ideas and themes of the text and provide a summary that captures the key supporting details.
3. Describe in detail two or more characters, events, or topics in the text and explain how they are related to one another.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. determine the theme of a story or drama, basing the understanding of theme on how characters adapt or change in response to the challenges posed in the plot
b. summarize accurately the significant events of a play or narrative in chronological order, describing where, when, why, and how specific actions take place
c. describe characters based on evidence from their thoughts, words, deeds, and interactions with others
d. describe the setting in detail, drawing on evidence of the time, place, and other cues
e. determine the theme of a poem, basing the understanding of theme on the key observations, images, or statements in a poem

Informational Text

a. outline the main and supporting ideas in the text and provide an accurate summary
b. identify the topic sentence and gist of each paragraph in a multi-paragraph text
c. describe related events in a history text or related topics in a science text and explain the relationships between the events or topics

Observing craft and structure

Core Standards — Students can and do:

4. Explain the meanings of words and phrases in the text, distinguishing literal and figurative uses.
5. Comprehend literature and information presented in a range of structures.
6. Compare and contrast texts written on the same topic or theme and explain how they are different and similar.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. describe the sensory details in texts and distinguish the use of literal versus figurative language
b. observe and explain how words with similar meanings can have different connotations
c. identify the meaning of figurative phrases and culturally significant characters found in mythology that are integral to understanding other works of literature and texts (e.g., *Herculean*, *Pandora's box*)
d. identify how narratives and plays are structured to describe the progress of characters through a series of events and challenges

e. identify rhymes and other repetitions of sounds that supply rhythm and pattern in poems and narrative prose
f. compare a narrative or a play with a presentation in another format, such as film, stage, or interactive text, and note what is surprising or different about the alternative version
g. compare works of literature on the same topic or with a similar theme

Informational Text

a. explain the meaning of key words and terms as they are used in the text
b. understand information drawn from a variety of texts with different structures, such as chronological, compare-and-contrast, or as a chain of causes and effects
c. identify and use text features (e.g., bold print, key words, topic sentences, hyperlinks, electronic menus, and icons) to locate information quickly and aid in comprehension
d. compare and contrast related accounts on the same or similar topics by different authors, by analyzing their content and perspectives

Integrating information and evaluating evidence

Core Standards — Students can and do:

7. Explain and use information presented graphically or visually in print, videos, or electronic texts.
8. Outline the information or evidence used to support an explanation or argument, determining which points support which key statements.
9. Determine the point of view or purpose that guides how events or ideas are described.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. identify the narrator of a story and explain how different stories are narrated from different perspectives
b. compare accounts of historical events and figures or natural phenomena with their depiction in a fictional work

Informational Text

a. explain how factual information presented graphically or visually (e.g., maps, charts, diagrams, timelines, animations, and other interactive visual elements) aids in the comprehension of print and electronic texts
b. explain how authors support their specific claims with evidence, including which evidence supports which claims
c. determine the author's purpose and how that is reflected in the description of the events and ideas

Developing habits for reading complex text

Core Standards — Students can and do:

10. Develop the habit of reading independently and productively, sustaining concentration and stamina to read increasingly demanding texts.

Writing and Research Standards

Writing to reflect audience, purpose, and task

Core Standards — Students can and do:

1. Write narratives, informative and explanatory texts, and arguments that demonstrate an awareness of audiences that are familiar and known to the student.

Conducting research

Core Standards — Students can and do:

2. Perform short, focused research tasks that build knowledge by exploring aspects of a single topic.
3. Gather information from experience, as well as print and digital resources.
4. Determine the accuracy and relevance of the information gathered to answer specific questions.
5. Restate information from source materials in one's own words, through summary or paraphrase.
6. Provide basic bibliographic information for print and digital sources.

Revising writing

Core Standards — Students can and do:

7. With guidance and support from peers and adults, strengthen writing through revision, editing, or beginning again to maintain a clear focus throughout.

Using tools and technology

Core Standards — Students can and do:

8. Use technology and other tools to produce, revise, and edit writing.

Developing proficiency in a range of writing

9. Create writing over extended timeframes (time for reflection and revision) and shorter timeframes (a single sitting or a day or two), responding to specific sources.

   Focus by grade level:

   Grade 4: Describing the content of literary or informational sources at the 4-5 grade band level of text complexity and content

   Grade 5: Comparing the contents of literary or informational sources at the 4-5 grade band level of complexity and content

Standards — Students can and do (by key text type):[19]

Narratives

a. orient the reader by establishing a situation, introducing characters, setting, and location, or by backfilling information after entering immediately into the storyline
b. create an organizing structure in which events are logically or causally sequenced
c. in producing a story, create a plot with an initiating event, complicating action, a climax, and a resolution
d. use a variety of temporal words, phrases, and clauses to signal sequence
e. use concrete and sensory details to develop narrative elements
f. develop the narrative using techniques such as dialogue, pacing, and reporting the narrator's thoughts
g. show both external behaviors and the internal responses of characters to events
h. provide closure and a realistic outcome of the narrative's events

Informative and Explanatory Texts

a. state the topic clearly and provide a general observation and focus
b. develop the subject using relevant facts, concrete details, quotations, or other information and examples
c. group related information logically in basic structures (paragraphs, sections) and provide headings or illustrations when useful
d. employ specialized vocabulary and a formal, objective style when appropriate
e. use appropriate links to join ideas
f. include only relevant appropriate information to demonstrate focus
g. provide a conclusion related to the information or explanation offered

Arguments (opinions)

a. introduce an opinion about a concrete issue or topic
b. support opinions with relevant reasons
c. support reasons with specific details
d. link the reasons together using words, phrases, and clauses (e.g., *because*, *since*)
e. adopt a relatively formal style for sharing and defending an opinion when appropriate to the discipline or context
f. provide a concluding statement or section that offers reflections, restatement, or recommendations consistent with the opinion presented

Speaking and Listening Standards

Listening closely and participating productively

Core Standards — Students can and do:

1. Participate productively one on one, in small groups, and as a whole class, joining in discussions and making relevant points about what they have read, heard, or written.
2. Sustain concentration on information presented orally, visually, or multi-modally and confirm understanding by summarizing the main ideas and supporting details.

Standards — Students can and do (by key communication type):

[19] See Appendix C for samples of student writing that illustrate through annotations the level of quality required to meet the writing standards.

Classroom discussions and collaboration

a. come to discussions having read required material and, in conversation, build upon background knowledge from that material and other information known about the topic
b. demonstrate understanding of the content and ideas presented or discussed by distilling them into an accurate summary
c. ask questions to clarify or follow up on ideas or information presented orally or through other media
d. respond to questions and make comments that contribute to the topic and ideas of previous speakers
e. explain information presented graphically or visually in conjunction with other information presented orally
f. engage productively and respectfully with others during discussions, including listening actively, gaining the floor respectfully, and qualifying or justifying what they think after listening to others' questions or accounts

Exchanging information and speaking effectively

Core Standards — Students can and do:

3. Share experiences, opinions or other information, choosing material that is relevant to the topic and to the listeners.

4. Speak audibly and clearly at an appropriate and understandable pace, using formal English when indicated or appropriate (e.g., presenting ideas versus class discussion).

Standards — Students can and do (by key communication type):

Presentation of ideas and information

a. speak coherently about events, topics, or texts that focus and organize ideas in a logical sequence and include facts, details, or other information that support the main ideas
b. use appropriate volume, phrasing, and pace for clarity
c. read aloud prose and poetry, with appropriate emotion and fidelity to the text

Language Development Standards

Conventions

In grades 4–5, students heighten their ability to situate and describe using language that is increasingly precise and vivid. They form and use verbs of various tenses to locate people, actions, and events in time, and they correctly use adjectives and adverbs to modify. Students begin to gain control of frequently confused words (e.g., *effect*, *affect*) and edit writing to remove language that is not idiomatic. Their mastery of capitalization is complete. They use punctuation to separate items in a series and a comma to distinguish an introductory element from the main part of the sentence. Students mark titles in conventional ways. They understand how to quote and use quotation marks. Their spelling is conventional. Their language is increasingly topic specific, precise, and varied, and they manipulate sentence structure for effect.

Key Terms: adjective; adverb; interjection; preposition; simple, progressive, and perfect tense

Conventions of language and writing

Core Standards — Students can and do:

1. Maintain the focus of a paragraph on a topic through structural elements such as main ideas, supporting sentences, and transitions.

Grammar and usage

Core Standards — Students can and do:

2. Form and use the simple (e.g., *I walked*, *I walk*, *I will walk*), progressive (e.g., *I was walking*, *I am walking*, *I will be walking*) and the perfect (e.g., *I had walked*, *I have walked*, *I will have walked*) verb tenses.
3. Recognize and correct inappropriate shifts in verb tense.*
4. Form and choose between adjectives and adverbs (including comparative and superlative forms), placing them appropriately within the sentence.*
5. Correctly use frequently confused words.*
6. Use idiomatic language.*

Mechanics

Core Standards — Students can and do:

7. Capitalize the first word in quotations as appropriate and other important words, such as section headers.
8. Use punctuation to separate items in a series.*
9. Use a comma to separate an introductory element from the rest of the sentence.
10. Use underlining, quotation marks, or italics to indicate titles of works.
11. Use quotation marks to mark direct speech and quotations from a text.
12. Spell grade-appropriate words correctly, consulting references as needed.*

Word choice and style

Core Standards — Students can and do:

13. Use specialized, topic-specific language to convey ideas precisely.*
14. Use figurative language to create images or make comparisons and connections between people, objects, or ideas.*
15. Use punctuation for effect.*
16. Expand, combine, and reduce sentences for meaning, reader/listener interest, and style.*[20]

Focus by Grade-Level
Grade 4: Distinguish one idea or thing from another (Conventions Standards #'s1-3, #8, #9, #11)
Grade 5: Word choice (Conventions Standards #'s 4-6, #13, #14)

[20] Conventions standards noted with an asterisk (*) need to be revisited by students in subsequent grades. See Appendix A for a complete listing.

Vocabulary

Key to students' vocabulary development is building rich and flexible word knowledge marked by multiple connections that link a word to similar words and to contexts and experiences that are related to that word—as compared to simply a definition. In grades 4–5, students are capable of selecting among a wide range of strategies—analyzing the word itself, using localized context clues (particularly at the sentence level), and consulting reference materials—to determine and clarify the meaning of unknown and multiple-meaning words. They develop the habit of verifying their inferences of word meanings. They are able to interpret simple figurative language found in what they read. They learn and can paraphrase many common idioms, proverbs, and adages. They make distinctions among words based on connotation. They acquire new words through interactive language use, including informal talk, discussion, reading and responding to text as well as by being taught the words directly. This includes a focus on "Tier 2" words and phrases (those that commonly appear in writing but not in spoken language), "Tier 3" words and phrases (those that are specific and important to particular disciplines).[21]

Determining the meaning of words

Core Standards — Students can and do:

1. Determine or clarify the meaning of an unknown word by using one or more of the following strategies:
   - analyzing the word's sounds, spelling, and meaningful word parts
   - using semantic clues in sentences, such as definitions, examples, or restatements included within the text
   - using syntactic clues, such as using its position within the sentence as a guide to whether it represents a thing or an action
   - consulting reference materials, including glossaries, dictionaries, and thesauruses, both print and digital
2. Determine the relevant meaning of multiple-meaning words by using context.
3. Verify the preliminary determination of a word's meaning (e.g., by checking the inferred meaning in context or by looking up the word in a dictionary).
4. Interpret figurative language, including simple similes and metaphors.
5. Paraphrase the meaning of common idioms, adages, and proverbs.

Understanding the nuances of words (denotations and connotations)

Core Standards — Students can and do:

6. Distinguish a word from other words with similar but not identical meanings (synonyms).

Acquiring vocabulary

Core Standards — Students can and do:

7. Acquire and use a grade-appropriate vocabulary of Tier 2[22] words taught directly and gained through reading.
8. Acquire and use a grade-appropriate vocabulary of Tier 3 words taught directly and gained through reading.
9. Know and use words and phrases that signal contrast, addition, or other logical relationships (e.g., *however*, *although*, *nevertheless*, *similarly*, *moreover*, *in addition*).

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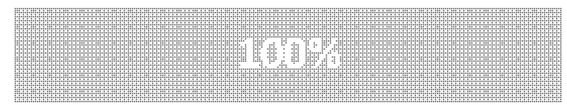
[21] Beck I. L., McKeown, M.G. & Kucan, L. (2002). *Brining Words to Life; Robust Vocabulary Instruction*, New York; Guilford Press

Grade 4 English Language Arts: Focus for Instruction

Reading and Literature

In grade 4, students apply the reading standards to the following types of text: narratives, drama, poetry, and informational text. Students focus on learning to read text at the 4-5 grade band level independently, with scaffolding likely required for texts at the high end of the range.

- Reading standards applied to different text types
- Mix of text types: Narratives, Drama, Poetry, Informational Text
- **Text Complexity focus:** 100% text at the 4-5 grade band level



Writing and Research

In grade 4, students apply the standards in writing to the following types of text: Narrative, Informative/Explanatory, and Argument. Students perform research, including short focused research tasks. They also write over various time frames in response to specific sources.

- Writing standards applied to different text types: Narrative, Informative/Explanatory, Argument
- Research, including short focused research tasks
- **Grade-specific focus:** Students create writing over extended and shorter timeframes, responding to specific sources by describing the contents of literary or informational sources at the 4-5 grade band level of complexity and content

Speaking and Listening

In grade 4, students apply the core speaking and listening standards in different contexts.

- Speaking and listening standards applied in different contexts: classroom discussion and collaboration as well as in presentation of ideas and information

Language Development

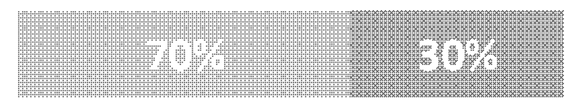
In grade 4, students apply the language development standards by applying the core vocabulary standards to determine word meaning, understand word nuances, and acquire vocabulary and to produce writing and speaking that observes appropriate conventions.

- Vocabulary standards applied to reading, writing, speaking and listening
- **Grade-specific conventions focus:** Distinguish one idea or thing from another:
  - Maintain the focus of a paragraph on a topic… (Conventions Standard #1)
  - Form and use the simple, progressive and perfect verb tenses … (Conventions Standard #2)
  - Recognize and correct inappropriate shifts in verb tense. (Conventions Standard #3)
  - Use punctuation to separate items in a series … (Conventions Standard #8)
  - Use a comma to separate an introductory element … (Conventions Standard #9)
  - Use quotation marks to mark direct speech and quotations … (Conventions Standard #11)

Grade 5 English Language Arts: Focus for Instruction

Reading and Literature

In grade 5, students apply the reading standards to the following types of text: narratives, drama, poetry, and informational text. Students focus on learning to read text at the 4-5 grade band level independently and are introduced to 6-8 grade band "stretch" texts, which will likely require scaffolding.



- Reading standards applied to different text types
- Mix of text types: Narratives, Drama, Poetry, Informational Text
- **Text Complexity focus:** 70% text at the 4-5 grade band level, 30% text at the 6-8 grade band level

Writing and Research

In grade 5, students apply the standards in writing to the following types of text: Narrative, Informative/Explanatory, and Argument. Students perform research, including short focused research tasks. There also write over various time frames in response to specific sources.

- Writing standards applied to different text types: Narrative, Informative/Explanatory, Argument
- Research, including short focused research tasks
- **Grade-specific focus:** Students create writing over extended and shorter timeframes, responding to specific sources by comparing the contents of literary or informational sources at the 4-5 grade band level of complexity and content.

Speaking and Listening

In grade 5, students apply the speaking and listening standards in different contexts.

- Speaking and listening Standards applied in different contexts: classroom discussion and collaboration as well as in presentation of ideas and information.

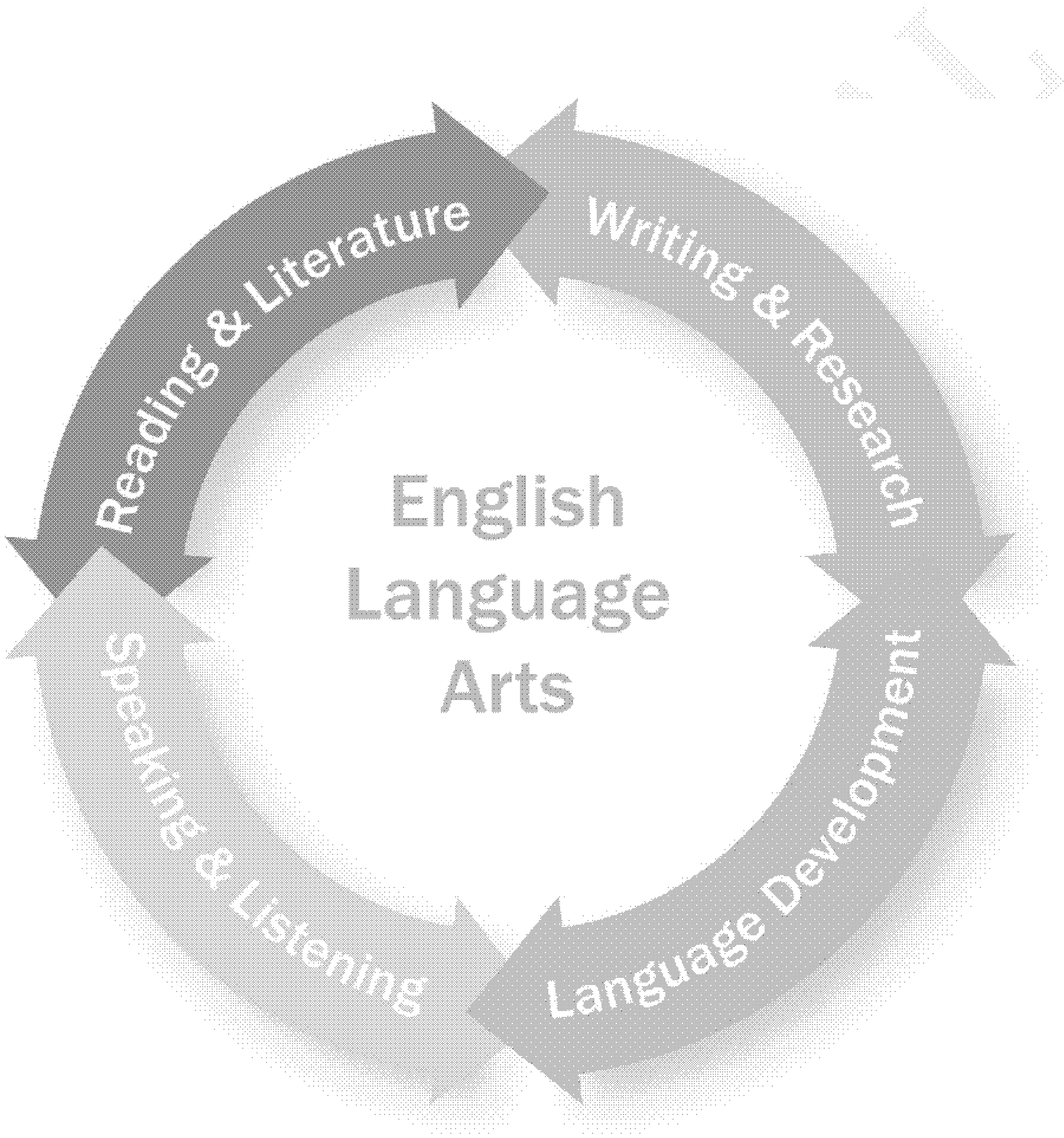
Language Development

In grade 5, students apply the language development standards by applying the core vocabulary standards to determine word meaning, understand word nuances, and acquire vocabulary and to produce writing and speaking that observes appropriate conventions,

- Vocabulary standards applied to both reading, writing, speaking and listening
- **Grade-specific conventions focus:** Word choice
  - Form and choose between adjectives and adverbs. (Conventions Standard #4)
  - Correctly use frequently confused words. (Conventions Standard #5)
  - Use idiomatic language. (Conventions Standard #6)
  - Use specialized, topic specific language to convey ideas precisely. (Conventions Standard #13)
  - Use figurative language to create images … (Conventions Standard #14)

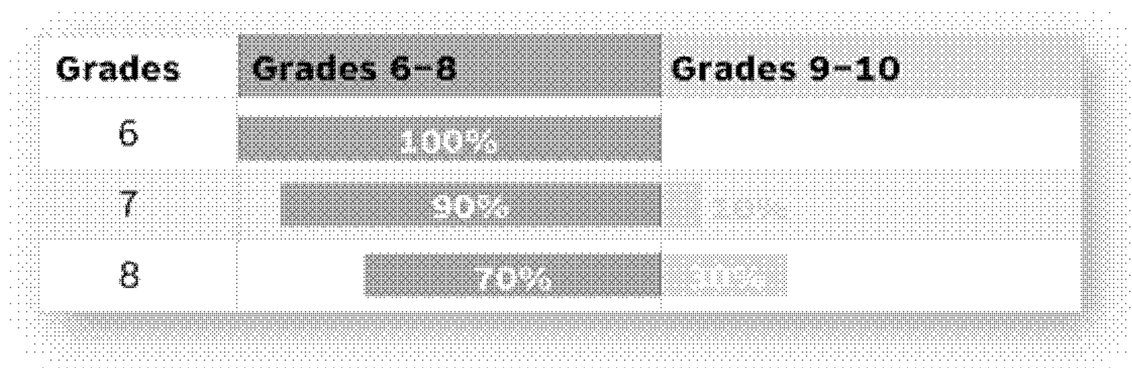
English Language Arts

Grades 6–8



Required Text Complexity by Grade

Proportion of Texts Within and Above Grade Band to be Read in Each Grade



While advancing through grades 6–8, students must engage with texts of steadily increasing complexity.

- **In grade 6**, students focus on reading texts in the 6–8 grade band level with scaffolding likely required for texts at the high end of the range.
- **In grade 7**, students focus on reading texts in the 6–8 grade band level (90 percent) independently and are introduced to texts in the 9–10 grade band level as "stretch" texts (10 percent), which will likely require scaffolding.
- **In grade 8**, students focus on reading texts in the 6–8 grade band level (70 percent) independently as well as sustained practice with texts in the 9–10 grade band level as "stretch" texts (30 percent), which will likely require scaffolding.

Determining Text Complexity for Grades 6–8[23]

Text complexity is determined by a mix of qualitative and quantitative measures of the text itself refined by teachers' professional judgment about the match of particular texts to particular students. The qualitative dimensions of text complexity are best understood as continua of increasing complexity rather than as representing discrete and easily defined stages. Most authentic texts will exhibit some but not all of the traits linked to a particular grade band; qualitatively assigning a text to a grade band is therefore a matter of "best fit," or determining which grade band's set of descriptors most accurately describes the text.

Qualitative Measures of Texts	Quantitative Measures of Texts
• *Structure:* Largely implicit and subtle; graphic representations are essential to meaning; texts are of increasing length • *Purpose:* Single or multiple; subtly stated • *Style and Language:* Moderately demanding; several literary devices; consistent use of Tier 2 and 3 words and figurative language • *Richness:* Several ideas/concepts; mostly abstract; moderate information density • *Relationships:* Several connections; largely implicit • *Knowledge Demands:* Ability to handle fairly challenging themes, consider multiple perspectives, and understand unfamiliar experiences; cultural and historical knowledge useful for understanding characters, settings, and allusions; some discipline-specific content knowledge	A study is underway with Coh-Metrix, a nonprofit research organization, to identify roughly five to seven computer-measurable dimensions of text cohesion. These dimensions, paired with a Lexile score, will yield a robust quantitative assessment of text complexity that, along with both the qualitative dimensions and professional judgment, will round out the Core Standards model of complexity.
Professional Judgment that weighs students' prior knowledge and life experiences as well as their interests, motivations, and maturity level.	

[23] Adapted from ACT, Inc., (2005); Carnegie Council on Advancing Adolescent Literacy (2010); Chall, Bissex, Conrad, & Harris-Sharples (1996); and Hess and Biggam (2004)

Mix of Key Text Types for Grades 6–8

Narratives	Drama	Poetry	Informational Text
At this level, includes the subgenres of adventure stories, biographies, memoirs, historical fiction, mysteries, folktales, legends, fables, tall tales, myths, fantasy, science fiction, realistic fiction, and graphic novels.	*At this level, includes one-act and multi-act plays both as text and film.*	*At this level, includes the subgenres of narrative poems, lyrical poems, free verse, odes, ballads, and epics.*	*At this level, includes such subgenres as exposition and argument in the form of essays, opinion pieces, speeches, opinion pieces as well as other documents and digital media sources on a range of topics.*

Illustrative Texts for Narratives, Drama, and Poetry[24]	Illustrative Informational Texts
Little Women by Louisa May Alcott (1869)	*Preamble and First Amendment to the United States Constitution* by United States (1787, 1791) **
The Adventures of Tom Sawyer by Mark Twain (1876)	*Narrative of the Life of Frederick Douglass an American Slave* by Frederick Douglass (1845)
A Wrinkle in Time by Madeline L'Engle (1962)	"Gettysburg Address"** by Abraham Lincoln (1863)
The Dark Is Rising by Susan Cooper (1973)	"Blood, Toil, Tears and Sweat" by Winston Churchill (1940)
Black Ships before Troy: The Story of the Iliad by Rosemary Sutcliff (1993)	*Travels with Charley: In Search of America* by John Steinbeck (1962)
A Midsummer Night's Dream by William Shakespeare (1596)	*I Know Why the Caged Bird Sings* by Maya Angelou (1969)
"Oh Captain, My Captain" by Walt Whitman (1865)	
"Stopping by a Wood on a Snowy Evening" by Robert Frost (1923)	
"I, Too" by Langston Hughes (1925)	

Seminal historical texts that all students are expected to read

[24] See Appendix B for other texts illustrative of Grades 6-8 text complexity.

Reading and Literature Standards

Grasping specific details and key ideas

Core Standards — Students can and do:

1. Read the text closely to determine what the text says explicitly and to make logical inferences from it; cite text evidence to support understanding in discussion and in writing.
2. Articulate the text's main ideas and themes and provide a summary that captures the key supporting details, without taking a position or expressing an opinion.
3. Explain in detail how events, ideas, and characters unfold in the text and interact with one another.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. infer themes when they are not explicitly stated and provide evidence on which those inferences are based
b. analyze the development of the narrative, describing how particular incidents advance or foreshadow the plot
c. recognize how the setting unfolds over the course of the text and describe its significance to the work
d. build on an author's explicit descriptions and other evidence to draw reasonable conclusions about characters and how they interact, change, and influence the central events
e. describe how a play unfolds and how particular lines of dialogue propel the action, reveal aspects of a character, or provoke a decision
f. analyze how patterns of imagery in a poem contribute to its overall theme or meaning

Informational Text

a. summarize a text without expressing a personal opinion by drawing on the author's specific description of events or information
b. determine how key ideas or concepts build on one another to reveal an overarching theme or idea

Observing craft and structure

Core Standards — Students can and do:

4. Interpret the meanings of words and phrases, including connotative and figurative meanings, and explain how specific word choices shape the meaning of the text.
5. Explain the text's structure, including how specific sentences, paragraphs, and larger portions build on each other and contribute to the whole of the text.
6. Compare and contrast how two or more texts written on similar topics or themes differ in their focus and key details.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. analyze how the author's choice of specific words or details contributes to the understanding of events and characters or to the tone of a narrative
b. trace the specific comparisons made by similes, metaphors, and analogies and explain how they contribute to the meaning of the text
c. compare similar ideas and themes as well as character types in myths, folktales, and legends from different cultures

d. analyze the impact of line breaks and stanzas on the meaning of a poem and acts, scenes, and stage directions on the meaning of a drama
e. compare the events, characters, ideas, and themes in texts written by the same author or on similar topics or themes

Informational Text

a. interpret the connotative meaning of closely related words and phrases as they are used in the text (e.g., *angry* versus *irate*)
b. describe how an author organizes the explanation or argument, as well as the ways in which the text's structure, language, and examples support its purpose
c. examine the structure of a Web site or other electronic text and describe how it organizes information and links to additional sources

Integrating information and evaluating evidence

Core Standards — Students can and do:

7. Interpret information presented graphically or visually in print, videos, or electronic texts and explain how this information clarifies and contributes to the text.

8. Analyze the structure and content of an argument, including its main claims or conclusions, supporting premises, and evidence.

9. Determine the point of view or purpose represented in the text, assessing how it shapes the content.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. compare the points of view from which different novels and poems are told, as well as the viewpoints of different characters in a drama
b. compare the fictional portrayal of a time, place, or character to historical sources from the period to determine which historical details have been emphasized, deleted, or changed in the fictional portrayal

Informational Text

a. interpret factual and quantitative data presented in diverse formats (including maps, charts, and diagrams as well as electronic media) and explain how this information clarifies or contributes to the text
b. distinguish between fact, opinion, and reasoned judgment presented in essays, speeches, and critiques
c. evaluate the strength of an argument's premises and specific claims as well as the degree to which each is supported by evidence
d. compare and contrast the viewpoints and use of evidence of two different authors writing about the same topic

Developing habits for reading complex text

Core Standards — Students can and do:

10. Develop the habit of reading independently and productively, sustaining concentration and stamina to read increasingly demanding texts.

Writing and Research Standards

Writing to reflect audience, purpose, and task

Core Standards — Students can and do:

1. Write narratives, informative and explanatory texts, and arguments that match purpose to task and address familiar as well as somewhat distant audiences (e.g., mayor, readers of school or neighborhood newspaper).

Conducting research

Core Standards — Students can and do:

2. Perform short, focused research projects that demonstrate understanding of the material under investigation and generate additional related questions for research.
3. Gather information independently using a variety of relevant print and digital resources.
4. Assess the credibility, reliability, consistency, and accuracy of the information and sources gathered.
5. Represent and cite accurately the data, conclusions, and opinions of others, quoting and paraphrasing them into one's own work while avoiding plagiarism.
6. Provide full bibliographic information for print and digital sources in a standard format and document quotations, paraphrases, and other information.

Revising writing

Core Standards — Students can and do:

7. With some guidance and support from peers and adults, strengthen writing through revising, editing, or beginning again to ensure logical organization, precision of word choice, and coherence.

Using tools and technology

Core Standards — Students can and do:

8. Use technology and other tools to produce, revise, and distribute writing, as well as interact online with others about writing, including responding to and providing feedback

Developing proficiency in a range of writing

9. Create writing over extended timeframes (time for reflection and revision) and shorter timeframes (a single sitting or a day or two), responding to specific sources.

   Focus by grade level:

   Grade 6: Conveying the main ideas and key details of literary or informational sources at the 6-8 grade band level of text complexity and content
   Grade 7: Analyzing the contents of literary or informational sources at the 6-8 grade band level of complexity and content
   Grade 8: Comparing or evaluating the contents of literary or informational sources at the 6-8 grade band level of complexity and content

Standards — Students can and do (by key text type):[25]

Narratives

a. orient the reader by establishing a situation, introducing characters, setting, and location, or by backfilling information after entering immediately into the storyline
b. create an organizing structure in which events are logically or causally sequenced
c. in producing a story, create a plot with well-structured episodes (e.g., initiating event, complicating action, resolution)
d. use a variety of temporal words, phrases, and clauses to convey sequence, to shift from one time frame to another, and to show the relationships among events
e. use relevant, specific details and literary devices, such as imagery and metaphor, purposefully to develop setting, plot, and character
f. use techniques such as pacing, dialogue, or foreshadowing to highlight the significance of events or create particular effects (e.g., tension or suspense)
g. show internal mental processes to develop complex characters and convey their needs, motives, and emotional responses
h. provide an engaging conclusion, such as a surprise ending, a reflection, or a conclusion that returns to the beginning

Informative and Explanatory Texts

a. establish the topic in an introduction that provides a sense of what's to follow
b. develop the subject through relevant and specific facts, concrete details, quotations, or other information and examples
c. organize specific information under broader concepts or categories and provide headings, figures, tables, or diagrams when useful
d. use factual, precise language and maintain a formal, objective style when appropriate
e. use strategies appropriate to informational and explanatory texts such as defining, classifying, comparing/contrasting, and cause/effect
f. use appropriate links to join ideas and create cohesion
g. provide only accurate and relevant information
h. provide a conclusion that follows logically from the information or explanation presented

Arguments

a. introduce a claim about a topic or concept
b. support claims with logical reasons
c. support reasons with detailed and relevant evidence

[25] See Appendix C for samples of student writing that illustrate through annotations the level of quality required to meet the writing standards.

d. signal the relationship between reasons, or between reasons and evidence, using words, phrases, and clauses (e.g., *another reason, such as, therefore, in addition*)
e. sustain an objective style and tone appropriate for making a case when appropriate to the discipline or context
f. include only relevant information and evidence in support of claims
g. provide a concluding statement or section that offers reflections, a restatement, or recommendations that follow from the argument

Speaking and Listening Standards

Listening closely and participating productively

Core Standards — Students can and do:

1. Participate productively one on one, in small groups, and as a whole class, joining in discussions and remaining flexible and adaptable as participants.
2. Sustain concentration on information presented orally, visually, or multi-modally and confirm understanding by drawing well-supported inferences about the purpose and meaning of the information.

Standards — Students can and do (by key communication type):

Classroom discussions and collaboration

a. come to discussions having completed reading or other preparation in advance and draw on that material explicitly in discussions
b. determine a speaker's attitude or point of view toward a topic presented orally or through other media
c. ask questions to check understanding to clarify the main ideas and the supporting evidence of material presented orally or through other media
d. advance a discussion by answering questions precisely and sharing specific factual knowledge and observations supported by credible evidence
e. interpret information presented in visual and digital formats and explain how this data clarifies and contributes to a discussion or information presented orally
f. support productive teamwork by setting clear goals and deadlines, monitoring progress and participation of each team member, and taking different views into account and modifying own views when indicated in light of what others say

Exchanging information and speaking effectively

Core Standards — Students can and do:

3. Share experiences, opinions, and other information, gaining and maintaining the interest and response of listeners.
4. Use appropriate tone and phrasing for emphasis, demonstrating a growing command of formal English when indicated or appropriate (e.g., presenting ideas versus class discussion).

Standards — Students can and do (by key communication type):

Presentation of ideas and information

a. organize and present information about situations, topics, or texts that emphasize salient points and clarify and support claims and findings with pertinent and specific descriptions, facts, and examples in ways that are accessible and verifiable to listeners
b. use gesture, tone, phrasing, and pace for emphasis
c. incorporate visual displays and electronic media when helpful and in a manner that strengthens the presentation
d. perform dramatic readings of various prose and poetry speaking with clarity, fidelity, and responsiveness to the text, noting changes in the situation, mood, or tone of text

Language Development Standards

Conventions

In grades 6–8, students develop a firm command of sentence structure. They are able to form sentences of varying structures, place phrases and clauses properly within a sentence, and use a variety of coordinating and subordinating conjunctions to express relationships between sentence parts. Students have also mastered pronoun use, ensuring proper case, number, and person and avoiding vagueness. They understand and use verb voice and mood, and identify and correct inappropriate shifts in pronouns and verbs. Students set off nonrestrictive or parenthetical elements from the rest of the sentence with proper punctuation and use a comma before a coordinating conjunction in a compound sentence. They vary sentence patterns for effect and edit writing for redundancy and wordiness.

Key Terms: conjunction; dash; nonrestrictive/parenthetical element; indicative, imperative, interrogative, conditional, and subjunctive mood; parentheses; phrase and clause; pronoun case, number, and person; simple, compound, complex, and compound-complex sentence; active and passive voice

Grammar and usage

Core Standards — Students can and do:

1. Form compound, complex, and compound-complex sentences.
2. Place phrases and clauses within a sentence, avoiding misplaced and dangling modifiers.*
3. Ensure that pronouns are in the proper case (subjective, objective, possessive).
4. Recognize and correct inappropriate shifts in pronoun number and person.*
5. Recognize and correct vague pronouns with unclear or ambiguous antecedents.*
6. Form and use verbs in the active and passive voice.
7. Form and use verbs in the indicative, imperative, interrogative, conditional, and subjunctive mood.
8. Avoid inappropriate shifts in verb voice and mood.*

Mechanics

Core Standards — Students can and do:

9. Use punctuation to set off nonrestrictive/parenthetical elements with commas, parentheses, or dashes.*
10. Use a comma before a coordinating conjunction in a compound sentence.

Word choice and style

Core Standards — Students can and do:

11. Use verbs in the active and passive voice and in the conditional and subjunctive moods to achieve particular effects (e.g., emphasizing the actor or the action; expressing uncertainty or describing a state contrary to fact).
12. Vary sentence patterns for meaning, reader/listener interest, and style.*
13. Choose words and phrases to express ideas precisely and concisely, avoiding wordiness and redundancy.*[26]

Grade-Level Focus
Focus by Grade-Level
Grade 6: Pronouns (Conventions Standards #s 3-5)
Grade 7: Sentence structure (Conventions Standards #1, #2, #12)
Grade 8: Verb voice and mood (Conventions Standards #s 6-8, #11)

Vocabulary

Key to students' vocabulary development is building rich and flexible word knowledge marked by multiple connections that link a word to similar words and to contexts and experiences that are related to that word—as compared to simply a definition. In grades 6–8, students continue to make use of a range of strategies to determine and clarify the meaning of unknown and multiple-meaning words. This repertoire now includes considering the word's use in a broader context that includes the content of the paragraph in which the word appears and the overarching structure of the text. They habitually verify their inferences of word meanings. They interpret a variety of figurative language found in what they read. They make distinctions among words based on connotation. They acquire new words through interactive language use, including informal talk, discussion, reading and responding to text as well as by being taught the words directly. This includes a continuing focus on "Tier 2" words and phrases (those that commonly appear in writing but not in spoken language), "Tier 3" words and phrases (those that are specific and important to particular disciplines).

Determining the meaning of words

Core Standards — Students can and do:

1. Determine or clarify the meaning of an unknown word by using one or more of the following strategies:
   - using knowledge of roots, prefixes, and suffixes
   - using semantic clues, such as sentence and paragraph context as well as the organizational structure of the text (e.g., cause and effect, comparison and contrast)
   - using syntactic clues, such as using its position within the sentence as a guide to whether it is a subject, verb, or object
   - consulting reference materials, including glossaries, dictionaries, and thesauruses, both print and digital
2. Determine the relevant meaning of multiple-meaning words by using context.
3. Verify the preliminary determination of a word's meaning (e.g., by checking the inferred meaning in context or by looking up the word in a dictionary).
4. Interpret figurative language, including metaphors, similes, and idioms.

[26] Conventions standards noted with an asterisk (*) need to be revisited by students in subsequent grades. See Appendix A for a complete listing.

Understanding the nuances of words (denotations and connotations)

Core Standards — Students can and do:

5. Distinguish a word from other words with similar but not identical meanings (synonyms).

Acquiring vocabulary

Core Standards — Students can and do:

6. Acquire and use a grade-appropriate vocabulary of Tier 2 words taught directly and gained through reading.
7. Acquire and use a grade-appropriate vocabulary of Tier 3 words taught directly and gained through reading.

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Grade 6 English Language Arts: Focus for Instruction

Reading and Literature

In grade 6, students apply the reading standards to the following types of text: narratives, drama, poetry, and informational text. Students focus on learning to read text at the 6-8 grade band level independently, with scaffolding likely required for texts at the high end of the range.

- Reading standards applied to different text types
- Mix of text types: Narratives, Drama, Poetry, Informational Text
- **Text Complexity focus:** 100% text at the 6-8 grade band level

100%

Writing and Research

In grade 6, students apply the writing standards to the following types of text: Narrative, Informative/Explanatory, and Argument. Students perform research, including short focused research tasks. They also write over various time frames in response to specific sources.

- Writing standards applied to different text types: Narrative, Informative/Explanatory, Argument
- Research, including short focused research tasks
- **Grade-specific focus:** Students create writing over extended and shorter time frames, responding to specific sources by conveying the main ideas and key details of literary or informational sources at the 6-8 grade band level of complexity and content.

Speaking and Listening

In grade 6, students apply the core speaking and listening standards in different contexts.

- Speaking and listening Standards applied in different contexts: classroom discussion and collaboration as well as in presentations of ideas and information.

Language Development

In grade 6, students apply the language development standards by applying the core vocabulary standards to determine word meaning, understand word nuances, and acquire vocabulary and to produce writing and speaking that observes appropriate conventions

- Vocabulary standards applied to both reading, writing, speaking and listening
- **Grade-specific conventions focus:** Pronouns
  - Ensure that pronouns are in the proper case… (Conventions Standard #3)
  - Recognize and correct inappropriate shifts… (Conventions Standard #4)
  - Recognize and correct vague pronouns… (Conventions Standard #5)

Grade 7 English Language Arts: Focus for Instruction

Reading and Literature

In grade 7, students apply the reading standards to the following types of text: narratives, drama, poetry, and informational text. Students focus on learning to read text at the 6-8 grade band level independently and are introduced to 9-10 grade band level "stretch" texts, which will likely require scaffolding.

- Reading Standards applied to different text types
- Mix of text types: Narratives, Drama, Poetry, Informational Text
- **Text Complexity focus:** 90% at the 6-8 grade band level, 10% at the 9-10 grade band level

Writing and Research

In grade 7, students apply the standards in writing to the following types of text: Narrative, Informative/Explanatory, and Argument. Students perform research, including short focused research tasks. They also write over various time frames in response to specific sources.

- Writing standards applied to different text types: Narrative, Informative/Explanatory, Argument
- Research, including short focused research tasks
- **Grade-specific focus:** Students create writing over extended and shorter timeframes, responding to specific sources by analyzing the contents of literary or informational sources at the 6-8th grade band level of complexity and content.

Speaking and Listening

In grade 7, students apply the core speaking and listening standards in different contexts.

- Speaking and listening standards applied in different contexts: classroom discussion and collaboration as well as in presentations of ideas and information.

Language Development

In grade 7, students apply the language development standards by applying the core vocabulary standards to determine word meaning, understand word nuances, and acquire vocabulary and to produce writing and speaking that observes appropriate conventions.

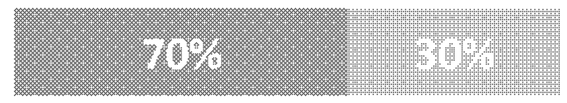
- Vocabulary standards applied to reading, writing, speaking and listening
- **Grade-specific conventions focus:** Sentence structure
  - Form compound, complex… (Conventions Standard #1)
  - Place phrases and clauses… (Conventions Standard #2)
  - Vary sentence patterns… (Conventions Standard #12)

Grade 8 English Language Arts: Focus for Instruction

Reading and Literature

In grade 8, students apply the reading standards to the following types of text: narratives, drama, poetry, and informational text. Students focus on reading text at the 6-8 grade band level independently as well as on sustained practice with 9-10 grade band level "stretch" texts, which may require scaffolding.

- Reading standards applied to different text types
- Mix of text types: Narratives, Drama, Poetry, Informational Text
- **Text Complexity focus:** 70% at the 6-8 grade band level, 30% at the 9-10 grade band level



Writing and Research

In grade 8, students apply the standards in writing to the following types of text: Narrative, Informative/Explanatory, and Argument. Students perform research, including short focused research tasks. They also write over various time frames in response to specific sources.

- Writing standards applied to different text types: Narrative, Informative/Explanatory, Argument
- Research, including short focused research tasks
- **Grade-specific focus:** Students create writing over extended and shorter timeframes, responding to specific sources by analyzing the contents of literary or informational sources at the 6-8th grade band level of complexity and content.

Speaking and Listening

In grade 8, students apply the core speaking and listening standards in different contexts.

- Speaking and listening standards applied in different contexts: classroom discussion and collaboration as well as in presentations of ideas and information.

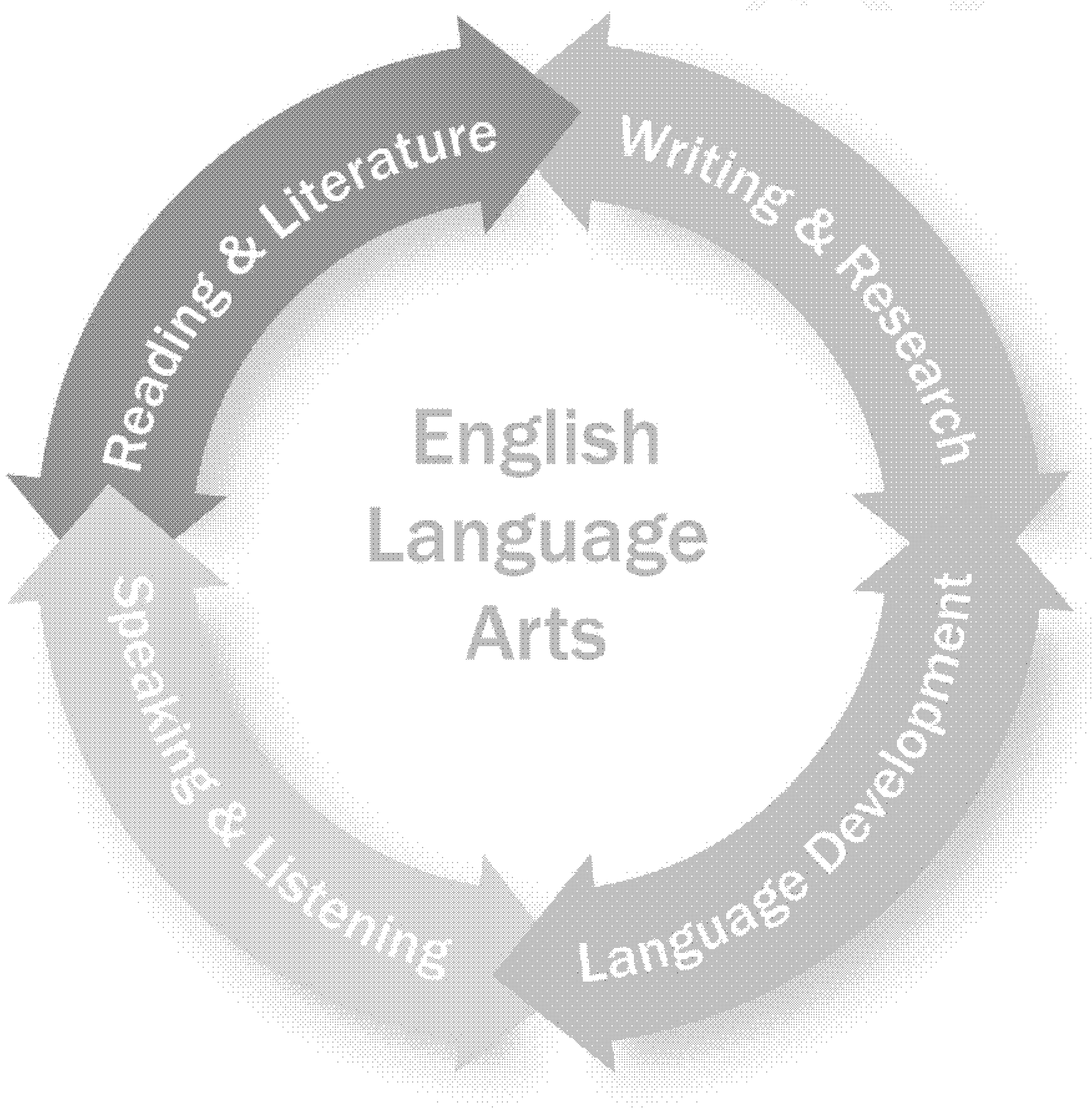
Language Development

In grade 8, students apply the language development standards by applying the core vocabulary standards to determine word meaning, understand word nuances, and acquire vocabulary and to produce writing and speaking that observes appropriate conventions.

- Vocabulary standards applied to reading, writing, speaking and listening
- **Grade-specific conventions focus:** Verb voice and mood
  - Form and use verbs in the active and passive voice (Conventions Standard #6)
  - Form and use verbs in the indicative… (Conventions Standard #7)
  - Avoid inappropriate shifts… (Conventions Standard #8)
  - Use verbs in the …voice …mood… (Conventions standard #11)

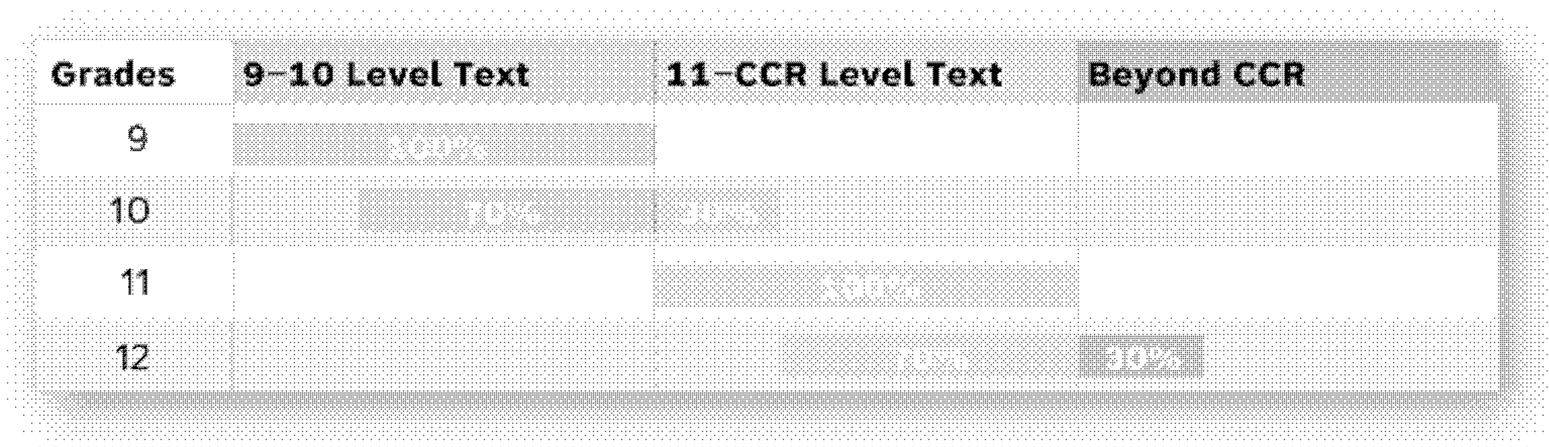
English Language Arts

Grades 9–10



Required Text Complexity by Grade

Proportion of Texts Within and Above Grade Band to be Read in Each Grade



While advancing through grades 9–10, students must engage with texts of steadily increasing complexity.

- **In grade 9**, students focus on reading texts in the 9–10 grade band level with scaffolding likely required for texts at the high end of the range.
- **In grade 10**, students focus on reading texts in the 9–10 grade band level (70 percent) independently and are introduced to texts in the 11–CCR grade band level as "stretch" texts (30 percent), which will likely require scaffolding.

Determining Text Complexity for Grades 9–10[27]

Text complexity is determined by a mix of qualitative and quantitative measures of the text itself refined by teachers' professional judgment about the match of particular texts to particular students. The qualitative dimensions of text complexity are best understood as continua of increasing complexity rather than as representing discrete and easily defined stages. Most authentic texts will exhibit some but not all of the traits linked to a particular grade band; qualitatively assigning a text to a grade band is therefore a matter of "best fit," or determining which grade band's set of descriptors most accurately describes the text.

Qualitative Measures of Texts	Quantitative Measures of Texts
• *Structure:* Implicit, subtle; graphic representations are essential to meaning; texts of increasing length • *Purpose:* Multiple; often implicit • *Style and Language:* Demanding; many literary devices; extensive use of Tier 2 and 3 words and figurative language • *Richness:* Several ideas/concepts; abstract • *Relationships:* Several connections; implicit • *Knowledge Demands:* Ability to handle challenging themes, consider multiple perspectives, and understand experiences distinctly different from one's own; cultural and historical knowledge useful for understanding characters, settings, and allusions; extensive discipline-specific content knowledge	A study is underway with Coh-Metrix, a nonprofit research organization, to identify roughly five to seven computer-measurable dimensions of text cohesion. These dimensions, paired with a Lexile score, will yield a robust quantitative assessment of text complexity that, along with both the qualitative dimensions and professional judgment, will round out the Core Standards model of complexity.
Professional Judgment that weighs students' prior knowledge and life experiences as well as their interests, motivations, and maturity level.	

[27] Adapted from ACT, Inc., (2005); Carnegie Council on Advancing Adolescent Literacy (2010); Chall, Bissex, Conrad, & Harris-Sharples (1996); and Hess and Biggam (2004)

Mix of Key Text Types for 9–10

Narratives	Drama	Poetry	Informational Text
At this level, includes the subgenres of adventure stories, biographies, memoirs, historical fiction, mysteries, science fiction, mysteries, myths, science fiction, realistic fiction, allegories, parodies, satire, and graphic novels.	*At this level, includes one-act and multi-act plays both in written form and on film.*	*At this level, includes the subgenres of narrative poems, lyrical poems, free verse, odes, ballads, and epics.*	*At this level, Includes such subgenres as exposition and argument in the form of essays, speeches, opinion pieces as well as other documents and digital media sources on a range of topics.*

Illustrative Texts for Narratives, Drama, and Poetry[28]

The Odyssey by Homer (8th century B.C.E.) translated by Robert Fagles

The Grapes of Wrath by John Steinbeck (1939)

The Killer Angels by Michael Shaara (1975)

In the Time of the Butterflies by Julia Alvarez (1994)

The Glass Menagerie by Tennessee Williams (1944)

"Song" by John Donne (1635)

"The Raven" by Edgar Allen Poe (1845)

"Loveliest of Trees" by A.E. Houseman (1896)

"I Am Offering This Poem to You" by Jimmy Santiago Baca (1977)

Seminal historical texts that all students are expected to read

Illustrative Informational Texts

"Second Inaugural Address" by Abraham Lincoln (1865)**

"State of the Union Address" by Franklin Delano Roosevelt (1941)

"Remarks to the Senate in Support of a Declaration of Conscience" by Margaret Chase Smith (1950)

"Address at the March on Washington" by Martin Luther King, Jr. (1963)**

"A Quilt of a Country" by Anna Quindlen (2001)

[28] See Appendix B for other texts illustrative of Grades 9–10 text complexity.

Reading and Literature Standards

Grasping specific details and key ideas

Core Standards — Students can and do:

1. Read the text closely to determine what the text says explicitly and to make logical inferences from it; cite text evidence to support analyses in discussion and in writing.
2. Articulate the theses and themes and summarize how they develop over the course of the text and how they are expressed by the key details.
3. Analyze in detail how complex and multifaceted events, ideas, and characters unfold and interact over the course of the text.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. draw on specific details to describe how the events, characters, or setting develops over the course of the drama, narrative poem, or story
b. summarize the development of a theme and describe how that theme resonates throughout the text
c. weave together the details of texts to form a comprehensive understanding of its characters, including their overlapping or competing motivations
d. describe how the accumulation of specific phrases and images within poems contributes to a theme as a whole

Informational Text

a. demonstrate a command of the precise details of the exposition or argument, drawing on specific points to support an understanding of a part or the text as a whole
b. analyze the development of theses or explanations in texts and summarize succinctly the key relationships among ideas and supporting details

Observing craft and structure

Core Standards — Students can and do:

4. Interpret the meanings of words and phrases, including connotative and figurative meanings, and explain how specific word choices shape the meaning and tone of the text.
5. Analyze the structure of complex text and its parts, including how specific sentences, paragraphs, and larger portions build on each other and contribute to the whole of the text.
6. Compare and contrast the content and style of two or more texts written on similar topics or themes.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. analyze how the precise choice of words and phrases creates vivid images and sets the tone, mood, and theme of the text; compare the impact of words selected by the author to similar words with different connotations

b. explain how authors manipulate time (e.g., flashbacks, foreshadowing, pacing) to create suspense, mystery, or humor
c. evaluate how playwrights use soliloquies to portray the internal thinking and feeling of characters
d. compare and contrast similarities and differences in styles and forms of poems on a similar theme or topic

Informational Text

a. analyze how the author uses specific words and metaphors to establish tone or to make illuminating comparisons in an argument, explanation, or description
b. explain how the author structures information or an argument to emphasize key points and advance a point of view
c. analyze how different authors organize and categorize similar information and describe the impact of those different approaches

Integrating information and evaluating evidence

Core Standards — Students can and do:

7. Synthesize information presented graphically or visually in print, videos, or electronic texts with the information provided by the text.
8. Follow and evaluate the logic and reasoning of the text, including assessing whether the evidence provided is sufficient to support the claims.
9. Analyze the point of view or purpose represented in the text, assessing how it shapes the content, style, and tone.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. explain how a story unfolds when it is told by alternating or multiple narrators with different points of view
b. analyze literature in terms of its connection to related historical and cultural events and contexts

Informational Text

a. interpret complex, multifaceted, quantitative, or technical information presented in maps, charts, illustrations, graphs, and time lines
b. provide an account of an author's precise claims, including how specific assertions are defined and distinguished from opposing statements
c. analyze the explicit and implicit premises of an argument and determine if the conclusions reached are logically justified by the evidence presented in the text
d. compare how different authors construct and develop different points of views or perspectives on similar events or issues by assessing their assumptions, evidence, and reasoning

Developing habits for reading complex text

Core Standards — Students can and do:

10. Develop the habit of reading independently and productively, sustaining concentration and stamina to read increasingly demanding texts.

Writing and Research Standards

Writing to reflect audience, purpose, and task

Core Standards — Students can and do:

1. Write informative and explanatory texts and arguments that match purpose to task and address familiar as well as more distant, unknown and general audiences (e.g., peers, elected officials and policy makers, community members).

Conducting research

Core Standards — Students can and do:

2. Demonstrate proficiency at performing short, focused research projects as well as more sustained inquiries that demonstrate an increasing command of the subject under investigation.
3. Assemble evidence independently from authoritative and credible print and digital sources.
4. Assess the credibility, reliability, consistency, and accuracy of the information and sources gathered and determine the strengths and limitations of each source and avoiding over-reliance on any one source.
5. Represent and cite accurately the data, conclusions, and opinions of others, effectively incorporating them into one's own work while avoiding plagiarism.
6. Cite print or electronic sources correctly and document quotations, paraphrases, graphics, and other information using a standard format.

Revising writing

Core Standards — Students can and do:

7. Strengthen writing through revision, editing, or beginning again to ensure to ensure logical organization, precision of word choice, and coherence.

Using tools and technology

Core Standards — Students can and do:

8. Use technology and other tools to produce, revise, and distribute writing, as well as to interact online with others about writing, including responding to and providing feedback.

Developing proficiency in a range of writing

9. Create writing over extended timeframes (time for reflection and revision) and shorter timeframes (a single sitting or a day or two), responding to specific sources.

   Focus by grade level:

   Grade 9: Analyzing the content of literary or informational sources at the 9-10 grade band level of text complexity and content
   Grade 10: Comparing or evaluating the contents of literary or informational sources at the 9-10 grade band level of complexity and content

Standards — Students can and do (by key text type):[29]

Narratives

By high school, students are most often using narrative writing as a technique embedded within other genres. They use narrative writing to inform and persuade. They may, for example, provide a brief anecdote to support a point made in an argument or a scenario to illustrate an explanation. In such cases, narrative writing is a technique rather than a form in itself.

Informative and Explanatory Texts

a. provide a clear and coherent introduction that establishes the subject and conveys a knowledgeable stance
b. develop a complex subject through relevant and specific facts, concrete details, quotations, or other information and examples
c. organize complex information into categories that make clear distinctions and provide headings, figures, tables, and diagrams when useful
d. employ discipline-specific and technical vocabulary and maintain a formal, objective style
e. adapt strategies to present information and explanations (e.g., if/then, extended definitions, classification, comparison/contrast, and cause/effect) and employ them to manage the complexity of a topic
f. link ideas with transitions and by varying sentence structures to express relationships between ideas and create cohesion
g. emphasize the most significant information and confirm the accuracy of key points
h. provide a conclusion that articulates the implications and significance of the information or explanation

Arguments

a. establish a substantive claim and distinguish it from alternate or opposing claims
b. support claims with logical reasons
c. provide relevant and sufficient evidence from credible sources in support of the reasons
d. explain how the evidence links to the claim
e. develop the argument in part based on knowledge of the audience (e.g., building bridges by opening with areas of agreement)
f. convey relationships between reasons, as well as between reasons and evidence, and signal alternative claims using words, phrases, and clauses (e.g., *on the other hand*, *however*, *but*, *nevertheless*, *because*, *therefore*, *in addition*).
g. maintain a formal style when appropriate to the discipline or context
h. enhance the reliability of the argument by employing strategies such as paraphrasing or quoting explicitly from a credible, authoritative source
i. provide a concluding statement or section that enhances the argument, using strategies such as articulating the implications, summing up the key factors, or weighing the evidence to support the claim

Speaking and Listening Standards

Listening closely and participating productively

Core Standards — Students can and do:

1. Participate productively in a range of structured interactions—both interpersonally and in groups—exchanging information constructively and with confidence.

[29] See Appendix C for samples of student writing that illustrate through annotations the level of quality required to meet the writing standards.

2. Sustain concentration on complex information presented orally, visually, or multi-modally and confirm understanding by summarizing, analyzing, and elaborating on key ideas.

Standards — Students can and do (by key communication type):

Classroom discussions and collaboration

a. come to discussions having researched, studied, and taken notes on topics or issues under study and draw upon that preparation in discussions
b. determine the key ideas as well as the tone and mood of communications presented orally or through other media
c. ask questions to test the evidence that supports a speaker's claims and conclusions presented orally or through other media
d. build on essential information from others' input and respond constructively by making cogent and verifiable comments that aid in the furthering and deepening of discussions
e. integrate multiple streams of data presented through a variety of multi-modal media into a cohesive, meaningful understanding of the information
f. support productive teamwork by identifying the comments and claims made on all sides of an issue; evaluating the degree to which each claim is supported by evidence; sifting, summarizing, and putting to use the most important ideas developed by the group; and determining what additional information, research, and tasks are required in order to move the group towards its goals

Exchanging information and speaking effectively

Core Standards — Students can and do:

3. Present information and points of view, structuring and organizing comments to support their purposes and guide the listener.
4. Vary intonation and phrasing for emphasis and effect, demonstrating command of formal English when indicated or appropriate (e.g., presenting ideas versus class discussion).

Standards — Students can and do (by key communication type):

Presentation of ideas and information

a. organize and present complex information about situations, topics, or texts so that listeners can follow the line of thought by grouping related ideas, using transitional markers, and clarifying one's claims with evidence that is verifiable and accessible
b. align verbal (tone, phrasing, pacing) and nonverbal strategies (gestures and facial expressions) for emphasis and effect
c. make strategic use of multimedia elements and visual displays of data to enhance understanding
d. perform dramatic readings of various prose and poetry, speaking with clarity, fidelity, and responsiveness to the text, reflecting on syntax and diction for cues regarding emphasis and rhythm

Language Development Standards

Conventions

In high school, students gain a broad range of sophisticated language skills to enhance meaning, achieve stylistic effect, and create subtle links between and among ideas. They maintain parallel structure. They acquire a more conceptual understanding of usage and the limits of "rules." They use a full range of punctuation, including ellipses, semicolons,

colons, and hyphens, and have a fuller understanding of how to employ commas and dashes. They make use of a wide range of phrases and clauses for effect. They maintain a consistent style and tone, using a style manual appropriate to the discipline in which they are working to help conventionalize their writing.

Key Terms: colon, ellipses, hyphen, semicolon, parallel structure, verbal

Grammar and usage

Core Standards — Students can and do:

1. Use parallel structure in writing.
2. Consult references (e.g., *Merriam-Webster's Dictionary of English Usage*) as needed to resolve particular usage issues, particularly when the usage is contested.

Mechanics

Core Standards — Students can and do:

3. Use a comma to separate coordinate adjectives (e.g., *It was a fascinating, enjoyable movie* but not *He wore a light*[,] *blue suit*).
4. Use a comma, ellipses, or dash to indicate a pause or break.
5. Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses.
6. Use a colon to introduce a list or a quotation.
7. Observe the conventions concerning using hyphens to join words.

Word choice and style

Core Standards — Students can and do:

8. Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to add variety and interest to writing.
9. Maintain consistency in style and tone.
10. Write and edit work so that it conforms to the guidelines in a style manual.

Focus by Grade-Level
Grade 9: Style (Conventions Standards #9, #10)
Grade 10: Advanced punctuation use (Conventions Standards #s 3-7)

Vocabulary

Key to students' vocabulary development is building rich and flexible word knowledge marked by multiple connections that link a word to similar words and to contexts and experiences that are related to that word—as compared to simply a definition. In high school, students continue to make use of a range of strategies to determine and clarify the meaning of unknown and multiple-meaning words. This repertoire now includes considering multiple levels of context (sentence, paragraph, and text levels) and the word's history. They habitually verify their inferences of word meanings. They interpret a wide range of figurative language found in what they read and consider its contribution to the text. Possessing a highly developed sense of the shadings among words with similar denotations,

they evaluate an author's or speaker's choice of words as well as alternatives to the words chosen. They acquire new words through interactive language use, including informal talk, discussion, reading and responding to text as well as by being taught the words directly. This includes a continuing focus on "Tier 2" words and phrases (those that commonly appear in writing but not in spoken language), "Tier 3" words and phrases (those that are specific and important to particular disciplines).

Determining the meaning of words

Core Standards — Students can and do:

1. Determine or clarify the meaning of an unknown word by using one or more of the following strategies:
   - using knowledge of roots, prefixes, and suffixes
   - using context, including syntactic and semantic clues, at the sentence, paragraph, and text levels
   - consulting reference materials, including general and specialized dictionaries and thesauruses, both print and digital
2. Determine the relevant meaning of multiple-meaning words by using context.
3. Verify the preliminary determination of a word's meaning (e.g., by checking the inferred meaning in context or by looking up the word in a dictionary).
4. Interpret figurative language and analyze its role within the text.

Understanding the nuances of words (denotations and connotations)

Core Standards — Students can and do:

5. Assess and explain the merits of the choice of one word over another in reading, writing, speaking, and listening.
6. Gain a clearer sense of a word's meaning and use by comparing it to other words with similar but not identical meanings (synonyms).

Acquiring vocabulary

Core Standards — Students can and do:

7. Acquire and use a grade-appropriate vocabulary of Tier 2 words taught directly and gained through reading.
8. Acquire and use a grade-appropriate vocabulary of Tier 3 words taught directly and gained through reading.

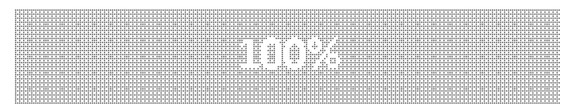
DRAFT

Grade 9 English Language Arts: Focus for Instruction

Reading and Literature

In grade 9, students apply the core reading standards to the following types of text: narratives, drama, poetry, and informational text. Students focus on learning to read 9-10 grade band text independently, with scaffolding likely required for texts at the high end of the range.

- Reading standards applied to different text types
- Mix of text types: Narratives, Drama, Poetry, Informational Text
- **Text Complexity focus:** 100% 9-10 Band Text



Writing and Research

In grade 9, students apply the standards in writing to the following types of text: Narrative, Informative/Explanatory, and Argument. Students perform research, including short focused research tasks. They also write over various time frames in response to specific sources.

- Writing standards applied to different text types: Narrative, Informative/Explanatory, Argument
- Research, including short focused research tasks
- **Grade-specific focus: Grade-specific focus:** Students create writing over extended and shorter timeframes, responding to specific sources by analyzing the contents of literary or informational sources at the 9-10th grade band level of complexity and content.

Speaking and Listening

In grade 9, students apply the core speaking and listening standards in different contexts.

- Speaking and listening standards applied in different contexts: classroom discussion and collaboration as well as in presentations of ideas and information.

Language Development

In grade 9, students apply the language development standards by applying the core vocabulary standards to determine word meaning, understand word nuances, and acquire vocabulary and to produce writing and speaking that observes appropriate conventions.

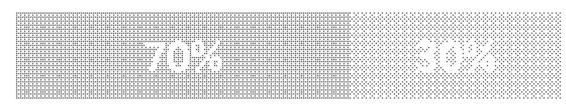
- Vocabulary standards applied to reading, writing, speaking and listening
- **Grade-specific conventions focus:** Style
  - Maintain consistency … (Conventions Standard #9)
  - (Style manual)… (Conventions Standard #10)

Grade 10 English Language Arts: Focus for Instruction

Reading and Literature

In grade 10, students apply the core reading standards to the following types of text: narratives, drama, poetry, and informational text. Students focus on learning to read 9-10 grade band text independently as well as on sustained practice with 11-CCR band "stretch" texts, which will likely require scaffolding.

- Reading standards applied to different text types
- Mix of text types: Narratives, Drama, Poetry, Informational Text
- **Text Complexity focus:** 70% 9-10 Band Text; 30% 11-CCR text



Writing and Research

In grade 10, students apply the standards in writing to the following types of text: Narrative, Informative/Explanatory, and Argument. Students perform research, including short focused research tasks. They also write over various time frames in response to specific sources.

- Writing standards applied to different text types: Narrative, Informative/Explanatory, Argument
- Research, including short focused research tasks
- **Grade-specific focus:** Students create writing over extended and shorter timeframes, responding to specific sources by analyzing the contents of literary or informational sources at the 9-10th grade band level of complexity and content.

Speaking and Listening

In grade 10, students apply the core speaking and listening standards in different contexts.

- Speaking and listening standards applied in different contexts: classroom discussion and collaboration as well as in presentations of ideas and information.

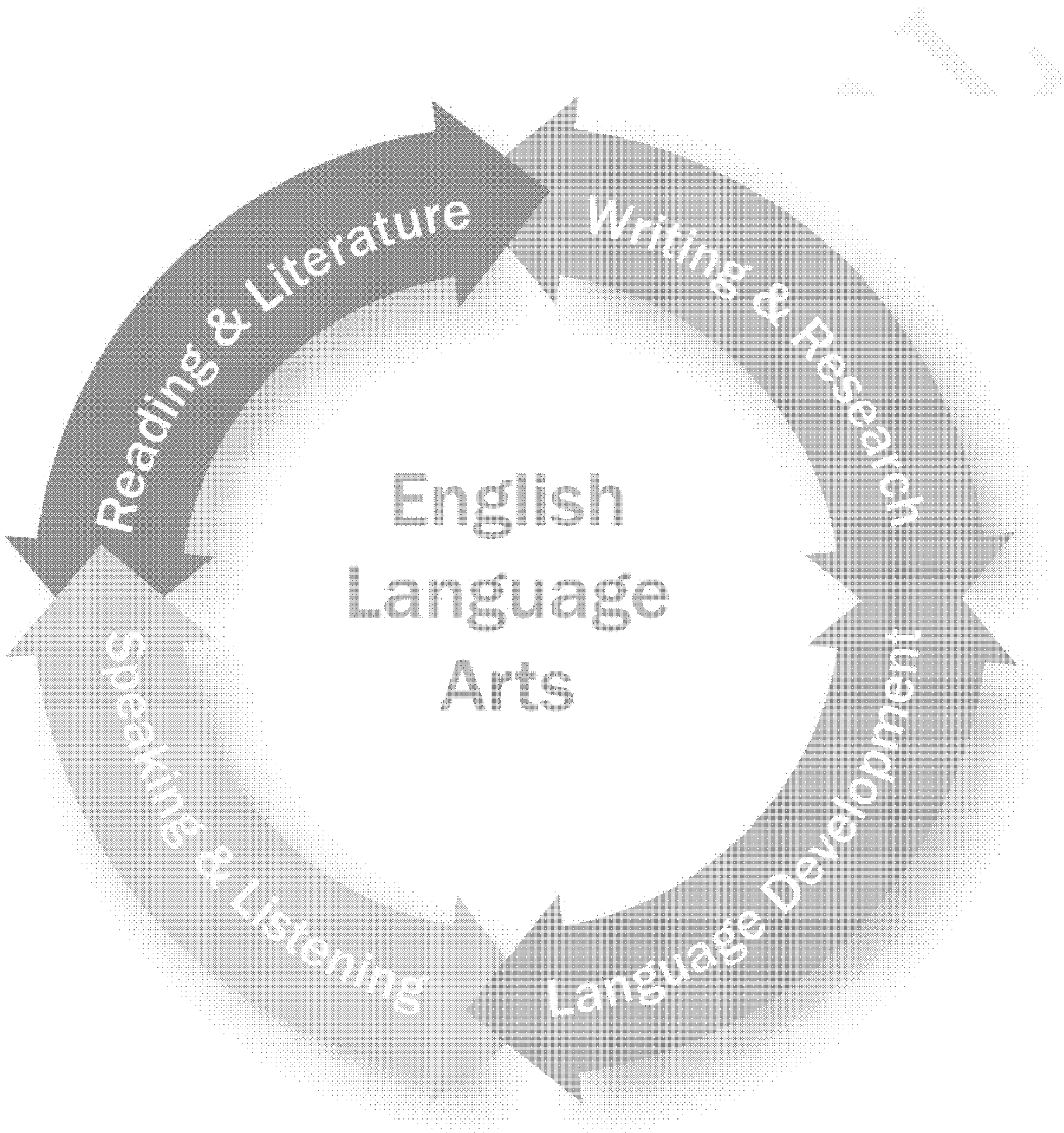
Language Development

In grade 10, students apply the language development standards by applying the core vocabulary standards to determine word meaning, understand word nuances, and acquire vocabulary and to produce writing and speaking that observes appropriate conventions.

- Vocabulary standards applied to reading, writing, speaking and listening
- **Grade-specific conventions focus:** Advanced Punctuation Use
  - Coordinate adjectives … (Conventions Standard #3)
  - Comma/dash/ellipsis… (Conventions Standard #4)
  - Semicolon … (Conventions Standard #5)
  - Colon … (Conventions Standard #6)
  - Hyphen … (Conventions Standard #7)

English Language Arts

Grades 11–CCR



Required Text Complexity by Grade

Proportion of Texts Within and Above Grade Band to be Read in Each Grad

Grades	9–10 Level Text	11–CCR Level Text	Beyond CCR
9	100%		
10	70%	30%	
11		100%	
12		70%	30%

While advancing through grades 11-12, students must engage with texts of steadily increasing complexity.

- **In grade 11**, students focus on reading texts in the 11-CCR grade band level with scaffolding likely required for texts at the high end of the range.
- **In grade 12**, students focus on reading texts in the 11-CCR grade band level (70 percent) independently and are introduced to texts in the "Beyond CCR" grade band level as "stretch" texts (30 percent), which will likely require scaffolding.

Determining Text Complexity for Grades 11–CCR[30]

Text complexity is determined by a mix of qualitative and quantitative measures of the text itself refined by teachers' professional judgment about the match of particular texts to particular students. The qualitative dimensions of text complexity are best understood as continua of increasing complexity rather than as representing discrete and easily defined stages. Most authentic texts will exhibit some but not all of the traits linked to a particular grade band; qualitatively assigning a text to a grade band is therefore a matter of "best fit," or determining which grade band's set of descriptors most accurately describes the text.

Qualitative Measures of Texts	Quantitative Measures of Texts
• *Structure:* Implicit, complex, unconventional; sophisticated graphic representations are essential to meaning; texts are sufficiently long to address complex subjects • *Purpose:* Multiple; often implicit and may be hidden or obscure • *Style and Language:* Unfamiliar, demanding, complex; many literary devices; extensive use of Tier 2 and 3 words and figurative language; language may be intentionally or unintentionally ambiguous • *Richness:* Many ideas/concepts; highly abstract; high information density • *Relationships:* Many implicit, complex, interwoven connections • *Knowledge Demands:* Ability to handle one or more complex themes, consider multiple and unusual perspectives, and understand experiences distinctly different from one's own; cultural and historical knowledge useful for understanding characters, settings, and allusions; extensive, perhaps specialized discipline-specific content knowledge	A study is underway with Coh-Metrix, a nonprofit research organization, to identify roughly five to seven computer-measurable dimensions of text cohesion. These dimensions, paired with a Lexile score, will yield a robust quantitative assessment of text complexity that, along with both the qualitative dimensions and professional judgment, will round out the Core Standards model of complexity.
Professional Judgment that weighs students' prior knowledge and life experiences, students' interests, motivations, and maturity level.	

[30] Adapted from ACT, Inc., (2005); Carnegie Council on Advancing Adolescent Literacy (2010); Chall, Bissex, Conrad, & Harris-Sharples (1996); and Hess and Biggam (2004)

Mix of Key Text Types for 11–CCR

Narratives	Drama	Poetry	Informational Text
At this level, includes the subgenres of adventure stories, biographies, memoirs, historical fiction, mysteries, science fiction, mysteries, myths, science fiction, realistic fiction, allegories, parodies, satire, and graphic novels.	*At this level, includes one-act and multi-act plays both in written form and on film.*	*At this level, includes the subgenres of narrative poems, lyrical poems, free verse, odes, ballads, and epics.*	*At this level, Includes such subgenres as exposition and argument in the form of essays, speeches, opinion pieces as well as other documents and digital media sources on a range of topics.*

Illustrative Texts for Narratives, Drama, and Poetry[31]

Pride and Prejudice by Jane Austen (1813)

Black Boy by Richard Wright (1945)

Their Eyes Were Watching God by Zora Neale Hurston (1937)

The Bluest Eye by Toni Morrison (1970)

The Namesake by Jhumpa Lahiri (2003)

The Importance of Being Earnest by Oscar Wilde (1895)

Death of a Salesman by Arthur Miller (1949)

"Ode on a Grecian Urn" by John Keats (1820)

"Because I Could Not Stop for Death" by Emily Dickinson (1890)

Illustrative Informational Texts

The Declaration of Independence by Thomas Jefferson (1776)**

The Crisis by Thomas Paine (1776)

Walden by Henry David Thoreau (1854)

"Politics and the English Language" by George Orwell (1946)

"Letter from a Birmingham Jail" by Martin Luther King (1963)**

"Mother Tongue" by Amy Tan (1990)

Seminal historical texts that all students are expected to read

[31] See Appendix B for other texts illustrative of Grades 11–CCR text complexity.

Reading and Literature Standards

Grasping specific details and key ideas

Core Standards — Students can and do:

1. Read the text closely to determine what the text says explicitly and to make logical inferences from it; cite text evidence to defend and challenge analyses in discussion and in writing.
2. Articulate the text's theses and themes and provide a summary that clarifies the relationships among ideas and the connections between key details.
3. Analyze in detail how complex and multifaceted events, ideas, and characters unfold and influence one another over the course of the text.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. analyze where the author chooses to focus and which details the author chooses to emphasize
b. analyze how multiple themes and ideas in the text interact and build on one another
c. evaluate the extent to which setting shapes the course of events and sets the mood
d. trace the origins and evolution of the traits, motivations, and relationships among characters and how they interact to influence the plot and its resolution
e. describe how the poet develops a central image, preoccupation, or idea through the accumulation of specific phrases and images

Informational Text

a. demonstrate an understanding of the precise elements of an author's explanation or argument, including the distinctions the author makes between different ideas or information
b. scrutinize the details within specific portions of texts and connect the insights gained to develop an understanding of the text as a whole
c. analyze how the text captures the interaction between complex ideas or multifaceted events

Observing craft and structure

Core Standards — Students can and do:

4. Interpret the meanings of words and phrases, including connotative and figurative meanings, and analyze how word choices have a significant effect on the meaning and tone of the text.
5. Analyze the ways the author chooses to structure the text, including how to present complex ideas and events and where to begin and end.
6. Compare and contrast the choices different authors make in treating similar topics or themes, including content, style, and tone.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. analyze how the author's use of language impacts the text, including the degree of formality of the diction and how it is evocative of a particular setting (e.g., a courtroom, a rural town)
b. evaluate how authors create meaningful ambiguity and multiple layers of meaning in poetry, drama, and other narratives
c. analyze how an author choice of where to begin a story, poem, or drama impacts the overall plot structure
d. contrast alternative treatments of the same dramatic work in different stage productions and evaluate how the directors' different interpretations relate to evidence within the script
e. analyze how the author draws upon and transforms fictional or historical source material (e.g., how Shakespeare draws on Plutarch or a story in Ovid)

Informational Text

a. describe how the choice of a particular word, phrase, or series of words can impact significantly the meaning of a document (e.g., contract, court opinion, essay)
b. evaluate how the author's choice of structure contributes to the effectiveness of the exposition or argument
c. compare and contrast presentations of the same topic in different media and describe the differences in focus, organization, and links to other sources

Integrating information and evaluating evidence

Core Standards — Students can and do:

7. Synthesize information presented graphically or visually in print, videos, or electronic texts and, when appropriate, note discrepancies of fact or interpretation (e.g., data in a table inconsistent with the author's analysis).

8. Rigorously evaluate the logic and reasoning of the text, including assessing whether the evidence provided is relevant and sufficient.

9. Analyze how the point of view or purpose develops in the text and explain how it is revealed in the key details.

Standards — Students can and do (by key text type):

Narratives, Drama, and Poetry

a. compare points of view from which different stories are told and trace how they shift within a story and influence characterization and plot
b. explain how dramatic irony created by the differences between what the audience or reader knows and what the characters know in a drama or narrative fiction creates suspense, anxiety, or humor

Informational Text

a. synthesize ideas and data presented graphically and determine their purpose and relationship to the rest of the text (print or digital), noting any inconsistencies or discrepancies between the two
b. evaluate the reasoning and rhetoric that support an argument or explanation, including assessing the sufficiency and relevance of the evidence as well as identifying any unsubstantiated statements or fallacious reasoning
c. analyze documents of historical and literary significance for their premises, perspectives, and logical structure

Developing habits for reading complex text

Core Standards — Students can and do:

10. Develop the habit of reading independently and productively, sustaining concentration and stamina to read increasingly demanding texts.

Writing and Research Standards

Writing to reflect audience, purpose, and task

Core Standards — Students can and do:

1. Write informative and explanatory texts and arguments that match purpose to task and are tailored to audiences with specific requirements (e.g., admissions officer, human resources officer, skeptical audience).

Conducting research

Core Standards — Students can and do:

2. Demonstrate proficiency at performing short, focused research projects as well as more sustained inquiries that synthesize multiple authoritative sources on a subject.
3. Analyze evidence independently gathered from multiple authoritative and credible print and digital sources.
4. Assess the credibility, reliability, consistency, and accuracy of the information and sources gathered and determine their usefulness and relevance for the specific audience, purpose, and task.
5. Represent and cite accurately the data, conclusions, and opinions of others, effectively incorporating them into one's own work while avoiding plagiarism.
6. Cite print or electronic sources correctly and document quotations, paraphrases, graphics, and other information using a standard format.

Revising writing

Core Standards — Students can and do:

7. Strengthen writing through revision, editing, or beginning again to ensure to ensure logical organization, precision of word choice, and coherence.

Using tools and technology

Core Standards — Students can and do:

8. Demonstrate command of technology and other tools to produce, revise, and distribute writing, as well as to interact online with others about writing, including responding to and providing feedback.

Developing proficiency in a range of writing

9. Create writing over extended timeframes (time for reflection and revision) and shorter timeframes (a single sitting or a day or two), responding to specific sources.

   Focus by grade level:

   Grade 11: Analyzing the content of literary or informational sources at the 11-CCR grade band level of text complexity and content
   Grade 12: Synthesizing or evaluating the contents of literary or informational sources at the 11-CCR grade band level of complexity and content

Standards — Students can and do (by key text type):[32]

Narratives

By high school, students are most often using narrative writing as a technique embedded within other genres. They use narrative writing to inform and persuade. They may, for example, provide a brief anecdote to support a point made in an argument or a scenario to illustrate an explanation. In such cases, narrative writing is a technique rather than a form in itself.

Informative and Explanatory Texts

a. provide a clear and coherent introduction that establishes the subject and conveys a knowledgeable stance
b. develop complex subjects through judicious use of relevant and specific facts, details, quotations, examples, or other information
c. organize and present information so that each new piece of information builds upon what precedes it to create a unified whole
d. demonstrate command of discipline-specific and technical vocabulary when appropriate and adjust style as appropriate to the situation
e. demonstrate control of a range of strategies to present complex information or explanations and employ them effectively to manage the complexity of the topic and accomplish the writer's purpose
f. link ideas with transitions and by varying sentence structures to express the precise relationships among ideas and create cohesion
g. provide a conclusion that articulates the implications and significance of the information or explanation

Arguments

a. establish the importance of the issue, make a substantive claim, and distinguish it from alternate or opposing claims
b. support claims with logical reasons
c. provide relevant, sufficient, and convincing evidence from credible sources in support of the reasons
d. make logical connections between the evidence and the claim
e. develop the argument in part based on an awareness of the audience's values, knowledge of the issue, and possible biases
f. convey relationships between reasons, as well as between reasons and evidence, and signal alternative claims using words, phrases and clauses (e.g., *on the other hand*, *however*, *but*, *nevertheless*, *because*, *therefore*, *in addition*)
g. maintain a formal style when appropriate to the discipline or context
h. enhance the credibility of the argument by demonstrating control of strategies, including paraphrasing or quoting from authoritative sources and citing logical consequences
i. provide a concluding statement or section that enhances the argument, using strategies such as articulating the implications, summing up the key factors, or weighing the evidence to support the claim

[32] See Appendix C for samples of student writing that illustrate through annotations the level of quality required to meet the writing standards.

Speaking and Listening Standards

Listening closely and participating productively

Core Standards — Students can and do:

1. Participate productively in a range of structured interactions—both interpersonally and in groups—exchanging information constructively and with confidence, adapting to different levels of formality.
2. Sustain concentration on complex information presented orally, visually, or multi-modally and confirm understanding by challenging or defending key ideas and supporting evidence.

Standards — Students can and do (by key communication type):

Classroom discussions and collaboration

a. come to discussions having formulated considered judgments on the topics or issues under study and draw upon that preparation in discussions
b. evaluate the content and rhetoric of a speaker, noting when evidence is exaggerated or distorted
c. ask questions that probe the reasoning and evidence that support the claims and conclusions made orally or through other media, including offering counter examples or other points of view
d. propel conversations forward by providing essential information and sharing findings that clarify, accommodate, or challenge ideas
e. synthesize information presented visually or digitally with other information presented orally, noting the effect on meaning of any discrepancies between the two presentations
f. assist in the formulation and productive functioning of both formal and informal self-directed work groups by identifying and assigning tasks and maintaining conversational norms as well as evaluating the progress of the team towards its goals

Exchanging information and speaking effectively

Core Standards — Students can and do:

3. Present information clearly and persuasively to others, selecting the most appropriate way to structure comments for clarity and effect.
4. Adapt delivery, tone, and mood for emphasis and effect, demonstrating command of formal English when indicated or appropriate (e.g., presenting ideas versus class discussion).

Standards — Students can and do (by key communication type):

Presentation of ideas and information

a. organize and present complex information about topics, situations, or texts, providing reliable and credible evidence from authoritative sources in support of findings and claims such that the line of reasoning is clear and alternative perspectives are addressed
b. shape delivery and message to the occasion and the audience's values, knowledge of the issue, and possible biases
c. engage an audience and improve comprehension through visual aids in presentations, including multimedia platforms

d. portray and explain various ways to perform dramatic readings of various prose and poetry, citing text evidence for the alternative readings

Language Development Standards

Conventions

In high school, students gain a broad range of sophisticated language skills to enhance meaning, achieve stylistic effect, and create subtle links between and among ideas. They maintain parallel structure. They acquire a more conceptual understanding of usage and the limits of "rules." They use a full range of punctuation, including ellipses, semicolons, colons, and hyphens, and have a fuller understanding of how to employ commas and dashes. They make use of a wide range of phrases and clauses for effect. They maintain a consistent style and tone, using a style manual appropriate to the discipline in which they are working to help conventionalize their writing.

Key Terms: colon, ellipses, hyphen, semicolon, parallel structure, verbal

Grammar and usage

Core Standards — Students can and do:

11. Use parallel structure in writing.
12. Consult references (e.g., *Merriam-Webster's Dictionary of English Usage*) as needed to resolve particular usage issues, particularly when the usage is contested.

Mechanics

Core Standards — Students can and do:

13. Use a comma to separate coordinate adjectives (e.g., *It was a fascinating, enjoyable movie* but not *He wore a light*[,] *blue suit*).
14. Use a comma, ellipses, or dash to indicate a pause or break.
15. Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses.
16. Use a colon to introduce a list or a quotation.
17. Observe the conventions concerning using hyphens to join words.

Word choice and style

Core Standards — Students can and do:

18. Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to add variety and interest to writing.
19. Maintain consistency in style and tone.
20. Write and edit work so that it conforms to the guidelines in a style manual.

Focus by Grade-Level
Grade 11: Parallel structure and phrasing (Conventions Standards #1, #8)
Grade 12: Usage (Conventions Standard #2)

Vocabulary

Key to students' vocabulary development is building rich and flexible word knowledge marked by multiple connections that link a word to similar words and to contexts and experiences that are related to that word—as compared to simply a definition. In high school, students continue to make use of a range of strategies to determine and clarify the meaning of unknown and multiple-meaning words. This repertoire now includes considering multiple levels of context (sentence, paragraph, and text levels) and the word's history. They habitually verify their inferences of word meanings. They interpret a wide range of figurative language found in what they read and consider its contribution to the text. Possessing a highly developed sense of the shadings among words with similar denotations, they evaluate an author's or speaker's choice of words as well as alternatives to the words chosen. They acquire new words through interactive language use, including informal talk, discussion, reading and responding to text as well as by being taught the words directly. This includes a continuing focus on "Tier 2" words and phrases (those that commonly appear in writing but not in spoken language), "Tier 3" words and phrases (those that are specific and important to particular disciplines).

Determining the meaning of words

Core Standards — Students can and do:

1. Determine or clarify the meaning of an unknown word by using one or more of the following strategies:
   - using knowledge of roots, prefixes, and suffixes
   - using context, including syntactic and semantic clues, at the sentence, paragraph, and text levels
   - consulting reference materials, including general and specialized dictionaries and thesauruses, both print and digital
   - using the word's history (etymology)
2. Determine the relevant meaning of multiple-meaning words by using context.
3. Verify the preliminary determination of a word's meaning (e.g., by checking the inferred meaning in context or by looking up the word in a dictionary).
4. Interpret figurative language and analyze its role within the text.

Understanding the nuances of words (denotations and connotations)

Core Standards — Students can and do:

7. Assess and explain the merits of the choice of one word over another in reading, writing, speaking, and listening.
8. Gain a clearer sense of a word's meaning and use by comparing it to other words with similar but not identical meanings (synonyms).

Acquiring vocabulary

Core Standards — Students can and do:

7. Acquire and use an extensive vocabulary of Tier 2 words taught directly and gained through reading.
8. Acquire and use a grade-appropriate vocabulary of Tier 3 words taught directly and gained through reading.

Grade 11 English Language Arts: Focus for Instruction

Reading and Literature

In grade 11, students apply the core reading standards to the following types of text: narratives, drama, poetry, and informational text. Students focus on learning to read 11-CCR grade band text independently, with scaffolding likely required for texts at the high end of the range.

- Reading standards applied to different text types
- Mix of text types: Narratives, Drama, Poetry, Informational Text
- **Text Complexity focus:** 100% 11-CCR Band Text

100%

Writing and Research

In grade 11, students apply the standards in writing to the following types of text: Narrative, Informative/Explanatory, and Argument. Students perform research, including short focused research tasks. They also write over various time frames in response to specific sources.

- Writing standards applied to different text types: Narrative, Informative/Explanatory, Argument
- Research, including short focused research tasks
- **Grade-specific focus:** Students create writing over extended and shorter timeframes, responding to specific sources by analyzing the contents of literary or informational sources at the 11-CCR grade band level of complexity and content.

Speaking and Listening

In grade 11, students apply the core speaking and listening standards in different contexts.

- Speaking and listening standards applied in different contexts: classroom discussion and collaboration as well as in presentations of ideas and information.

Language Development

In grade 11, students apply the language development standards by applying the core vocabulary standards to determine word meaning, understand word nuances, and acquire vocabulary and to produce writing and speaking that observes appropriate conventions.

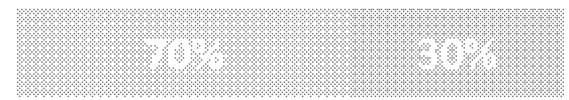
- Vocabulary standards applied to reading, writing, speaking and listening
- **Grade-specific conventions focus:** Parallel Structure and Phrasing
  - Use parallel structure in writing … (Conventions Standard #1)
  - Use various types of phrases… (Conventions Standard #8)

Grade 12 English Language Arts: Focus for Instruction

Reading and Literature

In grade 12, students apply the core reading standards to the following types of text: narratives, drama, poetry, and informational text. Students focus on learning to read 11-CCR grade band text independently as well as on sustained practice with Beyond CCR band "stretch" texts, which will likely require scaffolding.

- Reading standards applied to different text types
- Mix of text types: Narratives, Drama, Poetry, Informational Text
- **Text Complexity focus:** 70% 11-CCR Band Text; 30% Beyond CCR text



Writing and Research

In grade 12, students apply the standards in writing to the following types of text: Narrative, Informative/Explanatory, and Argument. Students perform research, including short focused research tasks. They also write over various time frames in response to specific sources.

- Writing standards applied to different text types: Narrative, Informative/Explanatory, Argument
- Research, including short focused research tasks
- **Grade-specific focus:** Students create writing over extended and shorter time frames, responding to specific sources by synthesizing or evaluating the contents of literary of informational sources of 11-CCR grade band level complexity and content.

Speaking and Listening

In grade 12, students apply the core speaking and listening standards in different contexts.

- Speaking and listening standards applied in different contexts: classroom discussion and collaboration as well as in presentations of ideas and information.

Language Development

In grade 12, students apply the language development standards by applying the core vocabulary standards to determine word meaning, understand word nuances, and acquire vocabulary and to produce writing and speaking that observes appropriate conventions.

- Vocabulary standards applied to reading, writing, speaking and listening
- **Grade-specific conventions focus:** Usage
  - Consult references … (Conventions Standard #2)

APPENDIX A

Text Complexity Next Steps

A key requirement of the Core Standards in Reading is that all students engage with texts of steadily increasing complexity as they advance through school. The Core Standards' model of *text complexity*—in the simplest terms, how easy or difficult a text is to read—blends qualitative and quantitative measures of inherent text difficulty with educators' knowledge of their students. All three elements should be considered together when evaluating a text's appropriateness for particular students.

Qualitative dimensions are aspects of text best measured by readers applying trained judgment to the evaluation task. These dimensions include the text's structure, format, and length; its purpose; its style and language; the quality, nature, and density of its ideas, concepts, and information; relationships among ideas, information, and characters in it; and the knowledge and experience demands it places upon readers.

Quantitative dimensions include not only those aspects of text traditionally measured by readability formulas—word length and sentence length—but also computer-assessable aspects of text cohesion. These include referential cohesion (the degree to which a text refers back to previous points) and word frequency.

The qualitative and quantitative measures of a text are balanced in the model by educators' *professional judgment* of the appropriateness of the text for particular students given their background knowledge, interests, and motivation. Harder texts may be appropriate for highly knowledgeable or motivated students, and easier texts may be suitable as a means for building struggling readers' skills up to required levels.

While the tools included in this draft and the forthcoming ones described below represent an important advance over those previously available, no measure or set of measures is perfectly accurate. The mandate is that the body of works that students study in a given year represent an appropriate level of complexity as defined by these standards.

Current and next steps

A qualitative rubric, derived from prior studies and refined through feedback from trained teacher-raters, is included in this draft to define some ways in which text complexity should increase as students move through the grades. The rubric can be used (in conjunction with forthcoming quantitative measures) to place individual texts into grade bands by complexity. The qualitative dimensions are best understood, however, as continua of increasing complexity rather than as representing discrete and easily defined stages. Most authentic texts will exhibit some but not all of the traits linked to a particular grade band; assigning a text to a grade band is therefore a matter of "best fit," or determining which grade band's set of descriptors most accurately describes the text.

The Core Standards work team is presently conducting a study with Coh-Metrix, a nonprofit research organization, to identify roughly five to seven computer-measurable dimensions of text cohesion. These dimensions, paired with a Lexile score, will yield a robust quantitative assessment of text complexity that, along with both the qualitative dimensions and professional judgment, will round out the Core Standards model of complexity. Graphically, these three elements will appear together in a "label" defining complexity for a given text.

Following the completion of that study in early 2010, the work team will oversee the development of a Web site designed to make the text complexity tools more user-friendly and broadly available. The site will contain a database of complexity information for a range of widely used texts, including links to texts and test passages of similar complexity. Educators will be able to input additional texts for evaluation and comment on the suitability of particular texts for particular groups of students. The overarching goal is to make text complexity a vital and easy-to-incorporate element of reading instruction.

Appendix B

Text Complexity Qualitative Scheme

Dimension of Text		Grade Span 2–3	4–5	6–8	9–10	11–12
Structure		Explicit, simple, conventional; simple graphic representations are supplementary to meaning; texts are relatively short	Largely explicit and direct; graphic representations are supplementary to meaning; texts are of increasing length	Largely implicit and subtle; graphic representations are essential to meaning; texts are of increasing length	Implicit, subtle; graphic representations are essential to meaning; texts are of increasing length	Implicit, complex, unconventional; sophisticated graphic representations are essential to meaning; texts are sufficiently long to address complex subjects
Purpose		Single; explicitly stated	Single or twofold; clearly indicated	Single or multiple; subtly stated	Multiple; often implicit	Multiple; often implicit and may be hidden or obscure
Style and Language	Style	Familiar, accessible, plain; few literary devices	Moderately accessible; some literary devices	Moderately demanding; several literary devices	Demanding; many literary devices	Unfamiliar, demanding, complex; many literary devices
	Language	Mostly clear, everyday language; limited use of Tier 2 and 3 words and figurative language	Some everyday language; some use of Tier 2 and 3 words and figurative language	Consistent use of Tier 2 and 3 words and figurative language	Extensive use of Tier 2 and 3 words and figurative language	Extensive use of Tier 2 and 3 words and figurative language; language may be intentionally or unintentionally ambiguous
Richness		A few ideas/concepts; concrete; low information density	Some ideas/concepts; mostly concrete; moderate information density	Several ideas/concepts; mostly abstract; moderate information density	Several ideas/concepts; abstract; high information density	Many ideas/concepts; highly abstract; high information density
Relationships		A few connections; explicit; simple	Some connections; largely explicit	Several connections; largely implicit	Several connections; implicit	Many connections; implicit; complex and interwoven
Knowledge Demands	Life experiences (literary texts)	Ability to handle simple themes and fantastical elements as well as draw upon common, everyday experiences	Ability to handle fairly simple themes, consider a perspective somewhat different from one's own, and understand unfamiliar experiences	Ability to handle fairly challenging themes, consider multiple perspectives, and understand unfamiliar experiences	Ability to handle challenging themes, consider multiple perspectives, and understand experiences distinctly different from one's own	Ability to handle one or more complex themes, consider multiple and unusual perspectives, and understand experiences distinctly different from one's own
	Cultural/literary knowledge (chiefly literary texts)	General background knowledge and familiarity with genre conventions required		Cultural and historical knowledge useful for understanding characters, settings, and allusions		
	Content/discipline knowledge (chiefly informational texts)	Some everyday and general content knowledge	Some general and discipline-specific content knowledge	Some discipline-specific content knowledge	Extensive discipline-specific content knowledge	Extensive, perhaps specialized discipline-specific content knowledge

Adapted from ACT, Inc., (2005); Carnegie Council on Advancing Adolescent Literacy (2010); Chall, Bissex, Conrad, & Harris-Sharples (1996); and Hess and Biggam (2004)

The qualitative dimensions of text complexity are best understood as continua of increasing complexity rather than as representing discrete and easily defined stages. Most authentic texts will exhibit some but not all of the traits linked to a particular grade band; qualitatively assigning a text to a grade band is therefore a matter of "best fit," or determining which grade band's set of descriptors most accurately describes the text.

Structure

- Explicit, simple, conventional → Implicit, complex, unconventional
- Simple graphic representations → Sophisticated graphic representations
- Graphic representations supplementary to meaning → Graphic representations essential to meaning
- Relatively short texts → Texts sufficiently long to address complex subjects

Purpose

- Single purpose → Multiple purposes
- Explicitly stated → Often implicit and may be hidden or obscure

Style

- Familiar, accessible, plain → Unfamiliar, demanding, complex
- Few literary devices → Many literary devices

Language

- Mostly everyday language → Extensive use of Tier 2 and 3 words
- Limited use of figurative language → Extensive use of figurative language
- Clear language → Potentially ambiguous language

Richness

- A few ideas/concepts → Many ideas/concepts
- Concrete ideas/concepts → Abstract ideas/concepts
- Low information density → High information density

Relationships

- A few connections → Many connections
- Explicit connections → Implicit connections
- Simple connections → Complex, interwoven connections

Knowledge Demands: Life Experiences

- Simple themes → Complex themes
- Single theme → Multiple themes
- Common, everyday experiences and fantastical elements → Experiences distinctly different from one's own
- Single perspective like one's own → Multiple and unusual perspectives

Knowledge Demands: Cultural Knowledge

- General background knowledge and familiarity with genre conventions required → Cultural and historical knowledge useful

Knowledge Demands: Content/Discipline Knowledge

- Some everyday and general content knowledge → Extensive, perhaps specialized discipline-specific content knowledge

Definitions of Key Writing Types

Narrative

Narrative writing is organized by time. Time is central because narrative writing depicts events, whether real or imagined. Narrative writing is fundamental to novels, short stories, biographies, autobiographies, historical accounts, and plays. With practice, students' repertoire of narrative strategies expands and their control of them increases. Students learn to provide visual details of scenes, objects, or people; to depict specific actions (movements, gestures, postures, and expressions); to use dialogue and interior monologue in order to provide insight into the narrator's and characters' personalities and motives; and to manipulate pace in order to highlight the significance of certain events and create tension and suspense. Narrative writing serves a variety of purposes; frequently it is embedded in other kinds of writing, such as writing intended to inform, instruct, or persuade.

Informative/Explanatory Text

Informative/explanatory writing conveys information accurately. This kind of writing can serve one or more of several closely related purposes: to increase readers' knowledge of a subject, to help readers better understand a procedure or process, or to enhance readers' comprehension of a concept. Informative/explanatory writing addresses questions, such as questions about types (What are the different types of whales?), about components (What are the parts of a motor?), about aspects of a subject such as its size, function, or behavior (How big is the United States? What is an x-ray used for? How do penguins find food?), about how things work (How does a camera work?), and about why things happen (Why is Earth warming?). To produce this kind of writing, students draw on what they already know and on primary and secondary sources. With practice, students become better able to develop a controlling idea that supports coherence and focus, and they can select examples, facts, and details that are relevant. They are also able to employ a variety of techniques that writers use to convey information, such as naming, describing, or differentiating different types or parts; comparing or contrasting one subject with another; and relating an anecdote or scenario to illustrate a point.

Argument

The purpose of argument is to persuade in order to change the reader's point of view or to bring about some action on the reader's part. There are many techniques employed by writers to persuade readers—for example, appeals to emotions, appeals to common beliefs, and the creation of a believable authorial voice. However, the core of argument is logic and evidence. A logical argument convinces its audience of the merit and reasonableness of the claims and the proof offered in support of the claims. Writers of logical arguments provide credible evidence (facts and details) to support their assertions. Although young children are not able to produce fully developed logical arguments, they are developing a variety of ways to extend and elaborate their work around opinions or judgments. They provide examples, they offer reasons for their assertions, and they explain cause and effect. These kinds of expository structures are steps on the road to argument.

Conventions

Three goals undergird the Conventions standards:

(1) Students should have a carefully specified range of broadly useful terms in order to be precise in their discussions about language. Such key terms (noted below) should be defined in grade-appropriate ways for younger students and fleshed out more fully in later grades. (For guidance on this matter, see, for example, Brock Haussamen with Amy Benjamin, Martha Kolln, and Rebecca S. Wheeler, *Grammar Alive!: A Guide for Teachers* [Urbana, IL: NCTE, 2003] and Amy Benjamin with Tom Oliva, *Engaging Grammar: Practical Advice for Real Classrooms* [Urbana, IL: NCTE, 2007].) Additional terminology may be helpful in particular instructional situations; avoiding terminology altogether may be appropriate in others.
(2) Students must be able to observe the conventions of standard English in their formal writing and speaking for the sake of having their efforts widely understood and taken seriously.
(3) Students need to understand that effective language use is more than simply observing a series of rules but also about making careful choices among alternatives, considering those choices in relation to task, purpose, audience, occasion, and discipline.

Many conventions-related issues are likely to arise in students' writing and speaking prior to their formal appearance in the sequence below. For example, students in kindergarten are expected to know what a complete sentence is even though the concept of a fragment is not mentioned specifically in the standards until grade 3.

Conversely, many skills and understandings introduced at lower grades will require continued attention as students advance in the grades. Students in grade 3, for instance, can ensure subject-verb agreement in simple situations, such as when the subject and verb appear next to each other in a sentence. As students' writing and speaking become more complex, however, new agreement challenges arise, such as intervening phrases suggesting a different number for the verb than the subject calls for. "Errors" with applying previously mastered skills and understandings are thus often a sign of progress in that students are stretching their ability to communicate. "Relearning" is then a matter of students becoming able to apply old skills and understandings in new, more sophisticated ways.

While all the Conventions standards should be considered cumulative, certain ones, noted with an asterisk (*), are particularly likely to need to be revisited by older students as they convey ever more elaborate ideas in writing and speech.

ELA Conventions Progressive Skills: By Standard

The following standards, marked with an asterisk (*) in the standards document, are skills and understandings that require continued attention in higher grades (after their introduction in lower grades) as they are applied to increasingly sophisticated writing and speaking.

Grade 3 Grades 4–5 Grades 6–8 (Grade/band in which the standard is introduced)

3.1 Generate complete sentences, avoiding sentence fragments, comma splices, and run-ons.

3.2 Ensure subject-verb and pronoun-antecedent agreement.

3.7 Choose words for effect.

4–5.2 Recognize and correct inappropriate shifts in verb tense.

4–5.3 Form and choose between adjectives and adverbs (including comparative and superlative forms), placing them appropriately within the sentence.

4–5.4 Correctly use frequently confused words.

4–5.5 Use idiomatic language.

4–5.7 Use punctuation to separate items in a series.

4–5.11 Spell grade-appropriate words correctly, consulting references as needed.

4–5.12 Use specialized, topic-specific language to convey ideas precisely.

4–5.13 Use figurative language to create images or make comparisons and connections between people, objects, or ideas.

4–5.14 Use punctuation for effect.

4–5.15 Expand, combine, and reduce sentences for meaning, reader/listener interest, and style.

6-8.2 Place phrases and clauses within a sentence, avoiding misplaced and dangling modifiers.

6-8.4 Recognize and correct inappropriate shifts in pronoun number and person.

6.8.5 Recognize and correct vague pronouns with unclear or ambiguous antecedents.

6-8.8 Recognize and correct inappropriate shifts in verb voice and mood.

6-8.9 Set off nonrestrictive/parenthetical elements with commas, parentheses, or dashes.

6-8.12 Vary sentence patterns for meaning, reader/listener interest, and style.

6-8.13 Choose words and phrases to express ideas precisely and concisely, avoiding redundancy and wordiness.

Vocabulary Instruction

> Words are not just words. They are the nexus — the interface — between communication and thought. When we read, it is through words that we build, refine, and modify our knowledge. What makes vocabulary valuable and important is not the words themselves so much as the understandings they afford.
>
> Marilyn Adams[33]

The importance of students acquiring a rich and varied vocabulary cannot be overstated. Research suggests that if students are going to grasp and retain words and comprehend text, they need incremental, repeated exposure to words they are trying to learn in a variety of contexts. When students make multiple connections between new words and their own experiences they develop a nuanced and flexible understanding of the word. In this way, students learn not only what a word means, but how to use that word in a variety of contexts and apply appropriate senses of the word's meaning in order to understand different contexts.[34]

Initially children readily learn words from oral conversation because oral conversations are context rich in ways that aid in vocabulary acquisition: in discussion a small set of words (accompanied by gesture and intonation) is used with great frequency to talk about a narrow range of situations children are exposed to on a day to day basis. Yet as children reach school age, new words are less frequently introduced in conversation, and consequently vocabulary acquisition eventually stagnates by fourth or fifth grade unless students acquire additional words from written context.[35]

Written language, by contrast, contains hundreds of times as many different words as are typically used in conversational language. Yet writing lacks the interactive opportunities and nonverbal context provided by oral conversation so it presents a special challenge towards successful vocabulary acquisition without purposeful and ongoing concentration on vocabulary.[36] In fact, at most, between five and fifteen percent of new words encountered when reading are retained.[37] The weaker a student's vocabulary is, the slighter the gain.[38] Yet research shows that if students are going to understand what they read, they must understand upward of 95 percent of the words. [39]

As this "tipping point" for lexical dexterity is quite challenging for students to reach, every classroom needs to focus on providing students with high quality contextual encounters with vocabulary words that epitomize what they encounter in written texts. The aim should be to expose students to words that have the widest application—concepts that students are likely to meet again and again not just in classroom settings but outside the school walls as well. Some of these highly transferable academic words, often referred to as Tier 2 words, such as qualifying adjectives and adverbs (e.g., important, typically) are used broadly across domains and indeed in contexts that

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[33]Adams, M. (2009). "The Challenge of Advanced Texts: The Interdependence of Reading and Learning," in Hiebert (Ed.), Reading more, reading better: Are American students reading enough of the right stuff?, New York: Guilford Publications.
[34]Landauer, TK, McNamara, DS, Dennis, S and Kintsch, W (2007) Handbook of Latent Semantic Analysis; Landauer, T. K., & Dumais, S. T. (1997). A solution to Plato's problem: The latent semantic analysis theory of acquisition, induction, and representation of knowledge. *Psychological Review, 104(2*), 211-240; Nagy, W. E., Herman, P., & Anderson, R. C. (1985). Learning words from context. *Reading* Research Quarterly, 20, 233-253.

[35] Hayes, D and Ahrens, M: "Vocabulary simplification for children: A special case of "motherese?" Journal of Child Language. Vol 15(2), Jun 1988, 395-410
[36] Ibid.

[37] Ibid.
[38] Daneman & Green, 1986; Herman, Anderson, Person &Nagy, 1987; Sternberg & Powell
[39] Betts, E. A. (1946). *Foundations of reading instruction.* New York, NY: American Book Company; Carver, R. P. (1994). Percentage of unknown vocabulary words in text as a function of the relative difficulty of the text: Implications for instruction. *Journal of Reading Behavior, 26,* 413-437; Hu, M., & Nation, P. (2000). Unknown vocabulary density and reading comprehension. *Reading in a Foreign Language, 13(1)*, 403-430; Laufer, B. (1988). What percentage of text-lexis is essential for comprehension. In C. Lauren & M. Nordmann (Eds.), *Special language: From humans to thinking machines,* pp. 316-323. Clevedon, UK: Multilingual Matters.

transcend the classroom.[40] However, the meanings of most words are specific to their domains—often referred to as Tier 3 words—including those that arise in multiple domains (e.g., chemical constituents, constituent voting patterns). To learn words, students have to read multiple selections from multiple authors within key domains of learning.

The problem is that, in any given instance, it is not the entire spectrum of a word's history, meanings, usages, and features that matters, but only those aspects that are relevant to the surrounding context. That means, first, that the reader's internal representation of the word must be sufficiently complete and well-articulated so that the intended meaning is available and, second, that the reader must understand the context well enough to select the intended meaning – which, in turn, depends on good understanding of the surrounding words of the passage.

Key to students' vocabulary development is building rich and flexible word knowledge. Students need plentiful opportunities to use and respond to the words they learn, through playful informal talk, discussion, and reading or being read to and responding to what is read. Along with attention to academic (Tier 2 words) and content-specific words (Tier 3 words), students benefit from instruction about the connections and patterns in language. Developing in students an analytical attitude toward the logic and sentence structure of their texts alongside an awareness of word parts, word origins, and word relationships provides students with a sense of how language works so that syntax, morphology and etymology can become useful cues to word in building meaning as students encounter new words and concepts in their reading.[41] As students are exposed to and interact with language throughout their school careers, they are able to acquire understandings of word meanings, build awareness of the workings of language, and apply word meanings to comprehend and produce language.

[40] Indeed, the fact that these words transcend specific disciplines argues for them being taught and used across the curriculum by all teachers.
[41] Beck, I. L., McKeown, M. & Kucan, L. (2008). *Creating robust vocabulary: Frequently asked questions and extended examples.*

APPENDIX B

Exemplars of Reading Text Complexity and Quality, ELA K–12

Selecting Text Samples

The following text samples primarily serve to exemplify the level of complexity and quality that the *Standards* require all students in a given grade band to engage with while additionally suggesting the breadth of text types that students should encounter. The choices should serve as useful guideposts in helping educators select texts of similar **complexity**, **quality**, and **breadth** for their own classrooms. The process of text selection was guided by these criteria in the following fashion:

- *Complexity*. Appendix A describes in detail a three-part model of measuring text complexity based on qualitative and quantitative indices of inherent text difficulty balanced with educators' professional judgment. In selecting texts to serve as exemplars, the work group began by soliciting contributions from teachers, educational leaders, and researchers who have experience working with students in the grades for which the texts have been selected. These contributors were asked to propose texts that they or their colleagues have used successfully with students in a given grade band. The work group made final selections based in part on whether qualitative and quantitative measures identified by the *Standards* indicated that the proposed texts were of sufficient complexity for the grade band. For those types of texts—particularly poetry and multimedia sources—for which these measures are not as well suited, professional judgment necessarily played a greater role in selection.

- *Quality*. While it is possible to have high-complexity texts of low inherent quality, the work group solicited only texts of recognized value. From the pool of submissions gathered from outside contributors, the work group selected classic or historically significant texts as well as contemporary works of comparable literary merit, cultural significance, and/or content richness.

- *Breadth*. After identifying texts of appropriate complexity and quality, the work group applied a range of secondary criteria to ensure that the samples presented in each band represented as broad a range of sufficiently complex, high-quality texts as possible. Among the factors considered were initial publication date, authorship, and subject matter.

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Organization and Excerpting

Texts are organized first by category, with narrative texts followed by drama and poetry and then the informational texts. Within each category, the texts are organized by date, usually of first publication, beginning with the oldest and ending with the most recent. In some cases, the date of any given work may be open to debate.

The excerpts given here are meant to stand in for the full work in most instances. Works that are not in the public domain may be represented by short excerpts or snippets while the work group awaits permission from the rights holders for full use.

Media Texts

Selected excerpts are accompanied by annotated links to related media texts available online at the time of the publication of this document.

Kindergarten to Grade 1 Exemplar Texts

Narratives

Little Bear by Else Holmelund Minarik, illustrated by Maurice Sendak (1957)

Are You My Mother? by P. D. Eastman (1960)

The Fire Cat by Esther Averill (1960)

Green Eggs and Ham by Dr. Seuss (1960)

Put Me in the Zoo by Robert Lopshire (1960)

Frog and Toad Together by Arnold Lobel (1971)

Owl at Home by Arnold Lobel (1975)

Henry and Mudge: The First Book of Their Adventures by Cynthia Rylant, illustrated by Suçie Stevenson (1987)

Poppleton in Winter by Cynthia Rylant, illustrated by Mark Teague (2001)

Cowgirl Kate and Cocoa by Erica Silverman, illustrated by Betsy Lewin (2005)

Poetry

"Mix a Pancake" by Christina G. Rossetti (1893)

"Singing-Time" by Rose Fyleman (1919)

"Halfway Down" by A. A. Milne (1924)

"As I Was Going to St. Ives" by Unknown, collected by Peter and Iona Opie (1951)

"Drinking Fountain" by Marchette Chute (1957)

"Poem" by Langston Hughes (1958)

"Wouldn't You?" by John Ciardi (1961)

"In the Falling Snow" by Richard Wright (1973)

"Covers" by Nikki Giovanni (1980)

"It Fell in the City" by Eve Merriam (1985)

"Celebration" by Alonzo Lopez (1993)

"Two Tree Toads" by Jon Agee (2009)

Informational Texts

A Tree Is a Plant by Clyde Robert Bulla, illustrated by Stacey Schuett (1960)

My Five Senses by Aliki (1962)

Starfish by Edith Thacher Hurd, illustrated by Robin Brickman (1962)

What Do You Do With a Tail Like This? by Steve Jenkins & Robin Page (2003)

From Seed to Pumpkin by Wendy Pfeffer, illustrated by James Graham Hale (2004)

Mouse in a Meadow by John Himmelman (2005)

Petting Zoo by Dorling Kindersley (2005)

Meet the Meerkat by Darrin Lunde, illustrated by Patricia J. Wynne (2007)

"The Forest in Spring" in National Geographic Young Explorer! April 2009 (2009)

"Our Good Earth" in National Geographic Young Explorer, April 2009 (2009)

Read-Aloud Narratives

The Wonderful Wizard of Oz by L. Frank Baum (1900)

Little House in the Big Woods by Laura Ingalls Wilder, illustrated by Garth Williams (1932)

Mr. Popper's Penguins by Richard Atwater (1938)

Finn Family Moomintroll by Tove Jansson, translated by Elizabeth Portch (1948)

A Story A Story by Gail E. Haley (1970)

The Paper Crane by Molly Bang (1985)

Read-Aloud Poetry

"The Owl and the Pussycat" by Edward Lear (1871)

"April Rain Song" by Langston Hughes (1932)

"The Fox's Foray" – Traditional rhyme in Opie / *The Oxford Nursery Rhyme Book* (1955)

Over in the Meadow by John Langstaff, illustrated by Feodor Rojankovsky (1957)

Zin! Zin! Zin! a Violin by Lloyd Moss, illustrated by Marjorie Priceman (1995)

Read-Aloud Informational Texts

The Year at Maple Hill Farm by Alice and Martin Provensen (1978)

Fire! Fire! by Gail Gibbons (1984)

Follow the Water from Brook to Ocean by Arthur Dorros (1991)

Amazing Whales! by Sarah L. Thomson (2005)

Living Sunlight: How Plants Bring the Earth to Life by Molly Bang & Penny Chisholm, illustrated by Molly Bang (2009)

Grades 2–3 Exemplar Texts

Narratives

My Father's Dragon by Ruth Stiles Gannett, illustrated by Ruth Chrisman Gannett (1948)

Crow Boy by Taro Yashima (1955)

Amos & Boris by William Steig (1971)

The Treasure by Uri Shulevitz (1978)

The Stories Julian Tells by Ann Cameron (1981)

Sarah, Plain and Tall by Patricia MacLachlan (1985)

Tops and Bottoms by Janet Stevens (1995)

The Raft by Jim LaMarche (2000)

The Lighthouse Family: The Storm by Cynthia Rylant, illustrated by Preston McDaniels (2002)

The One-Eyed Giant (Book One of Tales from the Odyssey) by Mary Pope Osborne (2002)

Poetry

"Autumn" by Emily Dickinson (1893)

"Who Has Seen the Wind" by Christina G. Rossetti (1893)

"Afternoon on a Hill" by Edna St. Vincent Millay (1917)

"Stopping by Woods on a Snowy Evening" by Robert Frost (1923)

"Something Told the Wild Geese" by Rachel Field (1934)

"Grandpa's Stories" by Langston Hughes (1958)

"A Bat Is Born" by Randall Jarrell (1964)

"Knoxville, Tennessee" by Nikki Giovanni (1968)

"Weather" by Eve Merriam (1969)

"Eating While Reading" by Gary Soto (1995)

Informational Texts

A Medieval Feast by Aliki (1983)

Maps & Globes by Jack Knowlton, pictures by Harriet Barton (1985)

Sunshine Makes the Seasons by Franklyn M. Branley (1985)

From Seed to Plant by Gail Gibbons (1991)

Throw Your Teeth on the Roof: Tooth Traditions Around the World by Selby B. Beeler, illustrated by G. Brian Karas (1998)

So You Want to Be President? By Judith St.George, illustrated by David Small (2000)

Boy, Were We Wrong About Dinosaurs by Kathleen V. Kudlinski, illustrated by S.D. Schindler (2005)

Bat Loves the Night by Nicola Davies, illustrated by Sarah Fox-Davies (2008)

Moonshot: The Flight of Apollo 11 by Brian Floca (2009)

Where Do Polar Bears Live? by Sarah L. Thomson, illustrated by Jason Chin (2010)

Read-Aloud Narratives

"How the Camel Got His Hump" in *Just So Stories* by Rudyard Kipling (1902)

The Thirteen Clocks by James Thurber (1950)

The Cricket in Times Square by George Selden, illustrated by Garth Williams (1960)

The Search for Delicious by Natalie Babbitt (1969)

Bud, Not Buddy by Christopher Paul Curtis (1999)

Read-Aloud Poetry

"The Jumblies" by Edward Lear (1871)

"The Pied Piper of Hamelin" by Robert Browning (1888)

"Your World" by Georgia Douglas Johnson (1918)

"The Song of the Jellicles" by T.S. Eliot (1939)

"Fireflies" by Paul Fleischman, illustrated by Eric Beddows (1988)

Read-Aloud Informational Texts

Lincoln: A Photobiography by Russell Freedman (1987)

A Drop of Water: A Book of Science and Wonder by Walter Wick (1997)

The Museum Book: A Guide to Strange and Wonderful Collections by Jan Mark, illustrated by Richard Holland (2007)

What the World Eats by Faith D'Aluisio, photographed by Peter Menzel (2008)

Wild Tracks! A Guide to Nature's Footprints by Jim Arnosky (2008)

Grades 4–5 Exemplar Texts

Narratives

Alice in Wonderland by Lewis Carroll (1865)

The Secret Garden by Frances Hodgson Burnett (1911)

The Black Stallion by Walter Farley (1941)

The Little Prince by Antoine de Saint-Exupery (1943)

Tuck Everlasting by Natalie Babbitt (1975)

"Zlateh the Goat" by Isaac Bashevis Singer (1984)

M. C. Higgins, the Great by Virginia Hamilton (1993)

The Birchbark House by Louise Erdrich (1999)

Bud, Not Buddy by Christopher Paul Curtis (1999)
[Also a read-aloud narrative at Grades 2–3]

Where the Mountain Meets the Moon by Grace Lin (2009)

Poetry

"The Echoing Green" from *Songs of Innocence* by William Blake (1789)

"The New Colossus" by Emma Lazarus (1883)

"Casey at the Bat" by Ernest Lawrence Thayer (1888)

"A Bird Came Down the Walk" by Emily Dickinson (1893)

"Fog" by Carl Sandburg (1916)

"Dust of Snow" by Robert Frost (1923)

"Little Red Riding Hood and the Wolf" by Roald Dahl (1982)

"They Were My People" by Grace Nichols (1988)

"Words Free As Confetti" by Pat Mora (1996)

Informational Texts

Discovering Mars by Melvin Berger (1992)

Let's Investigate Marvelously Meaningful Maps by Madelyn Wood Carlisle (1992)

Hurricanes: Earth's Mightiest Storms by Patricia Lauber (1996)

The Kid's Guide to Money by Steve Otfinoski (1996)

Toys: Amazing Stories behind Some Great Inventions by Don Wulffson (2000)

"Good Pet, Bad Pet" by Elizabeth Schleichert from *Ranger Rick* (2002)

"Ancient Mound Builders" by E. Barrie Kavash from *Cobblestone* (2003)

About Time: A First Look at Time and Clocks by Bruce Koscielniak (2004)

England the Land by Erinn Banting (2004)

A History of US by Joy Hakim (2005)

My Librarian Is a Camel by Margriet Ruurs (2005)

Horses by Seymour Simon (2006)

Quest for the Tree Kangaroo by Sy Montgomery (2006)

Volcanoes by Seymour Simon (2006)

We Are the Ship: The Story of Negro League Baseball by Kadir Nelson (2008)

"Kenya's Long Dry Season" by Nellie Gonzalez Cutler from *Time for Kids* (2009)

"Seeing Eye to Eye" by Leslie Hall from *National Geographic Explorer* (2009)

"Computer" from *Britannica Junior Encyclopedia* (2010)

"Telescopes" by Ronan, Colin A. from *The New Book of Knowledge* (2010)

"Underground Railroad" by Henrietta Buckmaster from *The New Book of Knowledge* (2010)

Grades 6–8 Exemplar Texts

Narratives

Little Women by Louisa May Alcott (1869)

The Adventures of Tom Sawyer by Mark Twain (1876)

A Wrinkle in Time by Madeline L'Engle (1962)

The Dark is Rising by Susan Cooper (1973)

Dragonwings by Laurence Yep (1975)

Roll of Thunder, Hear My Cry by Mildred Taylor (1976)

"The People Could Fly" from *The People Could Fly: American Black Folktales* by Virginia Hamilton (1985)

The Tale of the Mandarin Ducks by Katherine Paterson (1990)

"Eleven" from *Woman Hollering Creek: And Other Stories* by Sandra Cisneros (1992)

Black Ships Before Troy: The Story of the Iliad by Rosemary Sutcliff (1993)

Drama

A Midsummer Night's Dream by William Shakespeare (1596)

The Diary of Anne Frank by Frances Goodrich and Albert Hackett (1958)

Poetry

"Paul Revere's Ride" by Henry Wadsworth Longfellow (1861)

"O Captain, My Captain" by Walt Whitman (1865)

"Jabberwocky" by Lewis Carroll (1872)

"Twelfth Song of Thunder" from *The Mountain Chant: A Navajo Ceremony* Navajo tradition (1887)

"The Railway Train" by Emily Dickinson (1893)

"The Song of Wandering Aengus" by W. B. Yeats (1899)

"Chicago" from *Chicago Poems* (1914) by Carl Sandburg

"Stopping by a Wood on a Snowy Evening" by Robert Frost (1923)

"I, Too" by Langston Hughes (1925)

"The Book of Questions" by Pablo Neruda (1973) translated by William O'Daly

"Oranges" from *Black Hair* (1985) by Gary Soto

"A Poem for My Librarian, Mrs. Long" from *Acolytes* (2007) by Nikki Giovanni

Informational Texts (English Language Arts)

"Allegory of the Cave" from *The Republic* by Plato (380 BCE) translated by G.M.A. Grube

"Letter on Thomas Jefferson" by John Adams (1822)

Narrative of the Life of Frederick Douglass an American Slave by Frederick Douglass (1845)

"Gettysburg Address" by Abraham Lincoln (1863)

"Lee Surrenders to Grant" by Horace Porter (1865)

"Blood, Toil, Tears and Sweat" by Winston Churchill (1940)

Travels with Charley: In Search of America by John Steinbeck (1962)

"Address to the Nation on Civil Rights" by John F. Kennedy (1963)

I Know Why the Caged Bird Sings by Maya Angelou (1969)

"Address to Students at Moscow State University" by Ronald Reagan (1988)

Grades 9-10 Exemplar Texts

Narratives

The Odyssey by Homer (8th century B.C.E.) translated by Robert Fagles

"The Nose" by Nikolai Gogol (1836) translated by Ronald Wilks

"The Gift of the Magi" by O. Henry (1906)

The Grapes of Wrath by John Steinbeck (1939)

Fahrenheit 451 by Ray Bradbury (1953)

"I Stand Here Ironing" by Tillie Olsen (1956)

The Killer Angels by Michael Shaara (1975)

The Joy Luck Club by Amy Tan (1989)

In the Time of the Butterflies by Julia Alvarez (1994)

The Book Thief by Marcus Zusak (2005)

Drama

The Tragedy of Romeo and Juliet by William Shakespeare (1592)

The Glass Menagerie by Tennessee Williams (1944)

Rhinoceros by Eugene Ionesco (1959) translated by Derek Prouse

Master Harold…and the Boys by Athol Fugard (1982)

Poetry

"Song" by John Donne (1635)

"Ozymandias" by Percy Bysshe Shelley (1810)

"The Raven" by Edgar Allen Poe (1845)

"We Grow Accustomed to the Dark" by Emily Dickinson (1893)

"Loveliest of Trees" by A. E. Houseman (1896)

"Lift Ev'ry Voice and Sing" by James Weldon Johnson (1900)

"Domination of Black" by Wallace Stevens (1916)

"Yet Do I Marvel" by Countee Cullen (1925)

"Women" by Alice Walker (1970)

"I Am Offering This Poem to You" by Jimmy Santiago Baca (1977)

Informational Texts (English Language Arts)

"Preface to Lyrical Ballads" by William Wordsworth (1800)

"Speech to the Second Virginia Convention" by Patrick Henry (1775)

"Second Inaugural Address" by Abraham Lincoln (1865)

"State of the Union Address" by Franklin Delano Roosevelt (1941)

"I Am an American Day Address" by Learned Hand (1944)

"Remarks to the Senate in Support of a Declaration of Conscience" by Margaret Chase Smith (1950)

"Address at the March on Washington" by Martin Luther King, Jr. (1963)

"Nobel Prize Acceptance Speech" by Elie Wiesel (1986)

"A Quilt of a Country" by Anna Quindlen (2001)

Grades 11-12 Exemplar Texts

Narratives

Pride and Prejudice by Jane Austen (1813)

Jane Eyre by Charlotte Brontë (1848)

"At Home" by Anton Chekov (1887) translated by Constance Garnett

The Great Gatsby by F. Scott Fitzgerald (1925)

As I Lay Dying by William Faulkner (1930)

Their Eyes Were Watching God by Zora Neale Hurston (1937)

Black Boy by Richard Wright (1945)

The Adventures of Augie March by Saul Bellow (1949)

The Bluest Eye by Toni Morrison (1970)

Dreaming in Cuban by Cristina García (1992)

The Namesake by Jhumpa Lahiri (2003)

Drama

Macbeth by William Shakespeare (c1611)

The Importance of Being Earnest by Oscar Wilde (1895)

Death of a Salesman by Arthur Miller (1949)

A Raisin in the Sun by Lorraine Hansberry (1959)

Poetry

"A Valediction Forbidding Mourning" by John Donne (1633)

"Ode on a Grecian Urn" by John Keats (1820)

"Song of Myself" from *Leaves of Grass* by Walt Whitman (c1860)

"Because I Could Not Stop for Death" by Emily Dickinson (1890)

"Mending Wall" by Robert Frost (1914)

"Ode to My Suit" by Pablo Neruda (1954) translated by Margaret Sayers Peden

"Sestina" by Elizabeth Bishop (1983)

"The Latin Deli: An Ars Poetica" by Judith Ortiz Cofer (1988)

"Demeter's Prayer to Hades" by Rita Dove (1995)

"Man Listening to Disc" by Billy Collins (2001)

Informational Texts (English Language Arts)

The Declaration of Independence by Thomas Jefferson (1776)

The Crisis by Thomas Paine (1776)

Walden by Henry David Thoreau (1854)

"Society and Solitude" by Ralph Waldo Emerson (1857)

"The Fallacy of Success" by G.K. Chesterton (1909)

The American Language by H.L. Mencken (1938)

"Politics and the English Language" by George Orwell (1946)

"Abraham Lincoln and the Self-Made Myth" by Richard Hofstadter (1948)

"Letter from Birmingham City Jail" by Martin Luther King, Jr. (1963)

"Mother Tongue" by Amy Tan (1990)

"Take the Tortillas Out of Your Poetry" by Rudolfo Anaya (1995)

The Common Core K–12 Mathematics Standards

This document provides grade level standards for mathematics in grades K–8, and high school standards organized under the headings of the *College and Career Readiness Standards in Mathematics*. Students reaching the readiness level described in that document (adjusted in response to feedback) will be prepared for non-remedial college mathematics courses and for training programs for career-level jobs. Recognizing that most students and parents have higher aspirations, and that ready for college is not the same as ready for mathematics-intensive majors and careers, we have included in this document standards going beyond the readiness level. Most students will cover these additional standards. Students who want the option of entering STEM fields will reach the readiness level by grade 10 or 11 and take precalculus or calculus before graduating from high school. Other students will go beyond readiness through statistics to college. Other pathways can be designed and available as long as they include the readiness level. The final draft of the K–12 standards will indicate which concepts and skills are needed to reach the readiness level and which go beyond. We welcome feedback from states on where that line should be drawn.

English Language Learners in Mathematics Classrooms

English language learners (ELLs) must be held to the same high standards expected of students who are already proficient in English. However, because these students are acquiring English language proficiency and content area knowledge concurrently, some students will require additional time and all will require appropriate instructional support and aligned assessments.

ELLs are a heterogeneous group with differences in ethnic background, first language, socio-economic status, quality of prior schooling, and levels of English language proficiency. Effectively educating these students requires adjusting instruction and assessment in ways that consider these factors. For example ELLs who are literate in a first language that shares cognates with English can apply first-language vocabulary knowledge when reading in English; likewise ELLs with high levels of schooling can bring to bear conceptual knowledge developed in their first language when reading in a second language. On the other hand, ELLs with limited or interrupted schooling will need to acquire background knowledge prerequisite to educational tasks at hand. As they become acculturated to US schools, ELLs who are newcomers will need sufficiently scaffolded instruction and assessments to make sense of content delivered in a second language and display this content knowledge.

While some ELLs are economically and educationally advantaged, this is not the case for many of these students. Moreover, once in the U.S., the majority of ELLs attend high poverty schools with high percentages of other ELLs. These schools often lack the resources and capacity needed to help ELLs reach high academic standards. However, schools and districts can be assisted in providing a positive learning environment that capitalizes on the linguistic and cultural diversity of the student body.

Language proficiency is a complex construct that can reflect proficiency in multiple contexts, modes, and academic disciplines. Current measures of language proficiency may not give an accurate picture of an individual's language competence. In particular, we do not have measures or assessments for language proficiency related to competence in mathematics for different ages or mathematical topics. These two facts can confuse discussions of mathematics instruction for ELLs. In particular, because of the complexity of language proficiency and the limitations of the label "English Language Learner" as currently implemented, instructional decisions should not be made solely based on that label. However, research on language and mathematics education for this student population does provide a few clear results to guide practices for teaching ELLs mathematics:

- English learners can participate in mathematical discussions as they learn English (Moschkovich, 1999a, 2002, 2007a, 2007b, 2007d).

- Mathematics instruction for students who are learning English should draw on multiple resources and modes available in classrooms—such as objects, drawings, inscriptions, and gestures—as well as home languages and mathematical experiences outside of school.

- While mathematics instruction for ELLs should address mathematical discourse and academic language, this involves much more than vocabulary instruction.

Basic principles for improving the mathematics achievement of ELLs

Language is a resource for learning mathematics, it is not only a tool for communicating, but also a tool for thinking and reasoning mathematically. All languages (English, Spanish, Tagalog,etc.) and language varieties (different dialects, home or everyday ways of talking, vernacular, slang, etc.) provide resources for mathematical thinking, reasoning, and communicating.

Regular and active participation in the classroom—not only reading and listening but also discussing, explaining, writing, representing, and presenting—is crucial to ELLs' success in mathematics, and that ELLS can produce explanations, presentations, etc. and participate in classroom discussions *as they are learning English* (Moschkovich, 1999 and 2007).

- ELLs, like English-speaking students, require regular access to teaching practices that are most effective for improving student achievement. These practices include: a) Keeping mathematical tasks at high-cognitive demand (Henningsen & Stein, 1997; Silver & Stein, 1996); b) teachers and students attend explicitly to concepts (Hiebert & Grouws, 2007), and c) students wrestle with important mathematics (Hiebert & Grouws, 2007).
- See the evidence of ELLs' mathematical thinking, hear how ELLs use language to communicate about mathematics, understand the competence that ELLS bring to the classroom, build on this competence, and provide access to opportunities for advancing their mathematics learning.

Overall, research suggests that:

- Classroom instruction should allow bilingual students to choose the language they prefer for arithmetic computation. Language switching can be swift, highly automatic, and facilitate rather than inhibit solving word problems in the second language, as long as the student's language proficiency is sufficient for understanding the text of the word problem.
- Instruction should ensure that students understand the text of word problems before they attempt to solve them.
- Instruction should include a focus on "mathematical discourse" and "academic language" because these are important for English learners. Although it is crucial that students who are learning English have opportunities to communicate mathematically, this is not primarily a matter of learning vocabulary. Students learn to participate in mathematical reasoning, not by learning vocabulary, but by making conjectures, presenting explanations, and/or constructing arguments.
- While vocabulary instruction is important, it is not sufficient for supporting mathematical communication. Furthermore, vocabulary drill and practice are not the most effective instructional practices for learning vocabulary. Instead, research has demonstrated that vocabulary learning occurs most successfully through instructional environments that are language-rich, actively involve students in using language, require that students both understand spoken or written words and also express that understanding orally and in writing, and require students to use words in multiple ways over extended periods of time (Blachowicz, Camille, and Peter Fisher, 2000). To develop written and oral communication skills, students need to participate in negotiating meaning for mathematical situations and in mathematical practices that require output from students (Moschkovich, 2009).

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Access for Students with Disabilities

The Common Core Standards articulate rigorous expectations in the areas of mathematics, reading, writing, and speaking and listening in order to prepare students to be college- and career-ready. These standards identify the knowledge and skills students must acquire in order to be successful. Research shows that students with disabilities are capable of high levels of learning and should not be limited by low expectations and watered down curriculum. It is imperative that these highly capable students—regardless of their disability—are held to the same expectations articulated in the Core Standards as other students.[1]

However, *how* these high standards are taught is of the utmost importance in reaching students with special needs. When learning the knowledge and skills represented in the Core Standards, students with disabilities may need accommodations or—in exceptional cases—modified goals, incorporated in an individualized education program (IEP),[2] to help them access information or demonstrate their knowledge. Students might be precluded from reaching particular standards given the nature of the standard itself. In instances when a standard asks students to perform actions they are physically incapable of, students will need to be presented with alternative options to demonstrate similar knowledge and skills within the range of their abilities. Accommodations based on individual needs allow students of all disability levels to learn within the framework of the Core.

Meeting English Language Arts (ELA) Standards

Reading, writing, speaking, and listening standards often require accommodations for students with disabilities. In the case of students who are deaf, a standard that calls for "listening" should be interpreted to include reading sign language. In a similar vein, "speaking" as it occurs in standards for certain students with speech impairments should be read broadly to include "communication" or "self-expression." Students who are blind or have low vision should be able to read via Braille, screen reader technology, or other assistive technology to demonstrate their comprehension

[1] Research suggests that the vast majority of the population of students with intellectual impairments *can* achieve proficiency when they receive high quality instruction in the grade-level content and appropriate accommodations.
[2] According to the Individuals with Disabilities Act (IDEA), an IEP includes appropriate accommodations that are necessary to measure the individual achievement and functional performance of a child.

skills. "Writing" should not preclude the use of a scribe, computer, or speech-to-text technology for students with disabilities that interfere with putting pen to paper. In the case of students with intellectual impairments—less than 2 percent of the total population of all students and less than 20 percent of students with disabilities—accommodations should allow them to demonstrate their knowledge and skills through alternative modes like text to speech software or reading aloud. For these students, writing may involve the use of pictures to assist in illustrating plot or argument, or offering them the opportunity to "choose words and phrases" by selecting from options rather than generating direct answers. With appropriate accommodations and support, students with all levels of disabilities can participate in the general education curriculum and achieve grade-level proficiency with regard to the ELA content and skills articulated in the Core.

Meeting Mathematics Standards

In curriculum for students with disabilities, ELA skills often take precedence over mathematics understanding. However, most of these students can master mathematical concepts with accommodations in instructional delivery and the use of specialized technology, including computers and calculators. For example, students with visual disabilities might require enhanced verbal descriptions from teachers and the use of large-print to demonstrate subsequent knowledge. Students who are deaf might require visual aids such as charts, diagrams, and mental images and increased reliance on computers and calculators. Manipulatives can enable students with intellectual impairments to grasp abstract concepts and continue learning. Evidence suggests that students with disabilities, even those with full intellectual abilities, tend to lag behind their peers in mathematics achievement; strong curriculum that gives equal priority to mathematics and ELA will help these students succeed.

In short, while the standards remain and retain high expectations of students, they may need to be translated and occasionally modified to appropriately apply to students with disabilities, including all levels of intellectual impairment. Every student deserves to be treated with respect, and every student deserves an outstanding education. Promoting a culture of high expectations for all students is a fundamental goal of the Core Standards. Reaching students with disabilities requires broadening our understanding of what the standards say and being ready to make appropriate accommodations and/or modifications to meet individual students' needs.

How to read this document

The K–8 standards are organized by grade level. Within each grade level there are several headings, each one the title of a single progression having significant presence in the grade in question. Under each of these progression headings, there appear **core standards**, divided into standards describing concepts students should understand and standards describing skills students should acquire. A typical progression spans a number of grades, but does not span all of K-8. The progressions and their grade spans are listed at the end of the document.

The high school standards are not organized by grade level or by course, but rather are organized under headings of the *College and Career Ready Standards for Mathematics*: Expressions, Equations, Functions, Coordinates, Modeling, Statistics, Probability, and Geometry.[3] Subheadings under each heading refer either to mathematical practices or to principle topics, and core standards are listed under each subheading, as in the K-8 standards. The subheadings are not necessarily curricular units, but rather can describe concepts and skills that are revisited throughout a student's high school career. This design necessitates a future effort to develop course sequences (either traditional or integrated).

[3] Number and Quantity are not included, since they are principally the domain of K–8. In response to feedback, the headings have been reordered and Shape has been renamed to Geometry.

Mathematical Practice[4]

Proficient students expect mathematics to make sense. They take an active stance in solving mathematical problems. When faced with a non-routine problem, they have the courage to plunge in and try something, and they have the procedural and conceptual tools to carry through. They are experimenters and inventors, and can adapt known strategies to new problems. They think strategically.

Students who engage in these practices discover ideas and gain insights that spur them to pursue mathematics beyond the classroom walls. They learn that effort counts in mathematical achievement.[a] These are practices that expert mathematical thinkers encourage in apprentices. Encouraging these practices in our students should be as much a goal of the mathematics curriculum as is teaching specific content topics and procedures.[b] Taken together with the Standards for Mathematical Content, they support productive entry into college courses or career pathways.

Core Standards · Students can and do:

1 Attend to precision.

Mathematically proficient students organize their own ideas in a way that can be communicated precisely to others, and they analyze and evaluate others' mathematical thinking and strategies noting the assumptions made. They clarify definitions. They state the meaning of the symbols they choose, are careful about specifying units of measure and labeling axes, and express their answers with an appropriate degree of precision. Rather than saying, "let v be speed and let t be time," they would say "let v be the speed in meters per second and let t be the elapsed time in seconds from a given starting time." They recognize that when someone says the population of the United States in June 2008 was 304,059,724, the last few digits indicate unwarranted precision.

2 Construct viable arguments.

Mathematically proficient students understand and use stated assumptions, definitions and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They break things down into cases and can recognize and use counterexamples. They use logic to justify their conclusions, communicate them to others and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose.

3 Make sense of complex problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They consider analogous problems, try special cases and work on simpler forms. They evaluate their progress and change course if necessary. They try putting algebraic expressions into different forms or try changing the viewing window on their calculator to get the information they need. They look for correspondences between equations, verbal descriptions, tables, and graphs. They draw diagrams of relationships, graph data, search for regularity and trends, and construct mathematical models. They check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?"

4 Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern. For example, in $x^2 + 5x + 6$ they can see the 5 as $2 + 3$ and the 6 as 2×3. They recognize the significance of an existing line in a geometric figure and can add an auxiliary line to make the solution of a problem clear. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects. For example, by seeing $5 - 3(x$

[4] Slated for review and editing, based on feedback to the College and Career Readiness Standards, and in order to apply more naturally to elementary school as well.

$-y)^2$ as 5 minus a positive number times a square, they see that it cannot be more than 5 for any real numbers x and y.[b]

5 Look for and express regularity in repeated reasoning.

Mathematically proficient students pay attention to repeated calculations as they carry them out, and look both for general algorithms and for shortcuts. For example, by paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, they might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel in the expansions of $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ leads to the general formula for the sum of a geometric series. As they work through the solution to a problem, proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.[b]

6 Reason quantitatively.

Quantitative reasoning is a way of thinking by which one reasons with quantities and about relations among quantities. It entails habits of creating a coherent image of the problem at hand; considering the units involved; continually attending to the meaning of quantities, not just how to compute them; and having multiple images of a concept and being flexible in transitioning among them. In problems dealing with quantitative relationships, students exercise two inseparable abilities: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referential meanings for the symbols involved in the manipulation.

7 Make strategic decisions about the use of technological tools.

Mathematically proficient students consider the available tools when solving a mathematical problem, whether pencil and paper, ruler, protractor, graphing calculator, spreadsheet, computer algebra system, statistical package, or dynamic geometry software. They are familiar enough with all of these tools to make sound decisions about when each might be helpful. They use mathematical understanding and estimation strategically, attending to levels of precision, to ensure appropriate levels of approximation and to detect possible errors. They are able to use these tools to explore and deepen their understanding of concepts.

Mathematics: Kindergarten[5]

Developing Coherent Understanding

[Temporarily removed for editing.]

Counting and Cardinality

Core Standards · Students understand that:

1. The number words have a standard order.
2. In counting, each object receives one and only one number word.
3. The last number word tells the number of objects.
4. Numbers said later in the count refer to larger quantities.
5. Counting on 1 more is the same as adding 1. That is, one more than a number is the next number in the count.

Core Standards · Students can and do:

a. Count by ones from 1 to 100; count by tens to 100.[6]
b. Count forward from a given number within the known sequence (instead of always counting forward from 1).[7]
c. See collections of up to 10 objects as being composed of subgroups.
d. Count to answer "how many?" questions with up to 10 things in various arrangements (e.g., array, circular, scattered), or up to 25 things if in a row.
e. Write numerals from 1 to at least 30.

Base Ten Computation

Core Standards · Students understand that:

1. Ten ones make a tens unit (ten things can be thought of as bundled into a single unit).
2. Decade words refer to groups of tens units. For example, thirty refers to a group of three tens units.
3. A teen number[8] is a ten and some ones. The number 10 can be thought of as a ten and no ones.
4. Any teen number is larger than any single digit number. Teen numbers are ordered according to their ones digits.
5. A two-digit number is some tens and some ones. For example, 29 is two tens and nine ones.

Core Standards · Students can and do:

a. Make 10 with each number from 1 to 9 (i.e., know the number that makes 10 with the given number).
b. Show each teen number as a ten and some ones.

Early Relations and Operations

Core Standards · Students understand that:

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[5] Some material is used verbatim from National Research Council. (2009). *Mathematics Learning in Early Childhood: Paths Toward Excellence and Equity*. Committee on Early Childhood Mathematics, Christopher T. Cross, Taniesha A. Woods, and Heidi Schweingruber, Editors. Center for Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

[6] To "count" here means only to say the number words, not to determine how many objects are in a collection.

[7] To "count" here means only to say the number words, not to determine how many objects are in a collection.

[8] Glossary: Teen number. A whole number that is greater than or equal to 11 and less than or equal to 19.

1. Adding is putting two groups together or putting some more with a group, and subtracting is taking some from a group.
2. Addition and subtraction can be represented with physical or mental objects (including fingers), pictures, drawings, sounds (e.g. number words), motions, or equations.
3. Adding can be recorded by an expression, as when "three more than six" is recorded as 6 + 3, or by an equation that also shows the answer (6 + 3 = 9). Likewise, subtracting can be recorded by an expression, as when "how much more than 9 is 5" is recorded as 9 – 5, or by an equation that also shows the answer (9 – 5 = 4).
4. Breaking apart a group can be recorded in an equation such as 8 = 5 + 3. Breaking apart a group in more than one way can be recorded in an equation such as 7 + 6 = 10 + 3.
5. In all equations, the equals sign indicates that the values on either side are the same.

Core Standards · Students can and do:

a. Use matching and counting strategies to decide whether one set is more than, less than, or equal to another set in number of objects (less than or equal to 10).
b. Compare and order numbers less than or equal to 10.
c. Use concrete objects to determine the answer to addition and subtraction word problems and additions and subtractions with totals less than or equal to 10.
d. Experience enough problem situations so that additions to five and the corresponding subtractions and some additions and subtractions within ten become well known.

Quantity and Measurement

Core Standards · Students understand that:

1. Things have attributes—such as length, weight, capacity, loudness, softness, and so on. A single thing might have several attributes of interest (as when we focus on a child's height and gender).

Core Standards · Students can and do:

a. Directly compare two objects to see which one has "more of" a shared attribute.
b. Rank three objects by a shared attribute (especially length), and use transitivity[9] to compare two objects indirectly.
c. ♦ Classify objects or people into predetermined categories, and count the numbers in each category. List the categories and counts in order by count. (Each category count less than or equal to 10.)[10]

Shapes

Core Standards · Students understand that:

1. Names refer to shapes regardless of orientation or overall size.[11]

Core Standards · Students can and do:

a. Study a range of 2D and 3D shapes, in different sizes and orientations, and discuss their properties, similarities, and differences using informal language.

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[9] Glossary: Transitive property of measurement order: If one object is bigger than a second, and the second object is bigger than a third object, then the first object is bigger than the third object.

[10] The symbol ♦ indicates material in data analysis and statistics that appears under another progression heading in order to make an important connection.

[11] For example, a square rotated to form a "diamond" is still a square, even though it is rotated. Students at this grade might need to physically rotate a shape until it is "level" before they can correctly name it.

b. Move shapes using translations, reflections and rotations.[12]

[12] This is not meant to be assessed by showing students a picture of a shape and asking them to draw or select a translated, reflected or rotated version of it.

Mathematics: First Grade[13]

Developing Coherent Understanding

[Temporarily removed for editing.]

Early Relations and Operations

Core Standards · Students understand that:

1. Counting on is an efficient method of counting all, in which the initial count of the first addend is omitted.
2. Addition and subtraction apply to situations of joining, separating, part-part-whole, and comparing quantities to one another.[14] These situations can be represented by addition and subtraction equations such as 7 + 5 = 12, 10 = 5 + 5, and so on.
3. Addition and subtraction are inverse operations; that is 10 – 8 can be found by thinking 8 + 2 = 10.
4. When any two of the numbers in an addition or subtraction equation are known, the unknown number can be found.
5. One-to-one dealing of objects in a collection (e.g., "One for you, one for me, one for him, …") creates fair shares.

Core Standards · Students can and do:

a. Use counting on strategies or decomposing strategies for additions and subtractions within 20.
b. Solve addition problems containing three addends.
c. Use objects, pictures and story contexts to explain what happens when the order of addends in a sum is changed, when 0 is added to a number, and when one addend in a sum is increased by 1 and another decreased by 1.
d. Experience enough problem situations so that many or all sums and differences within 20 become well known.
e. Use drawings and equations to represent and solve word problems involving addition and subtraction.[15]
f. ♦ Organize, represent and interpret data with several categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another
g. Create *n* fair shares from a collection of objects. Identify the size of one share, and recognize the original collection as *n* copies of a single share.

Quantity and Measurement

Core Standards · Students understand that:

1. Lengths can be added by placing long objects, rods, or unit cubes end to end in a straight line. The total length is the same in whatever order the rods are placed.

[13] Some material is used verbatim from National Research Council. (2009, op. cit.)

[14] In join and separate problems, there is change over time. In part-part-whole problems, two quantities make up a whole in a static situation. Compare problems involve two quantities and the difference between them. Compare problems add specificity to the notions of greater than and less than.

[15] Include join, separate, part-part-whole, and compare problems, with unknowns in all positions. Represent these situations with equations that use a small square or a ? for the unknown.

2. Lengths can be compared by placing rods side by side, with one end lined up. The difference in length is how far the longer extends beyond the end of the shorter.
3. Lengths are measured (assigned numerical values) by comparing them to other lengths—that is, by using another object as a length unit. The length of an object can be expressed numerically by counting the number of length units that span it with no gaps or overlaps.
4. When an object or figure is decomposed into several pieces, the length of the whole can be found by placing the pieces end to end in any order.
5. A sum of two whole numbers represents a total length; a difference of two whole numbers represents a difference in length.
6. Durations of time are measured by comparing them to other durations of time, such as the earth's rotation period, or the time a minute hand takes to complete a circle around a clock face.

Core Standards · Students can and do:

a. Using an object as a length unit, measure, compare and estimate length.[16]
b. Using an object as a length unit, determine total length by adding lengths of two parts.[17] Compare lengths using addition and subtraction.
c. Decompose circles and rectangles into 2 and 4 equal parts. Describe the parts using the words "halves" and "quarters," and using the phrases "half of" and "quarter of." Describe the wholes as twice or four times as large as the parts.
d. Tell time in hours from clocks; subtract to find whole-hour durations on a clock (within AM or within PM).

Base Ten Computation

Core Standards · Students understand that:

1. In comparing two-digit numbers, the number with more tens units is larger; if the number of tens units is the same in each, the number of ones units decides.
2. In adding or subtracting 2-digit numbers, one adds or subtract like units (tens units and tens units, or ones units and ones units).

Core Standards · Students can and do:

a. Count to 100 or beyond, switching appropriately to the new decade after a 9 has been said in the ones place.
b. Compare and order numbers to 100 based on meanings of the tens and ones places.
c. Easily write numerals to 20; write numerals to 100.
d. Use break-apart and make-a-ten strategies to add and subtract with teen totals as in $7 + 6 = 10 + 3$ and $17 - 9 = 17 - 7 - 2$.
e. Find 10 more or 10 less than a number without having to count.
f. Add one-digit numbers to two-digit numbers, and add multiples of 10 to one-digit and two-digit numbers.
g. Represent addition of two-digit numbers using 10-rods and unit cubes,[18] including rearranging rods and cubes to show regrouping when needed.
h. Add two-digit numbers to two-digit numbers using strategies based on place value, Properties of Arithmetic, or the inverse relationship between addition and subtraction.

Shapes

[16] Select and iterate units, partition into equal parts, and compare lengths indirectly by using a reference length.
[17] Restrict to whole-unit lengths.
[18] Any concrete model that can show individual units and ten connected units will do.

Core Standards · Students understand that:

1. Several shapes can be joined together to form a larger shape. A single shape can also be visualized as a collection of smaller shapes joined together.
2. Decomposing larger shapes into equal-sized parts creates fair shares.
3. When an identical figure is decomposed into more fair shares, the shares are smaller than in the first instance.

Core Standards · Students can and do:

a. Form different 2D figures with cutouts of rectangles, squares, triangles, semicircles, and quarter-circles.[19]
b. Form different 3D figures with concrete models of cubes, rectangular prisms, cones, and cylinders.[20]
c. Decompose 2D shapes into rectangles, squares, triangles, semicircles, and quarter-circles, including decomposing into fair shares.

[19] From Singapore Primary 2
[20] From Singapore Primary 2

Mathematics: Second Grade

Developing Coherent Understanding

[Temporarily removed for editing.]

Operations and the Problems They Solve

Core Standards · Students understand that:

1. Addition and subtraction apply to situations of joining, separating, part-part-whole, and comparing quantities to one another.[21] These situations can be represented by addition and subtraction equations such as 17 + 5 = 22, 36 = 56 – 26, and so on.
2. Addition and subtraction are inverse operations; that is 100 – 98 can be found by thinking 98 + 2 = 100.
3. Numbers can be added and subtracted only when they refer to the same underlying unit.

Core Standards · Students can and do:

a. Use representations (objects, pictures, story contexts) to describe and justify properties of addition and subtraction.[22]
b. Produce full sets of related equations for addition and subtraction, as in the set 5 + 3 = 8, 3 + 5 = 8, 8 = 5 + 3, 8 = 3 + 5, 8 – 5 = 3, 8 – 3 = 5, 3 = 8 – 5, 5 = 8 – 3.
c. Solve up to two-step addition/subtraction word problems with whole numbers and whole number quantities within 100.[23]

Base Ten Computation

Core Standards · Students understand that:

1. A three-digit number is made up of hundreds, tens and ones units. Digits in each place are worth ten times as much as digits in the place to the right.
2. Comparison of numbers is decided by the leftmost digit, with subsequent digits breaking ties.
3. Three-digit numbers can be expanded into sums of hundreds, tens and ones units. In adding or subtracting, one adds or subtracts the units of each size; regrouping might be needed to write a total in standard form if there are too many of a unit, or to get enough of a unit to subtract from it.
4. The scheme for regrouping is the same at each place, because each unit is composed of ten of the smaller unit.

Core Standards · Students can and do:

a. Compare and order numbers to 1,000.

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[21] In join and separate problems, there is change over time. In part-part-whole problems, two quantities make up a whole in a static situation. Compare problems involve two quantities and the difference between them. Compare problems add specificity to the notions of greater than and less than.

[22] Include properties such as that the sum is the same when multiple addends are added in a different order; if adding two numbers gives a certain sum, then subtracting one of the addends from the sum results in the other addend; that if more is subtracted from a number, the difference is decreased and if less is subtracted the difference is increased; that in an addition problem, each addend can be taken apart and the parts can be recombined in any order without changing the sum.

[23] Include join, separate, part-part-whole, and compare problems, with unknowns in all positions. Represent these situations with equations that use a small square or a ? for the unknown.

b. Given a three-digit number, quickly find 10 more or 10 less than the number, and quickly find 100 more or 100 less than the number.
c. Rapidly add and subtract within 20.[24]
d. Add and subtract three-digit numbers to three-digit numbers using strategies based on place value, Properties of Arithmetic, or the inverse relationship between addition and subtraction.
e. Add and subtract three-digit numbers using an algorithm[25] based on place value and regrouping, such as the standard algorithm.
f. Explain why addition and subtraction strategies and algorithms work, using place value and the Properties of Arithmetic (including explanations supported by drawings or objects).

Quantity and Measurement

Core Standards · Students understand that:

1. 1 inch, 1 foot, 1 centimeter and 1 meter are conventionally defined lengths that allow standardized length measurements.
2. When measuring a length, if a smaller unit is chosen, more units must be iterated to measure the length in those units. But the length of an object itself does not depend on the choice of unit.
3. Units can be decomposed into smaller units, e.g. a foot contains 12 inches and a meter contains 100 centimeters. A small number of long units might form a greater total length than a large number of small units.
4. Sharing a circle or rectangle fairly among 2-6 shares creates equal parts, each of which is a single unit. Copying one unit by the number of pieces measures the whole in terms of the units.
5. A half, a third, or a quarter of a given rectangle encloses the same amount of space regardless of its shape.

Core Standards · Students can and do:

a. Measure, compare and estimate whole-unit lengths in units of inches, feet centimeters and meters.
b. Construct a number line with an origin (0) and a unit (1), marking off whole numbers one unit distance apart. Use a number line to represent sums and differences; determine lengths of intervals on the number line.
c. Decompose circles and rectangles into 2-6 equal parts. Describe the parts using the words "halves," "thirds," "half of," "a third of," etc. Describe the wholes as 2-6 times as large as the parts.
d. Construct a number line to 100 using tens-unit lengths, showing ones-unit lengths within a decade of interest. Explain regrouping by composing and decomposing concrete lengths.
e. ♦ Draw a bar graph (with single-unit scale) to represent a data set with several categories. Solve simple part-part-whole and compare problems using information presented in a bar graph.[26]
f. ♦ Identify correspondences in different representations of a data set with several categories.
g. Solve word problems involving dollar bills, quarters, dimes, nickels and pennies.

Shapes

Core Standards · Students understand that:

[24] Acceptable strategies include: mental strategies such as making a ten, use of fingers to assist in rapid counting-on, and producing sums or differences from memory.
[25] Glossary: Algorithm. A step by step routine that always gives some answer, rather than ever giving no answer; that always gives the right answer, and never gives a wrong answer; that can always be completed in a finite number of steps, rather than in an infinite number of steps; and that applies to all problems of a given type (e.g., adding any two multidigit whole numbers, or bisecting any angle). Cf. Wikipedia's "effective procedure," from which this definition is adapted.
[26] For part-part-whole problems, only sum-unknown problems are required to meet this standard. For compare problems, only difference-unknown problems are required to meet the standard.

1. A given category of shapes (e.g., triangles) can be divided into subcategories (e.g., isosceles triangles) on the basis of special properties. Conversely, different classes of shapes (e.g., squares and rectangles) can be united into a larger category (e.g., quadrilaterals) on the basis of shared properties.

Core Standards · Students can and do:

a. Draw and identify equilateral triangles, isosceles triangles,[27] squares and rectangles.[28]
b. Recognize squares and rectangles as examples of quadrilaterals; draw examples of quadrilaterals that are neither squares nor rectangles.
c. Draw and identify radii and diameters of a circle.
d. Recognize objects that resemble spheres, cylinders and rectangular prisms.

[27] Students at this grade need not understand that equilateral triangles are isosceles.
[28] Students at this grade need not understand that squares are rectangles.

Mathematics: Third Grade

Developing Coherent Understanding

[Temporarily removed for editing.]

Operations and the Problems They Solve

Core Standards · Students understand that:

1. Multiplication and division apply to situations of equal grouping, fair sharing, measuring, and comparing ("times as much").
   - An equation of the form $a \times b = n$ applies to a situation in which a groups of b things each make n things in all, or in which a copies of a continuous quantity of size b form a continuous quantity of size n. (See table for examples.)
   - An equation of the form $n \div a = b$ tells how many things, b, are in each group when n things are divided equally into a groups, or tells how large a quantity b results when a continuous quantity of size n is shared fairly into a shares. (See table for examples.)
   - An equation of the form $n \div b = a$ tells how many groups, a, result when n things are divided into equal groups of b things each, or tells how many fair shares, a, a quantity of size n yields when each share has size b. (See table for examples.)
   - Two quantities can be compared by multiplication or division. An equation of the form $a \times b = n$ means n is a times as much as b and b times as much as a.
2. Multiplication is commutative: The total number of things in a groups of b things each is the same as the total number of things in b groups of a things each, that is, $a \times b = b \times a$. Likewise, a copies of a continuous quantity of size b are equal in size to b copies of a continuous quantity of size a.
3. The area of a rectangle with whole number side lengths can be calculated by multiplying because the rectangle can be decomposed into equal rows (or columns) of unit squares.
4. Multiplication and division are inverse operations; that is $35 \div 7$ can be found by thinking $5 \times 7 = 35$. When any two of the numbers in a multiplication or division equation are known, the unknown number can be found.

	$3 \times 6 = 18$	$18 \div 3 = 6$	$18 \div 6 = 3$
Collections	3 rows of apples with 6 apples in each row are 18 apples.	If 18 apples are arranged into 3 equal rows, each row will have 6 apples in it.	If 18 apples are arranged into equal rows of 3 apples, there will be 6 rows.
Continuous Quantities	If you have enough ribbon to make 6 bows, then 3 times as much ribbon will make 18 bows.	If you have enough ribbon to make 18 bows and share the ribbon fairly among 3 kids, then each kid has enough ribbon to make 6 bows.	If each kid wants to make 6 bows and there's enough ribbon to make 18 bows, then 3 kids can make bows.

Core Standards · Students can and do:

a. Use representations (objects, pictures, story contexts) to describe and justify properties of multiplication and division.[29]
b. Solve simple multiplication and division word problems involving equal groups, length and area.
c. Solve up to two-step word problems involving the four operations with whole numbers and whole number quantities. (Whole number quotients only)
d. Solve multiplicative comparison problems with whole numbers (problems involving the notion of "times as much").
e. ♦ Draw a scaled bar graph to represent a data set with several categories. Solve "how many more"/"how many less" problems (two-step problems) using information presented in scaled bar graphs.[30]

Base Ten Computation

Core Standards · Students understand that:

1. Patterns in the multiplication table can be explained by the Properties of Arithmetic. For example, the distributive property explains why, for any row, the entries in the 7 column are the sums of the entries in the 5 and 2 columns.
2. The Properties of Arithmetic can be used to derive new multiplications and divisions from known ones.

Core Standards · Students can and do:

a. Explain strategies for multiplying and dividing that use the Properties of Arithmetic and properties of the base ten system.
b. Rapidly multiply and divide within 100.[31]
c. Produce full sets of fact families for multiplication and division, as in the set $6 \times 7 = 42$, $7 \times 6 = 42$, $42 = 7 \times 6$, $42 = 6 \times 7$, $42 \div 7 = 6$, $42 \div 6 = 7$, $6 = 42 \div 7$, $7 = 42 \div 6$.
d. Find the factor pairs for a given number, as in the factor pairs for the number 42: {42, 1}, {21, 2}, {14, 3}, {7, 6}.

Fractions

Core Standards · Students understand that:

1. When a whole, 1, is divided into b equal parts, the size of the parts is written $1/b$. To show $1/b$ of something, divide the thing into b equal parts.
2. For a whole number a and a positive whole number b, a/b is defined as a copies of $1/b$.[32] This can be thought of as the sum $1/b + 1/b + \ldots + 1/b$ (with a summands).
3. Whole numbers can be written as fractions, as in $b/b = 1$, $n/1 = n$, and cases such as $(4 \times 7)/4 = 7$.
4. Fractions are numbers and can be seen as lengths on a number line.[33]

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[29] Include properties such as that the product is the same when the order of the factors is changed; that multiplication problems involving 1-digit numbers can be solved by breaking one factor apart additively and multiplying each part by the other factor; and that multiplying a quantity by a number, then dividing by the same number, leaves the original quantity unchanged.

[30] Include single-unit scales and multiple-unit scales. For multiple-unit scales, all counts should be evenly divisible by the scale factor. No count should represent more than ten of the scale unit, and no scale unit should represent more than ten counts.

[31] A variety of mental strategies are acceptable, including derived fact strategies and producing products or quotients from memory.

[32] This includes fractions greater than 1. For example, $17/5$ is 17 copies of $1/5$.

[33] For example, $17/5$ is 17 copies of the subinterval $1/5$ laid end to end.

5. Two fractions are equal when they represent the same portion of a whole, or when they have the same length on a number line. One fraction is greater than another when it represents a greater portion of the whole than the other, or lies to the right of the other on the number line.

6. Given two unit fractions, the fraction with the larger denominator is smaller, because dividing a whole into a larger number of parts leads to smaller parts.

7. Fractions with the same denominator can be added or subtracted by adding or subtracting the units indicated by the unit fraction. For example, $2/3 + 4/3$ is 2 copies of $1/3$ plus 4 copies of $1/3$, or 6 copies of $1/3$ in all, that is $6/3$.

8. The decimal 0.1 denotes the fraction $1/10$, 0.2 denotes $2/10$, and so on through 0.9, which denotes $9/10$.

Core Standards · Students can and do:

a. Use fractions to describe quantities and parts of wholes.
b. Compare and order fractions with equal numerators or equal denominators, including in contextual situations, using the fractions themselves, bar strip drawings, number line representations, and area models.
c. Reason about fractions to establish equivalences between fractions with unlike denominators 2, 3, 4 and 6 (e.g. $1/2 = 2/4$, $4/6 = 2/3$).
d. Add and subtract fractions with like denominators.
e. Solve word problems that involve adding, subtracting, ordering and comparing fractions.
f. Represent fractions of the form $a/10$ in decimal notation; compare and order to tenths in decimal notation.

Quantity and Measurement

Core Standards · Students understand that:

1. A unit of measure can be partitioned into equal-sized parts, whose sizes can be represented as fractions of the unit.

2. The area of a closed plane figure is a measure of how much space it encloses. A square with side length 1 unit is said to enclose "one square unit" of area.

3. The area of a closed plane figure can be measured (expressed numerically) by the number of square units that fit inside it with no gaps or overlaps.

4. Area is a model for multiplication because tiling a rectangle with unit squares shows that a rectangle a units long by b units wide encloses an area of $a \times b$ square units.

Core Standards · Students can and do:

a. Measure lengths using rulers marked with halves and fourths of inches. Make a dot plot to show repeated measurements.
b. Convert compound units to a smaller or a larger unit, and solve problems involving mixed units (feet and inches, yards and feet).
c. Using customary units, demonstrate and justify correct processes for measuring, comparing, and estimating length, mass, capacity, and durations of time, including unit selection, partitioning and iterating units, and transitivity.
d. Compute perimeters of polygons by adding given side lengths, and find an unknown length in a polygon given the perimeter and all other side lengths. Represent these problems with equations involving a symbol for the unknown quantity.
e. Determine and compare areas by counting square units (improvised units, cm^2, m^2, in^2, ft^2).
f. Compute elapsed time and solve problems involving elapsed time (to the nearest minute).

Mathematics: Fourth Grade

Developing Coherent Understanding

[Temporarily removed for editing.]

Operations and the Problems They Solve

Core Standards · Students understand that:

1. Quantities in a problem might be described with whole numbers, fractions or decimals; the operations used to solve the problem depend on the relationships between the quantities whatever numbers are involved.
2. The distributive property (of multiplication over addition) relates addition and multiplication. The distributive property can be shown numerically and visually, using arrays and area models.

Core Standards · Students can and do:

a. Solve multistep word problems involving the four operations with whole numbers.[34]
b. Estimate answers to computations and compute mentally to assess reasonableness of results.
c. Solve problems that involve comparing, ordering, adding and subtracting fractions with like denominators. Compare fractions to benchmark fractions.
d. Solve problems that involve comparing and ordering decimal numbers to hundredths. Compare decimals to benchmark decimals.
e. ♦Make a table from given data, ask and answer questions about data in a table, solve multi-step problems using information presented in tables, and find patterns in tables.[35]

Fractions

Core Standards · Students understand that:

1. The fraction a/b can be written as $a \times 1/b$ because a/b is a copies of $1/b$.
2. When a identical things are divided into b equal parts, each of a things contributes $1/b$. So $a \div b = a/b$.[36]
3. A fraction can be multiplied by a whole number as $n \times a/b = n \times a/b$. For example, $3 \times 2/5$ can be seen as 3 groups of 2 unit fractions $1/5$.[37]
4. A decimal of two digits stands for a sum of fractions whose denominators are 10 and 100. For example, 0.34 stands for $3/10 + 4/100$.

Core Standards · Students can and do:

a. Reason about fractions to establish equivalences between related fractions[38] (e.g. $3/10 = 30/100$, $9/12 = 3/4$).

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[34] Use the properties of multiplication (commutative, associative, identity) or the inverse relationship between multiplication and division (multiplying a number by b then dividing by b, and vice versa, leaves the number unchanged) to make sense of single digit multiplication and division situations and solve problems.
[35] Include tables with data from proportional relationships.
[36] This definition agrees with previous understandings of division in cases like 28 ÷ 7 (i.e., when a is a multiple of b), but also gives meaning to quotients such as 3 ÷ 4 or 7 ÷ 2.
[37] Using the Properties of Arithmetic, $n \times a/b = n \times (a \times 1/b) = (n \times a) \times 1/b = (n \times a)/b$.

b. Add and subtract related fractions in simple cases within one whole (e.g. $1/2 + 1/4$, $3/10 + 4/100$).
c. Solve word problems posed with whole numbers that have fractional answers.
d. Represent multiplication of whole numbers by fractions and fractions by whole numbers, using length and area models.
e. Solve word problems involving multiplying fractions by whole numbers and multiplying whole numbers by fractions.[39]
f. Use decimals to hundredths to describe quantities and parts of wholes, compare and order decimals to hundredths, and write fractions of the form $a/10$ or $a/100$ in decimal notation.
g. Round decimals (to hundredths) to the nearest whole number.
h. Solve addition and subtraction story problems involving fractions with related denominators (situations familiar from whole number work).

Base Ten Computation

Core Standards · Students understand that:

1. The product of a one-digit number times a multidigit number is the sum of the products of the one-digit number times each place value component. This is an instance of the distributive property.
2. Multi-digit multiplication algorithms can be derived and explained by decomposing numbers into their place value components and applying the distributive property.
3. Digits in each place are worth ten times as much as digits in the place to the right and a tenth as much as digits to the left; comparison of numbers is decided by the leftmost digit, with subsequent digits breaking ties.
4. Given whole numbers a and b, find whole numbers Q and R so that $a = Q \times b + R$. For example, given 325 and 7, express 325 in the form $325 = 46 \times 7 + 3$.

Core Standards · Students can and do:

a. Demonstrate place value understanding for whole numbers to 1,000,000 and compare numbers within this range.
b. Round whole numbers to the nearest 10 or 100 and use rounding to estimate computations.
c. Multiply single place numbers (to 9000) by single digit numbers.[40]
d. Multiply two-, three- and four-digit numbers by single-digit whole numbers, and multiply two-digit numbers by two-digit numbers, using strategies based on place value, Properties of Arithmetic, or the inverse relationship between multiplication and division.
e. Multiply two-digit numbers by two-digit numbers using an algorithm based on place value and regrouping, such as the standard algorithm.
f. Divide two-, three- and four-digit numbers by single-digit numbers, with or without remainder. In the case of remainders, express results in the form of an equation, as in $325 = 46 \times 7 + 3$.
g. Explain why multiplication and division strategies and algorithms work, using place value and the Properties of Arithmetic (including explanations supported by drawings or objects).

Quantity and Measurement

Core Standards · Students understand that:

[38] Glossary: Related fractions. Two fractions are *related* if one denominator is a factor of the other. (See Ginsburg, Leinwand and Decker (2009), *Informing Grades 1-6 Mathematics Standards Development: What Can Be Learned from High-Performing Hong Kong, Korea, and Singapore?*, Table A1, p. A-5, grades 3 and 4.)
[39] Include sharing multiple continuous wholes a fairly among b people, naming an individual share as a/b. For example 5 meters of pink ribbon shared among 3 people results in $5/3$ meters each.
[40] Glossary: Single-place number. The numbers that result when a whole number between 1 and 9 (inclusive) is multiplied by the numbers 10, 100, 1000, etc.

1. Area is additive: If a figure is decomposed into several pieces, then the area of the whole figure can be found by adding the areas of the pieces (expressed in common units).
2. An angle is two rays with a common endpoint, and is measured by the relative amount of a circle that you trace when turning from one ray to the other.
3. A one-degree angle turns through 1/360 of a circle, where the circle is centered at the origin of the rays; the measure of an angle is the number of one-degree angle turned with no gaps or overlaps.

Core Standards · Students can and do:

a. Apply the formula for area of squares and rectangles. Measure and compute whole-square-unit areas of objects and geometric figures decomposable into rectangles.[41]
b. ♦ Make a dot plot to show repeated measurements in common fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in dot plots (e.g., finding the difference in length between the longest and shortest specimens in an insect collection).
c. Draw scales (number line representations) of problem situations involving length, height and distance including fractional units or decimal numbers.
d. Find one dimension of a rectangle given the other dimension and its area or perimeter; find the length of one side of a square given its area or perimeter. Represent these problems with equations involving a symbol for the unknown quantity.
e. Measure angles in whole-number degrees using a protractor; sketch angles of specified measure. Find the measure of a missing part of an angle, given the measure of the angle and the measure of a part of it; represent these problems with equations involving a symbol for the unknown quantity.

Shapes

Core Standards · Students understand that:

1. Shapes can be analyzed and classified using concepts of parallelism, perpendicularity and angle measure.

Core Standards · Students can and do:

a. Draw points, lines, line segments, rays and angles; identify these in geometric figures.
b. Associate angles of a quarter turn (subtending ¼ of a circle) with angle measure 90°, a half turn (½ of a circle) with angle measure 180°, ¾ turn (¾ of a circle) with angle measure 270°, and a full turn (complete circle) with angle measure 360°.[42]
c. Draw perpendicular and parallel lines; identify these in geometric figures.
d. Identify right angles and angles smaller than/greater than a right angle in geometric figures; recognize right triangles.
e. Given a quadrilateral, say whether it is a square, whether it is a rectangle, and whether it is a parallelogram (with an understanding that a given shape may fit more than one category).

[41] using one-digit or two-digit numbers times two-digit numbers
[42] From Singapore Primary 4

Mathematics: Fifth Grade

Developing Coherent Understanding

[Temporarily removed for editing.]

Fractions

Core Standards · Students understand that:

1. Fractions a/b and $(n\times a)/(n\times b)$ are equal: for $1/b$ is n copies of $1/(n\times b)$, so a/b is $n \times a$ copies of $1/(n\times b)$. Example: $1/3$ is 4 copies of $1/12$, so $2/3$ is 8 copies of $1/12$; thus $2/3 = 8/12$.
2. Fractions can be added or subtracted by replacing each with an equal fraction so that the resulting fractions have the same denominator. Example: $2/3 + 5/4 = 8/12 + 15/12 = 23/12$.
3. Multiplying unit fractions gives a new unit fraction with denominator equal to the product of the initial denominators. For example, $1/3 \times 1/2 = 1/(3\times 2)$. The product $1/3 \times 1/2$ is 1 part when a whole of size $1/2$ is divided into 3 parts, i.e. it is "$1/3$ of $1/2$."[43]
4. Multiplying unit fractions can be extended to multiplying fractions in general. For example, $2/3 \times 4/5$ can be seen as 2 groups of 4 unit fractions $1/15$, hence the product is $8/15$.[44] The product $2/3 \times 4/5$ is 2 parts when a whole of size $4/5$ is divided into 3 parts, i.e. it is "$2/3$ of $4/5$."[45]
5. Dividing a unit fraction $1/b$ by a whole number n gives a unit fraction with denominator $n \times b$, because when $1/b$ is divided into n equal parts, the size of each part is $1/(n\times b)$. For example, $1/3 \div 2 = 1/6$.
6. Dividing a whole number n by a unit fraction $1/b$ gives a whole number $n \times b$, because, as there are b units of $1/b$ in 1, there are $n \times b$ units of $1/b$ in n. For example, $2 \div 1/3 = 6$.
7. A mixed number stands for the sum of its whole number part and a fractional part less than 1. A mixed number can be written as a fraction greater than 1, such as $17/5$. This equivalence can be shown using area, length, and number line models.
8. The ratio of two whole number quantities a and b, written $a{:}b$ or a/b, is a multiplicative comparison telling how much of one quantity there is for a given amount of the other, or how many times as much one is than the other.[46]

Core Standards · Students can and do:

a. Use area models and length models (such as strip drawings or the number line) to represent multiplication of fractions, division of unit fractions by whole numbers, and division of whole numbers by unit fractions.
b. Multiply fractions, divide unit fractions by whole numbers, and divide whole numbers by unit fractions, and solve word problems involving these operations.
c. Divide whole numbers by single digit decimals by seeing that they are fractions with denominator 10 or 100.
d. Rename fractions and mixed numbers to equivalent forms and identify equivalent fractions.
e. Compare and order fractions and mixed numbers with like or unlike denominators, including in contextual situations, using the fractions themselves, strip drawings or number line representations, and area models. Describe the size of fractional quantities with reference to the problem situation.
f. Make tables of equal ratios relating whole number quantities, and find missing values in the tables. Plot pairs of values on the coordinate plane. Example

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[43] On the number line, $1/n \times 1/d$ is 1 part when the interval from 0 to $1/d$ is divided into n parts. This is the same as 1 part when the interval from 0 to 1 is divided into $n \times d$ parts, and thus $1/n \times 1/d = 1/n\times d$.

[44] Using the Properties of Arithmetic, $2/3 \times 4/5 = (2 \times 1/3) \times (4 \times 1/5) = (2 \times 4) \times (1/3 \times 1/5) = (2 \times 4) \times 1/3\times 5 = 2\times 4/3\times 5$.

[45] On a number line, $m/n \times c/d$ means m parts when the interval from 0 to c/d is divided into n parts.

[46] For example, in a mixture of 5 cups of flour and 2 cups of sugar, the ratio is 5 cups flour to 2 cups sugar. There is $5/2$ times as much flour as sugar (equivalently, $2\ 1/2$ times as much or 2.5 times as much).

Cups of Flour	5	10	?	20
Cups of Sugar	2	?	6	8
Flour:Sugar (fraction form)	5/2	10/4	?	20/8
Flour:Sugar (decimal form)	?	?	?	?

Hours of Snowfall	5	10	?	20
Inches of Snow	2	?	6	8
Inches:Hours (fraction form)	2/5	4/10	?	8/20
Inches:Hours (decimal form)	?	?	?	?

Base Ten Computation

Core Standards · Students understand that:

1. The standard division algorithm is based on successively finding the largest single digit multiple of the divisor that is less than the dividend, regrouping to the next lower unit if necessary, and then subtracting the multiple and repeating to find the next digit in the quotient.
2. The division algorithm can be used to express a fraction in decimal form by carrying the division into the decimal places.
3. The features of the place value system for whole numbers extend to the decimal positions and the combined system is symmetric around the ones place.
4. In adding or subtracting decimal numbers, one operates separately with the units of each size, except when regrouping is needed; the scheme for regrouping is the same at each place, because each unit is composed of ten of the next smaller unit.
5. Numbers in decimal notation can be shown on the number line by dividing and sub-dividing the unit intervals as many times as needed to locate the number. This process can be visualized as zooming in on the number line.

Core Standards · Students can and do:

a. Divide two, three and four digit numbers by two digit numbers, with remainder, using an algorithm based on place value and regrouping, such as the standard algorithm. In the case of remainders, express results in the form of an equation, as in $145 = 11 \times 13 + 2$.
b. Understand very large and very small numbers (from millionths to hundreds of millions); round very large numbers.
c. Quickly find 0.1 more than a number and less than a number; 0.01 more than a number and less than a number; and 0.001 more than a number and less than a number.
d. Add and subtract decimals using an algorithm based on place value and regrouping, such as the standard algorithm, and solve problems involving these operations.
e. Write fractions in decimal notation for denominators 2, 3, 4, 5, 6, 8, 10 and 100.
f. Explain why strategies and algorithms for decimals work, using place value and the Properties of Arithmetic (including explanations supported by drawings or objects).

Quantity and Measurement

Core Standards · Students understand that:

1. The volume of a solid figure is a measure of how much space it encloses. A cube with side length 1 unit is said to contain "one cubic unit" of volume. The volume of a solid figure can be measured (expressed numerically) by the number of cubic units that fit inside it with no gaps or overlaps.
2. Packing a rectangular prism with unit cubes and decomposing the prism into layers shows that a rectangular prism ℓ units long by w units wide by h units tall contains a volume $V = \ell \times w \times h$ cubic units. The base of the

prism has area $A = \ell \times w$ square units, and the prism can be viewed as h layers, each containing $\ell \times w$ cubic units,

so the volume of the prism can also be expressed as $V = A \times h$ cubic units.

3. Volume is additive: If a solid figure is decomposed into several pieces, then the volume of the whole figure can be found by adding the volumes of the pieces (expressed in common units).
4. Quantities with like units can be added or subtracted giving a sum or difference with the same unit; quantities with unlike units can be multiplied or divided giving products or quotients with derived units.
5. The ratio of a length, area or amount to another length, area or amount is the same regardless of the size of the unit used for measurement.
6. The number line is a scale that can be used to show units such as pounds, liters, etc.

Core Standards · Students can and do:

a. Measure and compute whole-cubic-unit volumes for rectangular prisms and for objects well described as rectangular prisms.
b. Convert among different-sized standard measurement units within a given measurement system (e.g. feet to yards, centimeters to meters) and use conversion to solve story problems.
c. Form ratios of lengths, areas, and other quantities, including when quantities being compared are measured in different units.
d. Solve word problems involving addition, subtraction, multiplication and/or division using quantities expressed as whole numbers, fractions, or decimals with measurement units.
e. Solve multi-step problems involving units of weight, capacity, money, volume and area.

Coordinate Geometry

Core Standards · Students understand that:

1. A pair of perpendicular number lines ("axes") defines a coordinate system. A given point in the plane has a separate position along each of the two axes; the two positions of the point are called its coordinates.
2. Graphs on coordinate axes can be used to make sense of relationships among quantities in complex problems.

Core Standards · Students can and do:

a. Graph points in the first quadrant the coordinate plane, and read off the coordinates of graphed points.[47]
b. Determine the lengths of horizontal and vertical segments in the plane, given the coordinates of their endpoints.
c. ♦ Collect data on continuous covarying quantities and display the data in a line graph with broken lines; distinguish bar graphs from line graphs; ask and answer questions from line graphs, including comparisons of ratios.

Statistics

Core Standards · Students understand that:

[47] The axes should sometimes represent dimensioned quantities, and the units of measure should not always be the same for both axes. Coordinates may be whole numbers, fractions or decimals.

1. Data are collected purposefully to answer a predefined question (e.g., "How tall are the fifth graders in our school?")
2. A set of data typically shows variability—not all of the values are the same—and yet the values also typically show some tendency to cluster. Identifying a "center" for a data set is a way to describe its many values using a single number.
3. The median is a measure of center in the sense that approximately half the data values are less than median, while approximately half are greater.
4. Variation in a data set can be measured by the range and by typical deviations from the center.

Core Standards · Students can and do:

a. Collect data to answer a predefined question about a measurement quantity. Make a dot plot to display the data, and describe the data using the median and typical deviations from the it.

Mathematics: Sixth Grade

Developing Coherent Understanding

[Temporarily removed for editing.]

Ratios and Proportional Relationships

Core Standards · Students understand that:

1. Multiplicative comparisons can be extended from whole numbers to fractions and decimals. When the ratio q/m is formed, or when q is r times as much as m, the numbers q, r and m can be fractions or decimals.
2. p% of a quantity means $p/100$ times as much as the quantity. The number p can be a fraction or decimal, as in 3.75%.
3. A unit rate is the multiplicative factor relating the two quantities in a ratio. Two quantities q and m can be compared by $q = r \times m$, where the unit rate r tells how much q per m.
4. Given two quantities in a ratio (e.g. distance and time), finding the unit rate produces a new type of quantity (e.g. speed).

Core Standards · Students can and do:

a. Solve for an unknown quantity in a problem involving two equal ratios.
b. Find a percentage of a quantity; solve problems involving finding the whole given a part and the percentage.
c. Solve unit rate problems including unit pricing and constant speed. (See table.)

$D = s \times T$	$D \div T = s$	$D \div s = T$
A car driving at a speed of 30 miles per hour for 6 hours travels a distance of 180 miles.	If a car drives 180 miles for 6 hours at a constant speed, that speed is 30 miles per hour.	When a car drives 180 miles at a speed of 30 miles per hour, the trip takes 6 hours.

d. Represent unit rate problems on a coordinate plane where each axis represents one of the two quantities involved, and find unit rates from a graph. Explain what a point (x, y) means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.

The Number System

Core Standards · Students understand that:

1. The Properties of Arithmetic govern operations on all numbers.
2. Division of fractions follows the "invert and multiply" rule because multiplication and division are inverse operations. For example, $(2/3) \div (5/7) = 14/15$ because $(14/15) \times (5/7) = 2/3$.
3. Every nonzero fraction has a unique multiplicative inverse,[48] namely its reciprocal. Division can be defined as "multiplying by the multiplicative inverse." Then $(2/3) \div (5/7) = 14/15$ because the division symbol indicates multiplication by the multiplicative inverse.
4. A two-sided number line can be created by reflecting the fractions across zero. Numbers located to the left of zero on the number line are called negative numbers and are labeled with a negative sign.

[48] Glossary: Multiplicative inverses. Two numbers whose product is 1 are multiplicative inverses of one another. Example: $3/4$ and $4/3$ are multiplicative inverses of one another because $3/4 \times 4/3 = 4/3 \times 3/4 = 1$.

5. Two different numbers, such as 7 and –7, that are equidistant from zero are said to be opposites of one another. The opposite of 7 is –7 and the opposite of –7 is 7. The opposite of the opposite of a number is the number itself. The opposite of 0 is 0. The operation of attaching a negative sign to a number can be interpreted as reflecting the number across zero on the number line.

6. The absolute value of a number is its distance from zero on the number line. For any positive number q, there are two numbers whose absolute value is q, namely q and $-q$.

7. The absolute value of a signed quantity (e.g. account balance, elevation) tells the size of the quantity irrespective of its sense (debit or credit; above or below sea level).

8. Comparison of numbers can be extended to the full number system. The statement $p > q$ means that p is located to the right of q on the number line, while $p < q$ means that p is located to the left of q on the number line. The statement $p > q$ does not mean $|p| > |q|$.

Core Standards · Students can and do:

a. Divide fractions, and divide finite decimals by expressing them as fractions.
b. Solve problems requiring arithmetic with fractions presented in various forms, converting between forms as appropriate and estimating to check reasonableness of answers.
c. Find and position rational numbers[49] on the number line.
d. Use rational numbers to describe quantities such as elevation, temperature,[50] account balance and so on. Compare these quantities using > and < symbols and also in terms of absolute value.
e. Graph points and identify coordinates of points on the Cartesian coordinate plane in all four quadrants.

Statistics

Core Standards · Students understand that:

1. The mean is a measure of center in the sense that it is the balance point; the mean is the value each data point would take on if the total value of all the data points were redistributed fairly.

2. When the mean and median of a data set differ substantially, both measures should be provided, and the difference explained in terms of the data values.

Core Standards · Students can and do:

a. Collect data to answer a predefined question about a measurement quantity. Make a dot plot to display the data, and describe the data using measures of center and measures of variation.[51]

Geometry

Core Standards · Students understand that:

1. Triangles and parallelograms can be dissected and reassembled into rectangles with the same area; this leads to a formula for area in terms of base and height.

2. Polygons can be dissected into triangles in order to find their area.

Core Standards · Students can and do:

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[49] Glossary: Rational number. A number expressible in the form a/b for integers a and $b \neq 0$. The rational numbers include positive and negative integers, positive and negative fractions, and 0.
[50] A caution for temperature problems: The rational numbers are not a good model for a temperature scale. There is no temperature that solves the equation $T + 1000^{\circ}\text{C} = 0$.
[51] Data sets should include fractional values at this grade but not negative values.

a. Find the area of right triangles, other triangles, special quadrilaterals, and polygons (by dissection into triangles and other shapes).
b. Find surface area of cubes, prisms and pyramids (include the use of nets to represent these figures).
c. Solve problems involving area, volume and surface area of objects.
d. Examine the relationship between volume and surface area. Exhibit rectangular prisms with the same surface area and different volume, and with the same volume and different surface area.
e. Use exponents and symbols for square roots and cube roots to express the area of a square and volume of a cube in terms of the side length, and to express the side length in terms of the area or volume.

Expressions and Equations

Core Standards · Students understand that:

1. A number that is the result of a sequence of operations with other numbers can be expressed in different ways using conventions about order of operations and parentheses, rules for working with fractions, and the Properties of Arithmetic. All such expressions are equivalent.
2. A letter is used to stand for a number in an expression in cases where one doesn't know what the number is, or where, for the purpose at hand, it can be any number in the domain of interest. Such a letter is called a variable.
3. An equation is a statement that two expressions are equal, and a solution to an equation is a value of the variable (or a set of values for each variable if there is more than one variable) that makes the equation true.

Core Standards · Students can and do:

a. Represent an unknown number using a letter in simple expressions such as $y + 2$, $y - 3$, $6 + y$, $5 - y$, $3y$, $y/2$, and $(3 \pm y)/5$.
b. Interpret $3y$ as $y + y + y$ or $3 \times y$, $y/2$ as $y \div 2$ or $1/2 \times y$, $(3 \pm y)/5$ as $(3 \pm y) \div 5$ or $1/5 \times (3 \pm y)$.[52]
c. Evaluate simple expressions when values for the variables in them are specified (exclude expressions with a variable in denominator).
d. Choose variables to represent quantities in a word problem and construct simple equations to solve the problem by reasoning about the quantities.
e. Solve equations of the form $x + p = q$ (for $p < q$) and $px = q$ where p and q are fractions.

[52] From Singapore Secondary 1

Mathematics: Seventh Grade

Developing Coherent Understanding

[Temporarily removed for editing.]

Ratios and Proportional Relationships

Core Standards · Students understand that:

1. Two variable quantities x and y are said to be proportional to one another if the ratio x/y is always equal to the same quantity k, so that $y = kx$. The constant k is the unit rate, and tells how much of y per unit of x.

Core Standards · Students can and do:

a. Compare proportional relationships represented in different ways (e.g. compare a graph to an equation to determine which of two objects has greater speed).
b. Decide whether two quantities that vary together have a proportional relationship, analyze proportional relationships using the unit rates that characterize them, and solve word problems involving proportional relationships.
c. Plot pairs (x, y) from a proportional relationship $y = kx$, and pass a straight line through them and the origin. Observe that increases in y are proportional to increases in x, and calculate [increase in y]/[increase in x] = k.

The Number System

Core Standards · Students understand that:

1. On the number line, the sum $p + q$ is defined to be the number lying distance $|q|$ from p, to the right of p if q is positive and to the left of p if q is negative. A number and its opposite are additive inverses (add to zero).[53]
2. Sums of signed numbers can be computed using the Properties of Arithmetic.[54]
3. The additive inverse of a sum is the sum of the additive inverses.[55]
4. Subtraction is defined as adding the additive inverse. This definition of subtraction allows subtraction of rational numbers and agrees with previous understandings of subtraction with positive numbers.[56] On the number line, the difference $p - q$ lies distance $|q|$ from p, to the left of p if q is positive and to the right of p if q is negative.
5. The absolute value of $p - q$ equals the distance between p and q on the number line.
6. Products of signed numbers can be computed using the Properties of Arithmetic.[57] In particular, multiplying a number by -1 produces its additive inverse.[58]

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[53] Glossary: Additive inverses. Two numbers whose sum is 0 are additive inverses of one another. Example: $3/4$ and $-3/4$ are additive inverses of one another because $3/4 + (-3/4) = (-3/4) + 3/4 = 0$.

[54] For example, $7 + (-3) = 4$ because $7 + (-3) = (4 + 3) + (-3) = 4 + [3 + (-3)] = 4 + [0] = 4$. And $(-2) + (-3) = -5$ because $5 + [(-2) + (-3)] = (2 + 3) + [(-2) + (-3)] = [2 + (-2)] + [3 + (-3)] = [0] + [0] = 0$ so $(-2) + (-3)$ is the additive inverse of 5, that is -5.

[55] For example, $-(6 + -2) = (-6) + 2$ because $[6 + (-2)] + [(-6) + 2] = [6 + (-6)] + [(-2) + 2] = [0] + [0] = 0$.

[56] For example, the subtraction $7 - 3$ means 7 plus the additive inverse of 3, i.e. $7 + (-3)$, which equals 4. The subtraction $9 - (-4)$ means 9 plus the additive inverse of -4, i.e. $9 + 4$, which equals 13.

[57] For example, $(-1) \times (-1) = 1$ because $(-1) + (-1) \times (-1) = 1 \times (-1) + (-1) \times (-1) = [1 + (-1)] \times (-1) = 0 \times (-1) = 0$.

[58] Because $(-1) \times a + a = (-1) \times a + (1) \times a = [(-1) + (1)] \times a = 0 \times a = 0$.

7. Every nonzero rational number has a multiplicative inverse. Division of rational numbers is defined as multiplying by the multiplicative inverse.
8. The operation of adding the rational number q to points on the number line is a translation; it shifts points to the right if $q > 0$, to the left if $q < 0$, and not at all if $q = 0$. The operation of adding $-q$ undoes the operation of adding q.
9. The operation of multiplying points on the number line by a positive rational number k is a dilation; it scales points further away from zero if $k > 1$, closer to zero if $k < 1$, and not at all if $k = 1$. The operation of multiplying by $1/k$ undoes the operation of multiplying by k.

Core Standards · Students can and do:

a. Explore and explain with number lines the rules for adding rational numbers, e.g., $r + s = s + r$; $r + (-s) = r - s$; $p - (q + r) = p - q - r$.
b. Use the rules of arithmetic to explore and explain with specific numbers the rules for multiplying rational numbers, e.g., 4×-5 is -5 added to itself 4 times, so equal to -20; $-3 \times (-2 + 2) = -3 \times 0 = 0$, so $-3 \times -2 = -(-3)\times 2 = -(-6) = 6$.
c. Add and subtract rational numbers, and use these operations to solve word problems (including signed quantities such as elevation, temperature, account balance, and so on).
d. Multiply and divide rational numbers, and use these operations to solve word problems (including signed quantities).

Expressions and Equations

Core Standards · Students understand that:

1. Expressing a quantity in different forms serves a purpose in analyzing quantitative situations.
2. The distributive property can be used in two directions, both to expand linear expressions, and to factor a sum of terms with a common factor.

Core Standards · Students can and do:

a. Construct algebraic expressions for simple real-world situations and generate equivalent expressions to interpret their meaning (e.g., $P + 0.05P = 1.05P$ means that "increase by 5%" is the same as "multiply by 1.05").
b. Generate equivalent expressions from a given expression, including putting linear expressions in standard form and taking out a common factor. Include expressions involving negative numbers and exponents 2 and 3.
c. Solve multi-step word problems that lead to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are rational numbers, by undoing the operations involved in producing the expression on the left, using additive and multiplicative inverses.
d. Solve simple absolute value equations of the form $|x + h| = j$ and $|x - h| = j$, where h and j are integers.
e. Read the structure in a numerical expression at a level necessary to enter it into a calculator or spreadsheet, making use of parentheses and the conventions on order of operations.

Statistics

Core Standards · Students understand that:

1. In addition to measurement variability, another source of variation in data is randomness.

Core Standards · Students can and do:

a. Collect experimental or simulation data from repeated random trials. Make a histogram showing absolute frequencies and a bar graph of relative frequencies. Discuss the patterns and make predictions for further experiments or simulations.

Probability

Core Standards · Students understand that:

1. Chance events fall along a spectrum: nearly impossible | unlikely | neither likely nor unlikely | likely | nearly certain.
2. Probability is a quantitative measure of likelihood. Probabilities are numbers lying between 0 and 1, with 0 representing impossible and 1 representing certain (in the case of a finite sample space).
3. The experimental probability of a specified outcome is the observed fraction of the outcome in a data set collected from a process involving randomness or chance.
4. In a random process, the individual outcomes are unpredictable, but patterns may emerge after repeated trials. Experimental probabilities in random experiments tend to approach stable values as more and more data is generated.
5. In a theoretical probability model, the set of distinct possible outcomes for a random experiment is called the sample space. An event is a set of sample points; a sample point may belong to several events. A specified event occurs in some fraction of the sample space. This fraction is called the theoretical probability of the event.
6. When computing theoretical probabilities, all members of the sample space are assumed equally probable. Theoretical probabilities will not match long-run experimental probabilities if this assumption is inappropriate (e.g., as in the case of a loaded die).

Core Standards · Students can and do:

a. Compute experimental probabilities from data sets, including data sets generated by simulations or sampling experiments.
b. Compute experimental probabilities to estimate theoretical probabilities when no theoretical probability model is apparent.
c. Represent sample spaces for one-stage random experiments; identify members of the sample space in which specified events occur.
d. Use a theoretical probability model to compute theoretical probabilities for one-stage random experiments, expressing theoretical probabilities as fractions, decimals and percents.
e. Compare experimental probabilities to theoretical probabilities for one-stage random experiments, examining and if feasible revising the assumptions of the theoretical model when the two conflict.

Geometry

Core Standards · Students understand that:

1. Two polygons are congruent[59] if and only if there is a correspondence between vertices so that the corresponding sides are equal and the corresponding angles are equal.
2. A plane or solid figure is similar to another if the second can be obtained from the first by a similarity transformation.[60] All ratios of lengths in the second figure to corresponding lengths in the first figure are equal to the scale factor of the dilation.

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[59] Glossary: Congruent. Two plane or solid figures are *congruent* if one can be obtained from the other by a sequence of rigid motions (rotations, reflections, and translations).
[60] Glossary: Similarity transformation. A rigid motion followed by a dilation. Glossary: Dilation. A transformation that moves each point along the ray through the point emanating from a fixed center, and multiplies distances from the center by a common scale factor.

3. Congruent figures have the same area or volume. A similarity transformation with a scale factor of k leaves angle measures unchanged, changes lengths by a factor of k, changes areas by a factor of k^2, and changes volumes by a factor of k^3.

4. Given a line in the coordinate plane not parallel to either axis, any two right triangles with legs parallel to the axes and hypotenuse on the given line are similar, and so the slope of the line (rise over run) is the same regardless of which two distinct points are used to compute it.

Core Standards· Students can & do:

a. Solve problems involving similar triangles and scale drawings (including computing actual lengths, areas and volumes from a scale drawing and reproducing a scale drawing at a different scale).
b. Explore using hands-on activities the area of non-rectangular figures and the perimeter of curvilinear figures, and the fact that a dilation of the plane changes areas by the square of the scale factor.[61]
c. Use scale factors to find lengths and areas of similar figures, including an informal derivation of the formulas relating the area, radius and circumference of a circle.
d. Give an explanation of why the volume of a cylinder is the area of the base times the height, using informal arguments involving slices.
e. Use coordinate grids to transform figures and to predict the effect of dilations, translations, rotations and reflections.
f. Use two-dimensional representations of three-dimensional objects (schematics, assembly instructions, perspective drawings and multiple views) to solve problems.
g. Explore three-dimensional figures formed by translations and rotations of plane figures through space.
h. Sketch and describe cross-sections of cones, cylinders, pyramids and prisms.

[61] Include using grids of squares with fractional side lengths to estimate area, and measuring the length of strings wrapped around the perimter.

Mathematics: Eighth Grade

Developing Coherent Understanding

[Temporarily removed for editing.]

Functions and the Situations They Model

Core Standards · Students understand that:

1. A function is a rule, often defined by an expression, that states a relationship between the values of two variable quantities.
2. A linear function models a situation where the change in one quantity is proportional to the corresponding change in the other quantity. The constant of proportionality, m, is the rate of change of the function. If x is the input and y is the output then the function is defined by $y = mx + b$ for some constant b, which is called the initial value of the function (the value of the function when x is 0).
3. The graph of a linear function $y = mx + b$ is a straight line, and the slope of the line is the function's rate of change.
4. The problem of finding where two linear functions have the same output value for a common input value leads to an equation in one variable; the solution or solutions (if any) can be visualized as the input value(s) where the graphs of the functions intersect.
5. A linear equation in one variable can be solved by successively transforming it into simpler equations with the same solutions using the Properties of Arithmetic and the Properties of Equality, until an equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

Core Standards · Students can and do:

a. Compare features of two or more functions that may be presented in different representations (as formulas, graphs, tables of values, or verbally).
b. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship; from two (x, y) values (including reading these from a table); or from a graph.
c. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
d. Solve linear equations with rational number coefficients, including equations that require expanding expressions using the distributive law and collecting like terms.

The Number System

Core Standards · Students understand that:

1. The number line has numbers that are not rational, such as 2π or $2 + \sqrt{3}$, called irrational numbers.
2. An irrational number can be approximated to arbitrary precision by rational numbers.
3. If $n > 0$ is an integer and $\sqrt{n}$ is not an integer, then $\sqrt{n}$ is irrational. If q is rational and r is irrational, then $q + r$ is irrational, and so is qr provided $q \neq 0$.

Core Standards · Students can and do:

a. Use rational approximations to compare the size of irrational numbers, locate them approximately on a number line and estimate the value of expressions (e.g. π^2).

Geometry

Core Standards · Students understand that:

1. Angle measures formed by a configuration of lines in a plane can often be deduced from other angle measures (e.g., vertically opposite angles, angles produced when a transversal line cuts two parallel lines).
2. The side lengths of a right triangle are related by the Pythagorean theorem.

Core Standards · Students can and do:

a. Explore and explain by hands-on activities facts about the angle sum of triangles, exterior angles, and alternate interior angles of parallel lines. Use these facts to determine the angle sum of interior angles of convex polygons, and the angle sum of exterior angles of convex polygons.[62]
b. Explore and explain using hands-on activities: parallel lines in space, line perpendicular to a line through a given point, lines perpendicular to a plane, lines parallel to a plane, the plane passing through three given points, and the plane perpendicular to a given line at a given point.
c. Use facts about angles to write and solve simple equations for an unknown angle in a figure.
d. Explain a proof of the Pythagorean theorem.[63]
e. Use the Pythagorean theorem to determine missing side lengths in right triangles and to solve problems in two and three dimensions.
f. Use the Pythagorean theorem to find the distance between two points in a coordinate system.
g. Draw (freehand, with ruler and protractor, and with technology) geometric shapes from given conditions. (Focus on constructing triangles from three measures of angles or sides, noticing when the triangle is uniquely defined, ambiguous, or impossible.)
h. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc): copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.
i. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

Statistics

Core Standards · Students understand that:

1. Scatterplots for bivariate continuous data may reveal patterns of association between two quantities. This kind of relationship between quantities is not a functional relationship—and yet, a function might be a valuable way to describe a statistical relationship.

Core Standards · Students can and do:

a. Construct and interpret scatterplots for bivariate measurement data.
b. Describe patterns that appear in scatterplots, such as clustering, outliers, positive/negative association, linear association, nonlinear association.
c. For scatterplots that suggest a linear association, model the relationship with a linear function using an informal fitting procedure. Use the model function to solve problems in the context of the data,

[62] Use physical models, transparencies, or dynamic geometry software to make rigid motions and give informal arguments, for example, arrange three copies of the same triangle so that the three angles form a line, and give an argument in terms of transversals why this is so.
[63] For example, by the method of right triangles in a square.

interpreting the slope/rate of change and intercept/initial value. Informally assess the goodness of the model by judging the closeness of the data points to the graph of the function.

Probability

Core Standards · Students understand that:

1. The framework for theoretical probability models is the same for compound events as for simple events: the theoretical probability is the fraction of the sample space in which the compound event occurs.

Core Standards · Students can and do:

a. Compute experimental probabilities from data sets, including data sets generated by simulations or repeated sampling experiments.
b. Compute experimental probabilities to estimate theoretical probabilities of compound events when no theoretical probability model is apparent.
c. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams; identify members of the sample space in which specified events occur.
d. Compute theoretical probabilities for compound events by counting members of the sample space.
e. Compare experimental probabilities to theoretical probabilities for multi-stage random experiments, examining the assumptions of the theoretical model when the two conflict.

Mathematics: High School—Expressions

A Coherent Understanding of Expressions

[Final draft of CCR narrative goes here.]

Seeing structure in expressions

Core Standards · Students understand that:

1. Different forms of expression for functions reveal different properties of the function; a purpose in transforming expressions is to find those properties.

   For example, factoring a quadratic expression reveals the zeros of the function it defines, and putting the expression in vertex form reveals the maximum or minimum of the function; the expression 1.15^t can be rewritten in the form $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate monthly interest rate if the annual rate is 15%.

2. The laws of exponents for whole number exponents follow from an understanding of exponents as indicating repeated multiplication, and from the associative property of multiplication.

3. The interpretation of zero, fractional and negative exponents follows from extending the laws of exponents to those values.

   For example, since $(x^{1/3})^3 = x^{(1/3)\cdot 3} = x^1 = x$, $x^{1/3}$ is the cube root of x.

4. Complex expressions can be interpreted by "chunking": temporarily viewing a part of the expression as a single entity.

Core Standards · Students can and do:

a. Factor, expand, and complete the square in quadratic expressions.
b. Use chunking to see expressions in different ways that suggest ways of rewriting them.

   For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.

c. Rewrite expressions using the laws of exponents.

   For example $(x^{1/2})^3 = x^{3/2}$ and $1/x = x^{-1}$.

d. Use the laws of exponents to interpret expressions for exponential functions, recognizing fractional exponents as indicating roots of the base and negative exponents as indicating the reciprocal of a power.

   For example, identify the relative rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.2)^{10t}$, $y = (1.01)^{t/12}$, and recognize that any non-zero number raised to the 0 power is 1 (for example, $12(1.05)^0 = 12$). Avoid common errors such as confusing as $6(1.05)^t$ with $(6\cdot 1.05)^t$ and $5(0.03)^t$ with $5(1.03)^t$.

e. Given an expression for an exponential function, identify whether it represents exponential growth or decay.
f. Using a method such as the factorization $(x^n-1) = (x-1)(x^{n-1} + \ldots + 1)$ where n is a whole number, prove the formula for the sum of a geometric series, and use the formula to solve problems.

   Include problems involving compound interest and mortgage payments.

The arithmetic of polynomials and rational functions

Core Standards · Students understand that:

1. Polynomials form a system analogous to the integers, closed under the operations of addition, subtraction, and multiplication.

2. A polynomial of degree n has n complex roots, where roots are counted according to multiplicity.
3. For a polynomial $p(x)$, $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.
4. The Binomial Theorem gives the expansion of $(x + a)^n$ in powers of x for a whole number n and a real number a, with coefficients determined for example by Pascal's triangle. The Binomial Theorem can be proved by mathematical induction.
5. Rational functions are fractions whose numerator and denominator are polynomials, and the rational functions are closed under the operation of division by a nonzero rational function.

Core Standards · Students can and do:

a. Add, subtract and multiply polynomials.
b. Identify zeros of polynomials when suitable factorizations are available, and graph polynomials.
c. Transform simple rational functions using the Properties of Arithmetic and the rules for operations on fractions.
d. Identify zeros and asymptotes of rational functions, when suitable factorizations are available, and graph rational functions.
e. Divide polynomials by monomials

Mathematics: High School—Equations

A Coherent Understanding of Equations

[Final draft of CCR narrative goes here.]

Building equations to model relations between quantities

Core Standards · Students understand that:

1. Choosing a unit for a general quantity (e.g. length) establishes a correspondence between specific instances of the quantity (e.g. lengths of specific objects) and numbers called coordinates.
2. A relation between two quantities can be represented by an equation in variables representing coordinates for the quantities; by a graph on a pair of axes marked with units for the quantities; and by a table of coordinate pairs from the relation. The graph and the table show pairs that are solutions to the equation.

Core Standards · Students can and do:

a. Build equations to express relations between quantities and solve problems.

Include equations arising from situations involving linear, quadratic, simple rational, and exponential functions.

b. Rearrange formulas to isolate a quantity of interest.
c. Build systems of equations and solve problems involving systems of equations.

Reasoning with equations and inequalities

Core Standards · Students understand that:

1. To solve an equation algebraically, one assumes it is true and deduces the solutions, often in steps that replace it with a simpler equation whose solutions include the solutions of the original one.
2. Adding a number to both sides of an equation, or multiplying both sides by a nonzero number, leads to an equation that has exactly the same solutions as the original.
3. If the product of two numbers is zero, then at least one equals zero, and conversely. This principle is the basis for solving equations by factoring.
4. Multiplying both sides of an equation by an expression that can be zero for certain values of the variables in it, or squaring both sides of an equation, can lead to an equation that has more solutions than the original. Evaluating these in the original equation eliminates extraneous solutions.
5. The method of completing the square can transform any quadratic equation in x into an equivalent equation of the form $(x - p)^2 = q$. This leads to the quadratic formula.
6. Equations not solvable in one number system may have solutions in a larger number system.
7. Equations of the form $f(x) = g(x)$ can be solved graphically by finding the intersections (if any) of the graphs of $f(x)$ and $g(x)$.
8. The relationship between a function f and its inverse (if it has one) can be used to solve equations of the form $f(x) = c$. For example, a logarithmic function can help solve exponential equations, and an inverse trigonometric function can help solve trigonometric equations.
9. Given a system of linear equations, adding a multiple of one equation to another produces a system with the same solutions. This principle, combined with principles already encountered with equations in one variable, allows for the simplification of systems.

10. The solutions to an equation in two variables form a graph—a set of points, often a curve or a line, in the coordinate plane.
11. The solutions to two equations in two variables (if any) can be visualized as the points of intersection of their graphs, because those points satisfy both equations simultaneously.
12. The solution to a system of inequalities in two variables can be visualized as the intersection of the regions in the plane defined by the inequalities.

Core Standards · Students can and do:

a. Solve simple rational and radical equations, noting and explaining extraneous solutions.
b. Solve quadratic equations over the real numbers by completing the square, using the quadratic formula and factoring.
c. Solve linear inequalities in one variable and graph the solution set on a number line.

   Emphasize solving the associated equality and determining on which side of the solution of the associated equation the solutions to the inequality lie.

d. Solve linear systems of equations algebraically, focusing on pairs of linear equations in two variables.
e. Graph a system of two linear or quadratic equations in two unknowns and estimate the solution from a graph.
f. Graph the solution set of a linear inequality in two variables.
g. Use the properties of logarithms to solve equations involving exponential functions.
h. Use inverse trigonometric functions to solve equations of the form $A\sin(Bx + C) = D$.
i. Find complex roots of quadratic equations.
j. Solve a system of two quadratic equations in two unknowns.

Mathematics: High School—Functions

A Coherent Understanding of Functions

[Final draft of CCR narrative goes here.]

Interpreting functions

Core Standards · Students understand that:

1. The domain of a function is the set of its inputs, and the range is the set of its outputs.
2. Function notation uses a letter to stand for a function. If f is a function and x is a number in its domain, then $f(x)$ indicates the output of f corresponding to the input x.
3. Functions can be described by key characteristics, including: zeros; vertical intercept; extreme points; average rates of change (over intervals); intervals of increasing, decreasing and/or constant behavior; and end behavior.
4. Linear, quadratic and exponential functions are defined by expressions that have forms specific to each type, in which the parameters can often be interpreted in terms of characteristics of the graph.
5. An equation in two variables implicitly expresses one variable as a function of the other if there are no points on the graph having the same value of the first variable but different values of the second.
6. When x is a power of ten, the common logarithm $\log(x)$ tells the exponent. When x lies between 10^n and 10^{n+1}, $\log(x)$ lies between n and $n+1$.

Core Standards · Students can and do:

a. Describe qualitatively the functional relationship between two quantities by reading a graph; e.g., where the function is increasing or decreasing, what its long run behavior appears to be, and whether it appears to be periodic.
b. Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
c. Compare values and properties of two functions represented in different ways (algebraically, graphically, numerically in tables, or by verbal descriptions).
d. Relate the domain and range of a function to its graph and, where applicable, to the quantitative relationship it describes.
e. Describe the qualitative behavior of common types of functions using graphs and tables.

   Identify: intercepts; intervals where the function is increasing, decreasing, positive or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. Use technology to explore the effects of parameter changes on the graphs of linear, power, quadratic, square root and cube root, polynomial, simple rational, exponential, logarithmic, sine and cosine, absolute value and step functions.

f. Interpret the parameters in the general expressions for linear, quadratic, and exponential functions, and draw conclusions about the parameters by inspection of the graph.
g. Given a function f, and given a constant c, evaluate $f(c)$ if possible and find solutions to $f(x) = c$ (if they exist). Where appropriate, relate the possibility of evaluation to the domain and the existence or nonexistence of solutions to the range.

Building functions

Core Standards · Students understand that:

1. Varying a parameter in the general expression for a linear, quadratic or exponential function can (often) be interpreted as performing a geometric transformation on the graph. This can be used to adjust a function to model a particular situation.

2. Composing a function f with a function g creates a new function called the composite function—for an input number x, the output of the composite function is $f(g(x))$.

3. The inverse of a function "undoes" what the function does; that is, composing the function with its inverse in either order returns the original input.

4. Sequences are functions whose domain is the whole numbers, and they can be defined recursively as well as explicitly. Arithmetic sequences are linear functions and geometric sequences are exponential functions.

Core Standards · Students can and do:

a. Make graphs of linear, quadratic, cubic, absolute value and exponential functions, and, given the graph of one of these types, identify the type.
b. Sketch graphs of quadratic functions presented in the form $y = ax^2+bx+c$, $y = a(x-h)^2+k$ and $y = a(x-p)(x-q)$ (without plotting points).
c. Solve problems involving quadratic functions, such as analyzing projectile motion and maximizing profit.
d. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$. Include both positive and negative k; find the value of k given the graphs.
e. Write an expression of the form $a(1+r)^t$ or ab^t for an exponential function to express a constant percent growth rate or a constant growth factor.
f. Evaluate composite functions and compose functions symbolically in simple cases (e.g. one or both functions linear).
g. Read values of an inverse function from a graph or a table, given that the function has an inverse.
h. For linear or simple exponential functions, find a formula for an inverse function by solving an equation.
i. For linear functions or simple exponential functions, verify symbolically by composition that one function is the inverse of another.
j. Write arithmetic and geometric sequences both recursively and in closed form, and translate between the two forms.

Linear vs. exponential behavior

Core Standards · Students understand that:

1. Linear functions grow by equal differences in equal time periods; exponential functions grow by equal factors in equal time periods.

2. The rate of change of a linear function is constant; the rate of change of an exponential function is proportional to the value of the function.

3. Exponential growth eventually outstrips polynomial growth (including, in particular, linear growth).

Students can and do:

a. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
b. Interpret absolute and relative rates of change and use them to make predictions.
c. Identify the initial value and growth or decay rate from a table or graph of an exponential function.
d. Calculate and interpret the growth factor for an exponential function (presented symbolically or as a table) given a fixed time interval. Estimate the growth factor from a graph.
e. Recognize a quantitative relationship as linear or exponential from description of a situation.

Trigonometric functions

Core Standards · Students understand that:

1. The unit circle in the coordinate plane enables one to extend the domains of the sine, cosine and tangent functions of right-triangle trigonometry to the real numbers.
2. Trigonometric functions are periodic by definition, and sums and products of these functions are periodic.
3. Restricting trigonometric functions to a domain on which they are always increasing or always decreasing allows for the construction of an inverse function.

Core Standards · Students can and do:

a. Use radian measure and revisit graphs of trigonometric functions in terms of radians.
b. Use the unit circle to determine geometrically the values of sine, cosine, tangent for multiples of $\pi/4$ and $\pi/3$; commit sines and cosines of principal angles to memory.
c. Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.
d. Solve simple trigonometric equations formally using inverse trigonometric functions;[64] evaluate solutions using technology.
e. Explain relationships between the identity $\sin^2 x + \cos^2 x = 1$, the equation of a circle, and the Pythagorean theorem.
f. Explain proofs of the sine and cosine addition and subtraction formulas.
g. Use trigonometric identities to simplify expressions.
h. Use trigonometric functions to solve problems in science, economics or other fields where periodic phenomena occur.

[64] Solving trigonometric equations by means of the quadratic formula is optional.

Mathematics: High School—Coordinates

A Coherent Understanding of Coordinates.

[Final draft of CCR narrative goes here.]

Expressing geometric properties with equations

Core Standards · Students understand that:

1. The graph of a linear equation is the straight line through any two of its solutions. Conversely, any line is the set of solutions to some linear equation.
2. Two lines with well-defined slopes are parallel if their slopes are equal and perpendicular if their slopes multiply to –1.
3. The equation of a circle can be found using its definition and the Pythagorean theorem.
4. Transforming the graph of an equation by reflecting in the axes, translating parallel to the axes, or applying a dilation to one of the axes correspond to substitutions in the equation.

   For example, reflection in the y axis corresponds to $(x,y) \rightarrow (-x,y)$, translation vertically down by three units corresponds to $(x,y) \rightarrow (x,y+3)$, and dilating by a factor of 2 parallel to the x-axis corresponds to $(x, y) \rightarrow (x/2, y)$.
5. An ellipse is obtained by stretching a circle, leading to an equation of the form $x^2/a^2 + y^2/b^2 = 1$.
6. The formula $A = \pi ab$ for the area of an ellipse can be derived from the formula for the area of a circle.

Core Standards · Students can and do:

a. Write the equation of a line in point-slope form, slope-intercept form, or standard form.
b. Identify parallel and perpendicular lines in a coordinate plane, and use the relationship between slopes of parallel and perpendicular lines to solve problems. Know the equations of vertical and horizontal lines.
c. Find the point on the segment between two given points that divides the segment in a given ratio.
d. Complete the square to find the center and radius of a circle given by an equation.
e. Find an equation for an ellipse given the lengths of its major and minor axes; calculate the area of an ellipse.
f. Use coordinates to solve geometric problems.

   Include proving simple geometric theorems algebraically, using coordinates to compute perimeters and areas for triangles and rectangles, finding midpoints of line segments, finding distances between pairs of points and determining when two lines are parallel or perpendicular.

Vectors and matrices[65]

Core Standards · Students understand that:

1. Vectors are quantities having both magnitude and direction. They are typically represented by directed line segments.
2. On a coordinate plane, vectors are determined by the coordinates of their initial and terminal points or by their x- and y-components.

[65] Limit to vectors in the plane and 2x2 matrices.

3. Vectors can be added end-to-end, component-wise, or by the parallelogram rule. The length of the sum of two vectors is typically not the sum of the lengths.
4. Translations of the plane can be represented by vectors.
5. Vectors are often used to describe "directed quantities" in physics, such as position, velocity, acceleration and force. Vector addition is used to find resultant forces or compute displacements.
6. Multiplying a 2x2 matrix into a vector produces another vector. This can be viewed as a transformation of the plane.
7. A system of two linear equations in two variables can be represented as a single matrix equation in a vector variable.
8. Matrices can be added, subtracted and multiplied.
9. The zero and identify matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a 2x2 matrix determines whether it has a multiplicative inverse.

Core Standards · Students can and do:

a. Represent vectors graphically.
b. Perform basic vector operations (addition, subtraction, scalar multiplication) both graphically and algebraically.
c. Use vectors to model and solve problems.
d. Use trigonometry to decompose a vector into perpendicular components.
e. Add, subtract and multiply matrices.
f. Represent systems of equations as matrix equations.
g. Find the inverse of a matrix if it exists and use it to solve equations.

Complex Numbers

Core Standards · Students understand that:

1. To solve quadratic equations that have no solutions in the real numbers, the number system can be extended to include the square roots of –1, creating a closed number system called the complex numbers.
2. The Properties of Arithmetic and the relation $i^2 = -1$ can be used to perform operations on complex numbers.
3. All polynomials can be factored over the complex numbers, e.g. as in $x^2 + 4 = (x + 2i)(x - 2i)$.
4. Complex numbers can be visualized on the complex plane. Real numbers fall on the horizontal (real) axis, and imaginary numbers fall on the vertical axis.
5. On the complex plane, arithmetic of complex numbers can be interpreted geometrically: addition is analogous to vector addition, and multiplication can be understood as rotation and dilation about the origin. Complex conjugation is reflection across the real axis.
6. The absolute value (or modulus) of a complex number is defined as its distance from the origin in the complex plane. On the complex plane, as on the real line, the distance between numbers is the absolute value of the difference, and the midpoint of a segment is the average of the numbers at its endpoints.
7. Euler's formula $e^{i\theta} = \cos\theta + i \sin\theta$ links complex numbers to trigonometry.

Core Standards · Students can and do:

a. Add, subtract and multiply complex numbers.
b. Find the conjugate of complex a number and use it to find absolute values and divide complex numbers.
c. Graph complex numbers in both rectangular and polar form and interpret arithmetic of complex numbers geometrically.

d. Solve quadratic equations over the complex numbers.
e. Convert complex numbers between rectangular and polar form.
f. Re-derive trigonometric identities using complex methods.

Mathematics: High School—Modeling

A Coherent Understanding of Modeling.

Modeling uses mathematics to help us make sense of the real world—to understand quantitative relationships, make predictions, and propose solutions.

A model can be very simple, such as a geometric shape to describe a physical object like a coin. Even so simple a model involves making choices. It is up to us whether to model the solid nature of the coin with a three-dimensional cylinder, or whether a two-dimensional disk works well enough for our purposes. For some purposes, we might even choose to adjust the right circular cylinder to model more closely the way the coin deviates from the cylinder.

In any given situation, the model we devise depends on a number of factors: How precise an answer do we want or need? What aspects of the situation do we most need to understand, control, or optimize? What resources of time and tools do we have? The range of models we can create and analyze is constrained as well by the limitations of our mathematical and technical skills. For example, modeling a physical object, a delivery route, a production schedule, or a comparison of loan amortizations each requires different sets of tools. Networks, spreadsheets and algebra are powerful tools for understanding and solving problems drawn from different types of real-world situations. One of the insights provided by mathematical modeling is that essentially the same mathematical structure might model seemingly different situations.

The basic modeling cycle is one of (1) identifying the key features of a situation, (2) creating geometric, algebraic or statistical objects that describe key features of the situation, (3) analyzing and performing operations on these objects to draw conclusions and (4) interpreting the results of the mathematics in terms of the original situation. Choices and assumptions are present throughout this cycle.

The modeling cycle and general tools

Core Standards · Students understand that:

1. The behavior of quantities in physical, economic, public policy, social and everyday situations can be modeled using mathematics. Mathematics is used to model relationships among quantities, constraints and objectives.
2. Models are formulated to answer questions about the world based on an analysis of the situation and a conceptual model that involves assumptions and choices.
3. Quantities in the situation are represented by variables in the model, usually through measurement. Modeling includes decisions about what to measure and how, and how well the measurements work for the purpose.
4. Mathematical knowledge and skill are required in order to get results from a mathematical model—even to devise a model in the first place. Areas of mathematics commonly used in modeling include linear, quadratic, exponential or other functions; probability and statistics; and geometry (solid, plane and coordinate). In active modeling, fluency with math content is required in order to focus on the larger problem.
5. Technology is often required in order to obtain results from a model.
6. The results of a mathematical model must be evaluated against evidence and the phenomena at hand. If the mathematics is correct, then unreasonable results point to unreasonable assumptions and the need to revise the model.
7. Real-world problems do not announce that they are amenable to mathematical analysis and solution; bringing mathematics to bear on such a problem is a highly creative act.

Core Standards · Students can and do:

a. Creatively apply the mathematics they know to situations in which it only imperfectly applies—and achieve useful results by doing so.

For example, independently choose to describe HIV transmission as a random event with a fixed probability per sexual encounter.

b. Decide what measures are relevant to a problem.

For example, given the purpose at hand, is traffic safety best measured in terms of fatalities per year or fatalities per vehicle-mile? (or fatalities per 100 million vehicle-miles?)

c. Use network diagrams or other techniques to visualize complex situations with many factors, causes or agents.

For example, what agents and factors are responsible for setting the price of gasoline? How do they interact?

d. In situations with many factors, causes or agents, organize the factors/causes/agents into a hierarchy of importance.

For example, what are the primary, secondary, and relatively rare causes of lung cancer?

e. Use order of magnitude estimates, unprompted, to identify important effects, disregard unimportant effects and predict results of a more detailed model.
f. Use 2-by-2 tables, flowcharts, and other strategies to organize information and manage scenarios.

Modeling with geometry, equations, functions, probability, and statistics

Core Standards · Students can and do:

a. Model physical objects with geometric shapes.

Include common objects that can reasonably be idealized as two- and three-dimensional geometric shapes. Identify the ways in which the actual shape varies from the idealized geometric model.

b. Model situations with equations and inequalities.

Include situations well described by a linear inequality in two variables or a system of linear inequalities defining a region in the plane.

c. Model situations with common functions.

Include situations well described by linear, quadratic or exponential functions; and situations that can be well described by inverse variation ($f(x) = k/x$). Include identifying a family of functions that models features of a problem, and identifying a particular function of that family and adjusting it to fit by changing parameters. Understand the recursive nature of situations modeled by linear and exponential functions.

d. Model situations using probability and statistics.

Include using simulations to model probabilistic situations; describing the shape of a distribution of values and summarizing a distribution with measures of center and variability; modeling a bivariate relationship using a trend line or a regression line.

Mathematics: High School—Statistics

A Coherent Understanding of Statistics.

[Final draft of CCR narrative goes here.]

Summarizing and interpreting categorical, count and measurement data

Core Standards · Students understand that:

1. Statistical methods take variability into account to support making informed decisions based on quantitative studies designed to answer specific questions.
2. Visual displays and summary statistics condense the information in data sets into usable knowledge.

Core Standards · Students can and do:

a. Summarize comparative or bivariate categorical data in two-way frequency tables; interpret joint, marginal and conditional relative frequencies in the context of the data.
b. Compare data on two or more count or measurement variables by using plots on the real number line (dot plots, histograms and box plots); use appropriate statistics to summarize center (median, mean) and spread (interquartile range, standard deviation) of the data sets; interpret changes in shape, center and spread in the context of the data sets, accounting for possible effects of extreme data points.
c. Summarize bivariate quantitative data by giving a regression line and a measure of goodness of fit.

Making inferences and justifying conclusions drawn from data

Core Standards · Students understand that:

1. Statistics is a process for making inferences about population parameters based on a sample from that population; randomness is the foundation for statistical inference.
2. The design of an experiment or sample survey is of critical importance to analyzing the data and drawing conclusions.

Core Standards · Students can and do:

a. Use probabilistic reasoning to decide if a specified model is consistent with a given data-generating process.
b. Recognize the purposes of and differences among sample surveys, experiments and observational studies; explain how randomization relates to each.
c. Use data from a sample survey to estimate a population parameter.
d. Use data from a randomized experiment to compare two treatments.
e. Evaluate reports based on data.

Mathematics: High School—Probability

A Coherent Understanding of Probability.

[Final draft of CCR narrative goes here.]

Modeling random events with finite sample spaces

Core Standards · Students understand that:

1. Random phenomena can be modeled mathematically using a sample space in which sample points represent distinct outcomes, and in which each sample point is assumed to have the same probability.
2. Events are subsets of a sample space that can be defined using characteristics (or categories) of the sample points, as well as unions, intersections, or complements thereof ('and', 'or', 'not'). A sample point may belong to several events (categories).
3. If A and B are two events (categories), then the conditional probability of A given B, denoted by $p(A \mid B)$, is the fraction of sample points in B that also lie in A.
4. The laws of probability can be used to generate new probabilities from known probabilities.

Core Standards · Students can and do:

a. Compute theoretical probabilities of compound events by constructing and analyzing representations, including tree diagrams, systematic lists, and Venn diagrams
b. Use the addition and multiplication laws of probability to compute probabilities of complementary, disjunctive, and compound events.
c. Apply concepts such as intersections, unions and complements of events, and conditional probability and independence, to define or analyze compound events, calculate probabilities, and solve problems.
d. Construct and interpret two way tables to show probabilities when two characteristics (or categories) are associated with each sample point. Use a two way table to determine conditional probabilities.
e. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.
f. Use permutations and combinations to compute probabilities of compound events and solve problems.

Experimenting and simulating to model probabilities

Core Standards · Students understand that:

1. Sets of data obtained from surveys, simulations, or other means, can be used as probability models, by treating the data set itself as a sample space, in which the sample points are the individual pieces of data. The probability of an event within the data set is its relative frequency.
2. The law of large numbers provides the basis for estimating certain probabilities by use of empirical relative frequencies.
3. The probability of an outcome can be interpreted as an assertion about the long-run proportion of the time the outcome will occur if the random experiment is repeated a large number of times. The observed proportion of occurrence for the outcome of interest can be used as an estimate of the relevant probability.

Core Standards · Students can and do:

a. Calculate experimental probabilities by performing simulations or experiments involving a probability model and using relative frequencies of outcomes.

b. Compare the results of simulations (e.g., random number tables, random functions, and area models) with predicted probabilities. When there are substantial discrepancies between predicted and observed probabilities, explain them in terms of the assumptions of the probability model.
c. Use the relationship between conditional probabilities and relative frequencies in contingency tables to analyze decision problems.
d. Use the mean and standard deviation of a data set to fit it to a normal distribution (bell-shaped curve) and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets and tables to estimate areas under the normal curve.
e. Apply the binomial theorem to solve probability problems.

Using probability to make decisions

Core Standards · Students understand that:

1. A probability distribution is a collection of probabilities $\{p_1, \ldots, p_n\}$ for a set of mutually exclusive and jointly exhaustive events $\{E_1, \ldots, E_n\}$. The probabilities in a probability distribution sum to unity.
2. A random variable attaches a value to each event in a probability distribution. The expected value of the random variable is the weighted average of its possible values, with weights given by their respective probabilities.
3. When the possible outcomes of a decision can be assigned probabilities and payoff values, the decision can be analyzed as a random variable with an expected value, e.g. of a wager. If possible, this is the first thing to compute in a decision context.

Core Standards · Students can and do:

a. Calculate expected value to analyze mathematical fairness, payoff.
b. Evaluate and compare options in situations where all of the available options share the same expected value but carry different levels of risk.
c. Analyze each of two options and make a quantitatively informed decision in situations where one option has both a higher expected return and a higher level of risk. Include both low-stakes and high-stakes decisions.
d. Analyze decision problems using probability concepts.

Mathematics: High School—Geometry

A Coherent Understanding of Geometry.

[Final draft of CCR narrative goes here.]

Triangle Congruence

Core Standards · Students understand that:

1. Rigid motions move lines to lines and segments to segments; preserve the distance between points; and preserve measures of angles.
2. Two geometric figures are congruent if there is a sequence of rigid motions that carries one onto the other. This is the principle of superposition.
3. Criteria for triangle congruence can be thought of as answers to the following question: What information about the measures in a triangle ensures that all triangles drawn with those measures are congruent?
4. Criteria for triangle congruence can be established using rigid motions.

Core Standards · Students can and do:

a. Use (in reasoning and problem solving) precise definitions of angles, polygons, parallel and perpendicular lines, rigid motions (rotations, reflections, translations), parallelograms and rectangles; commit these definitions to memory.

b. Prove theorems about lines and angles; test conjectures and identify logical errors in fallacious proofs.

Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; measures of supplementary angles sum to 180°; two lines parallel to a third are parallel to each other; points on a perpendicular bisector of a segment are exactly those equidistant from the segment's endpoints.

c. Prove theorems about triangles; test conjectures and identify logical errors in fallacious proofs.

Theorems include: measures of interior angles of a triangle sum to 180°, base angles of isosceles triangles are equal, the triangle inequality, the longest side of a triangle faces the largest side and vice-versa, the exterior-angle inequality, and the segment joining midpoints of two sides of a triangle parallel to the third side and half the length.

d. Use and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid and kite.

e. Characterize parallelograms in terms of equality of opposite sides, in terms of equality of opposite angles, and in terms of bisection of diagonals; characterize rectangles as parallelograms with equal diagonals.

Similarity, Right Triangles and Trigonometry

Core Standards · Students understand that:

1. The dilation of a given line is parallel to the given line. (In particular, lines passing through the center remain unchanged.)
2. The dilation of a given segment is parallel to the given segment and longer or shorter in the ratio given by the scale factor. A dilation leaves a segment unchanged if and only if the scale factor is 1.
3. The assumed properties of dilations can be used to establish the AA, SAS and SSS criteria for similarity of triangles.
4. Similarity allows one to view side ratios in right triangles as properties of the angles themselves, leading to elementary definitions of sine, cosine and tangent.

Core Standards · Students can and do:

a. Use triangle similarity criteria to solve problems and to prove relationships in geometric figures.
b. Prove that two lines with well-defined slopes are parallel if and only if they have the same slope, and perpendicular if and only if the product of their slopes is equal to –1.
c. Give an informal explanation using successive approximation that a dilation of scale factor r changes the length of a curve by a factor of r and the area of a region by a factor of r^2.
d. Use and explain the relationship between the trigonometric ratios of complementary angles.
e. Use trigonometric ratios and the Pythagorean theorem to solve right triangles[66] in applied problems.

Circles

Core Standards · Students understand that:

1. All circles are similar.
2. There is a unique circle through three non-collinear points, or tangent to three non-concurrent lines.

Core Standards · Students can and do:

a. Identify and describe relationships among angles, radii, and chords.

Include the relationship between central, inscribed and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.

b. Identify and define radius, diameter, chord, tangent, secant and circumference.
c. Determine the arc lengths and the areas of sectors of circles, using proportions.
d. Construct a tangent line from a point outside a given circle to the circle.
e. Prove and use basic theorems about circles, and use these theorems to solve problems. Include:

- Symmetries of a circle
- Similarity of a circle to any other
- Tangent line, perpendicularity to a radius
- Inscribed angles in a circle, relationship to central angles, and equality of inscribed angles
- Properties of chords, tangents and secants as an application of triangle similarity.

Axiomatic Systems

Core Standards · Students understand that:

1. Mathematical statements are proven or disproven by deductive reasoning. Conjectures can arise from inductive reasoning, but they cannot be proven that way.
2. Precise definitions make possible rigorous logical reasoning, and definitions shared in common make possible the objective evaluation of one's own reasoning by others.
3. Logical reasoning requires avoiding common fallacies, such as using an example to prove the rule or confusing a statement with its converse.
4. Axiomatic systems require precise definitions, but some terms must be left "undefined." The axioms specify how the undefined terms behave.
5. The first three postulates of the *Elements* are models of straightedge and compass construction.
6. Hilbert and other mathematicians improved on the *Elements* by identifying its hidden assumptions and making them explicit with additional axioms.

[66] A right triangle has five parameters, its three lengths and two acute angles. Given a length and any other parameter, "solving a right triangle" means finding the remaining three parameters. (It is worth reflecting on why this problem is well-posed.)

7. Three classical construction problems (trisecting an angle, duplicating a cube and squaring a circle) inspired the development of much important mathematics.

8. The Parallel Postulate (axiom) distinguishes Euclidean geometry from other geometries. Other geometries, such as spherical and hyperbolic geometry, use alternatives to the Parallel Postulate. Many theorems of Euclidean geometry are not theorems in other geometries.

Core Standards · Students can and do:

a. Use the terms point, line and plane to define other geometric terms as line segments, angles and rays.
b. With ruler and compass:
   - Divide a segment into any number of equal parts.
   - Given two segments of lengths r and s, construct a segment of length rs and one of length r/s.
   - Given a segment of length r, construct a segment of length $\sqrt{r}$.

Trigonometry of General Triangles

Core Standards · Students understand that:

1. The Law of Sines generalizes the side-angle inequality.

2. The Law of Cosines generalizes the Pythagorean theorem.

3. The Laws of Sines and Cosines embody the triangle congruence criteria, in that three pieces of information are usually sufficient to completely solve a triangle. Furthermore, these laws yield two possible solutions in the ambiguous case, illustrating that "Side-Side-Angle" is not a congruence criterion.

Core Standards · Students can and do:

a. Explain proofs of the Law of Sines and the Law of Cosines.
b. Use the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

Geometric Measurement and Dimension

Core Standards · Students understand that:

1. Congruence plays a fundamental role defining the concepts of length, area and volume.

2. Areas of polygons can be computed by dissecting them into triangles and using the fundamental property of area, that the area of a dissected figure is the sum of the areas of its components.

3. Lengths of curves and areas of curved regions can be defined informally using the concept of "limit."

4. Cavalieri's principle allows one to understand volume formulas informally by visualizing volumes as stacks of thin slices.

Core Standards · Students can and do:

a. Give definitions of rectangular prism, (right) pyramid, (right circular) cone, (right circular) cylinder and sphere.

b. For a pyramid or a cone, give an heuristic argument to show why its volume is (1/3) its height times the area of its base.

c. Use the behavior of length and area under dilations to prove the formulas for the circumference and area of a circle.

d. Apply formulas and solve problems involving volume and surface area of right prisms, right circular cylinders and right pyramids, cones, spheres and composite figures.

e. Identify and apply the 3:2:1 relationship among volumes of circular cylinders, hemispheres and cones with same height and circular base and 3:1 relationship between volume of a prism and pyramid with same base area and height.

f. Identify cross-sectional shapes of slices of three-dimensional objects, and identify three-dimensional objects traced out by rotations of two-dimensional objects.

Mathematics: High School—Calculus

Calculus is an important part of the high school curriculum for a large and growing number of students. To see well-established standards for this course, please see course descriptions such as those of the College Board, International Baccalaureate Organization, or any of the following states: California, Florida, Hawaii, Indiana, Mississippi, Pennsylvania, South Carolina, Tennessee, Utah, and Virginia. We invite feedback from states as to whether they would like to see Calculus in future drafts of the Common Core Standards.

Progressions in Grades K–8

Note, a progression may appear in more than one band.

Grades K-5

Number

Counting and Cardinality
Base Ten Computation
Early Relations and Operations
Quantity and Measurement
Operations and the Problems They Solve
Fractions

Geometry

Shapes
Coordinates
Geometry

Data

Statistics

Grades 6-8

Number

The Number System

Algebra

Ratios and Proportional Relationships
Expressions and Equations
Functions and the Situations They Model

Geometry

Geometry

Data

Statistics
Probability

List of Progressions and Grade Ranges

Strand	Progression	Start	End
Number	Counting and Cardinality	K	K
	Early Relations and Operations	K	1
	Base Ten Computation	K	5
	Quantity and Measurement	K	5
	Operations and the Problems They Solve	2	4
	Fractions	3	5
	Ratios and Proportional Relationships	6	7
	The Number System	6	8
Geometry	Shapes	K	4
	Coordinate Geometry	5	5
	Geometry	6	8
Algebra*	Expressions and Equations	6	7
	Functions & The Situations They Model	8	8
Data*	Statistics	5	8
	Probability	7	8

* The Algebra and Data strands have concepts and skills in earlier grades that progressions in the Number strand.

GLOSSARY

Additive inverses. Two numbers whose sum is 0 are additive inverses of one another. Example: $^3/4$ and $-^3/4$ are additive inverses of one another because $^3/4 + (-^3/4) = (-^3/4) + ^3/4 = 0$.

Algorithm. A step by step routine that always gives some answer, rather than ever giving no answer; that always gives the right answer, and never gives a wrong answer; that can always be completed in a finite number of steps, rather than in an infinite number of steps; and that applies to all problems of a given type (e.g., adding any two multidigit whole numbers, or bisecting any angle). Cf. Wikipedia's "effective procedure," from which this definition is adapted.

Common logarithm. The common logarithm of x is the power to which you raise 10 in order to get x.

Congruent. Two plane or solid figures are congruent if one can be obtained from the other by a sequence of rigid motions (rotations, reflections, and translations).

Dilation. A transformation that moves each point along the ray through the point emanating from a fixed center, and multiplies distances from the center by a common scale factor.

Integer. A positive whole number, a negative whole number, or 0.

Mean. The sum of the values in a list divided by the number of values in the list. (To be more precise, this defines the *arithmetic mean*.)

Median. In a list of values, the value appearing at the center of a sorted version of the list—or the mean of the two central values, if the list contains an even number of values.

Multiplicative inverses. Two numbers whose product is 1 are multiplicative inverses of one another. Example: $^3/4$ and $^4/3$ are multiplicative inverses of one another because $^3/4 \times {}^4/3 = {}^4/3 \times {}^3/4 = 1$.

Range. The difference between the greatest and smallest values in a list of numbers.

Rational number. A number expressible in the form $^a/_b$ for integers a and $b \neq 0$. The rational numbers include positive and negative integers, positive and negative fractions, and 0.

Related fractions. Two fractions are *related* if one denominator is a factor of the other. (See Ginsburg, Leinwand and Decker (2009), *Informing Grades 1-6 Mathematics Standards Development: What Can Be Learned from High-Performing Hong Kong, Korea, and Singapore?*, Table A1, p. A-5, grades 3 and 4.)

Similarity transformation. A rigid motion followed by a dilation.

Single-place number. The numbers that result when a whole number between 1 and 9 (inclusive) is multiplied by the numbers 10, 100, 1000, etc.

Teen number. A whole number that is greater than or equal to 11 and less than or equal to 19.

Transitive property of measurement order. If one object is bigger than a second, and the second object is bigger than a third object, then the first object is bigger than the third object.

International Benchmarking and the Common Core

The Common Core State Standards (CCSS) are designed to be **college- and career-ready** and **internationally benchmarked**. To that end, the development process included the review and consideration of many sources, including research studies, existing standards from the U.S and abroad, and the professional judgment of teachers, content area experts, and college faculty. This paper will briefly describe how international benchmarking was used to develop the CCSS.

What documents were used to ensure that the CCSS were internationally benchmarked?

To ensure that the standards prepare students to be globally competitive, the development team used a number of sources, including: the frameworks for PISA and TIMSS; the International Baccalaureate syllabi; the American Institutes for Research report , *Informing Grades 1-6 Mathematics Standards Development: What Can Be Learned From High-Performing Hong Kong, Korea, and Singapore* and; the A+ Composite found in *A Coherent Curriculum: The Case for Mathematics* by Bill Schmidt, Richard Houang, and Leland Cogan.

In addition, the development team looked to the standards of a number of individual countries and provinces to inform the content, structure and language of the CCSS. In *mathematics*, twelve set of standards were selected to help guide the writing of the standards: Belgium, Canada [Alberta], China, Chinese Taipei, England, Finland, Hong Kong, India, Ireland, Japan, Korea, and Singapore.[i] In *English language arts*, the writing team looked closely at ten sets of standards from Australia (New South Wales and Victoria), Canada (Alberta, British Columbia, and Ontario), England, Finland, Hong Kong, Ireland, and Singapore.[ii]

How were the international benchmarks used to inform the development of the CCSS?

The goal of the international benchmarking in the common core state standards development process was to ensure that the CCSS are as rigorous as comparable standards in the high-performing and other countries. However, the use of international benchmarks as evidence is no easy feat; it is not simply a matter of identifying the "best" source and copying it, or of aggregating all viable sources to find some set of shared expectations. Rather, international benchmarks were used to guide critical decisions in the following areas:

- *Whether particular content should be included:* One of the principal ways international standards were used in this development process was as a guide when making tough decisions about whether content should be included or excluded.
- *When content should be introduced and how that content should progress*: The progression of topics in the international mathematics standards helped the development team make decisions about when to introduce topics in the CCSS as well as when to stop focusing on them.
- *Ensuring focus and coherence*: Standards from other countries tend to be very focused, including only what is absolutely necessary.

- *Organizing and formatting the standards*: Certain organizational aspects or characteristics of international standards that promoted clarity and ease of reading and use served as a model for the CCSS.
- *Determining emphasis on particular topics in standards*: Where emphasis on particular topics was found repeatedly in international standard, this was instructive in determining their importance for inclusion in the CCSS.

* * * * *

When the final version of the K-12 Common Core State Standards is released, it will be accompanied by a discussion of the evidence that was used in their development. In the meantime, the evidence from the September 2009 draft of the College and Career Ready Standards is available: The URL for the ELA document is http://www.corestandards.org/Files/ELAEvidence.pdf, and the URL for the mathematics document is http://www.corestandards.org/Files/MathEvidence.pdf.

[i] Eight of these were high-performers on either TIMSS, PISA or both: Belgium, Canada [Alberta], Chinese Taipei, Finland, Hong Kong, Japan, Korea, and Singapore. England and Ireland, which have uneven performances on international assessments, were included because of their cultural links to the United States. China and India were included because of their growing global competitiveness.

[ii] Differences in language have a greater impact on the teaching and learning of language arts than of mathematics, so the teams looked primarily at English-speaking countries. All were high-performers on PISA except Singapore, which did not participate, and England, which as in mathematics was selected partly for its cultural links to the United States.

State Innovations

Vol. 14, No. 2 National Association of State Boards of Education April 2009

State Assessment Collaboratives: Lessons from the New England Common Assessment Program

With the increasing importance of all students reaching world class standards for college and workplace readiness, collaboration across state lines in standards, assessments, and other areas is one strategy policymakers are approaching with less hesitancy than in the past. However, such efforts are not happening for the first time in today's context. In response to the No Child Left Behind (NCLB) legislation in 2002, New Hampshire, Vermont, Rhode Island, and later Maine, leveraged resources and political will to build a consortium to drive the New England Common Assessment Program (NECAP). The state's commissioners and deputy commissioners of education acknowledged the patchwork nature of tests then current in each of their states would not independently meet the requirements for testing in grades 3-8 specified in NCLB compliance regulations. Joining forces produced efficiencies and an opportunity to create better quality tests for less money. Of particular benefit to the states, the cost savings rendered from shared capacity meant they would not have to default to multiple choice tests.

Additionally, given the regional similarities and shared investment in graduates who often shuffle among New England states, this process also provided a venue to establish collective "must haves" for graduates. Measured Progress, Inc. was contracted as the consortium's assessment developer and the National Center for the Improvement of Educational Assessment, Inc. as the facilitator. As a first step, the states had to reconcile their standards. Common Grade-Level Expectations (GLEs) were determined for mathematics, reading, and writing first for grades 3-8. Later, targets were set for science assessments, and Grade-Span Expectations (GSEs) were created for high school students in grades 9-10 and 11-12 in mathematics, reading, and writing content areas. The states integrated GLEs and GSEs into curriculum frameworks that were subsequently approved by their state boards. By establishing shared standards up front, NECAP has built capacity for cross-state comparisons as well as a powerful shared commitment to prepare New England graduates to meet the needs and demands of the 21st century workforce.

The same states involved in NECAP later joined together as the New England Compact to conduct research funded by the U.S. Department of Education from 2005 to 2007. Their work in this capacity centered on "students in the gaps" in large-scale state assessment systems and explored adaptive technologies for testing. Results from the research clarified that there are multiple groups of students whose abilities and skills are not fairly or accurately reflected on large-scale, state-wide assessments. These include students who achieve at grade level in classroom assignments but significantly below on state tests, as well as students who perform significantly below grade level in both classwork and state test measures of achievement. The research began exploring possible uses of technology to support students through computer-automated read alouds, single-screen presentations of reading passages, and word processor editing functions. In sum, the work with Reaching Students in the Gaps and the Enhanced Assessment Project showed promise for the use of technology in adaptive assessment, while also drawing attention to the impact of quality classroom instruction on proficiency.

Perhaps equal in value to the research contributions and testing materials generated by these two major efforts is the human capital contained within the four states. Despite transitions in leadership, the shared work continues. This continuity speaks volumes to the issues of capacity that are often substantial barriers, and emphasizes how a tradition of speaking across state lines has long-term institutional value. Indeed, at the end of last year, in the context of bringing attention to the drop-out crisis and high school reform, the Nellie Mae Education Foundation and the Bill and Melinda Gates Foundation announced they would be providing financial support to the New England Secondary School Consortium With coordination and organizational support from the Great Schools Partnership, the New England SSC has set a mission of ensuring "that by 2016 every public high school student in the four partner states will receive an education that will prepare them for college, career, and civic responsibility in the interconnected global community of the 21st century." Efforts around this goal are speeding up, particularly in the context of the stimulus, and the states remain open to expanding the consortium.

Issues to Consider

While NECAP is often regarded as the best example of an assessment/accountability consortium to date, this work was

neither clean nor easy. Dr. Stuart Kahl, CEO of Measured Progress, Inc., is NECAP's assessment developer. Based on his experiences, he urges states to consider the following issues before building or joining a consortium around testing:

- *Timing*: This work takes significant quantities of time and is not a one-time commitment. States that are not scheduled to revise standards may have to make significant changes to their workscope calendars to begin such work. Once engaged in a collaborative, before the clock for assessment development can even start, states have to agree on testing windows and shared standards. In Maine's case, while the state was part of the GLE effort, its commitment to NECAP came later. Maine's delay was attributed to passing the legislation necessary to enable implementation of the fall testing schedule followed by the rest of the collaborative.

- *Shared Values and Proximity:* Several similarities among the NECAP states illustrate why this regional collaborative has been more successful than it may have been with a grouping of four different states. They share similar budgetary, resource, and capacity obstacles that helped draw them into collaborative work. Moreover, they hold similar priorities for assessment: they all value constructed responses, challenging tests, and high standards enforced by rigorous cut scores. Regional proximity also allowed NECAP members to readily conduct face-to-face meetings. On the development end, the common geography also allowed for the use of "regionally flavored" content (e.g. reading passages on cold weather as opposed to hurricanes) which can boost student engagement and motivation during testing.

- *Strong Leadership:* "Don't start telling me what the barriers are, because we are going to do this." According to Dr. Kahl, this sentiment expressed by Rhode Island Commissioner Peter McWalters in the early stages was pivotal to the success of the group. The nature of compromise in consortiums is both tricky and critical. In order for the people who will be implementing an assessment system to buy in to a new strategy, strong commitment to a unilateral approach must be solidified at the top. This is not to say that quality should be sacrificed to a least common denominator of agreement, Kahl said. But there has to be some degree of coercion in support of a mission to avoid expending too much energy on the small fraction of disagreement that may surface among states' perspectives.

- *External Management:* Contracting with a program manager outside of the states and assessment developer is another step in building a successful consortium. An independent facilitator offers logistical support in terms of planning and chairing meetings, as well as serving as a mediator and ensuring that one vision is conveyed to the test contractor.

- *Identical Standards and Tests:* Efficiencies are not a certain result of forming consortia. If states do not accept *identical* standards and the same tests, the payoffs in production and scoring are lost. While a shared test significantly lowers printing and scoring expenses, allowing every state to augment unique pieces of the test substantially detracts from benefits in cost and comparability.

- *Cost Sharing Formulas:* Establishing how states will pay for the various expenditures associated with building assessments is an important step in the planning process. Since states differ in size, a hybrid formula is typically needed. In such an arrangement, states share fixed costs such as those for development and divide variable costs such as shipping and scoring according to number of pupils being tested in each state.

- *Standards and Assessments Will Not Do It All:* While the benefits can be significant, there are two cautions states should acknowledge. First, common standards do not allow for comparability in state test results unless the same test is also administered. Second, the disparity between student performance in the United States and Singapore, which uses U.S.- created standards, is a testament to the reality that standards do not guarantee improvements. Performance growth takes place at the classroom level.

For More Information

More information about the consortium is available on each state education department's NECAP webpage at:

New Hampshire: www.ed.state.nh.us/education/doe/organization/curriculum/NECAP/NECAP.htm;

Rhode Island: www.ride.ri.gov/assessment/NECAP.aspx;

Vermont: www.education.vermont.gov/new/html/pgm_assessment/necap.html; and

Maine: www.maine.gov/education/lsalt/necap/.

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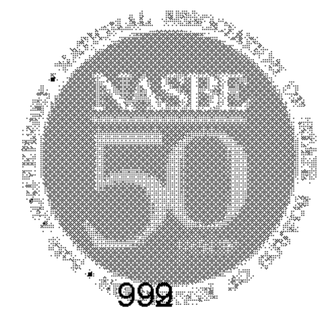

MOU for a State Consortium Developing Balanced Assessments of the Common Core Standards

This Non-Binding Memorandum of Understanding ("MOU") is entered into by and between the Balanced Assessment Consortium and New Hampshire. The purpose of this agreement is to establish a framework of collaboration for states in supporting assessment of the common core standards. The agreement also articulates tasks in support of a Multi-State Consortium in its implementation of an approved Standards and Assessment Section of a Race to the Top grant. The MOU outlines a set of working principles, the roles of states and local districts within the consortium, and a set of tasks that the Consortium would undertake.

Working Principles

A consortium of states developing a balanced assessment system for evaluating the common core standards would start with working principles derived from an examination of successful state systems in the U.S. and high-achieving systems internationally. For example:

1) **Assessments are grounded in a thoughtful, standards-based curriculum and are managed as part of a tightly integrated system of standards, curriculum, assessment, instruction, and teacher development**.

- Curriculum guidance is lean, clear, and focused on what students should know and be able to *do* as a result of their learning experiences. Assessment expectations are described in the curriculum frameworks or course syllabi and are exemplified by samples of student work.
- Curriculum and assessments are organized around a well-defined set of learning progressions within subject areas. These guide teaching decisions, classroom-based assessment, and external assessment.
- Teachers and other curriculum experts are involved in developing curriculum and assessments which guide professional learning and teaching. Thus, everything that comes to schools is well-aligned and pulling in the same direction.

2) **Assessments elicit evidence of actual student performance on challenging tasks that prepare students for the demands of college and career in the 21st century.** Curriculum and assessments seek to teach and evaluate a broad array of skills and competencies that generalize to higher education and work settings. They emphasize deep knowledge of core concepts within and across the disciplines, including problem solving, analysis, synthesis, and critical thinking, and include essays and open-ended tasks and problems, as well as selected response items.

3) **Teachers are involved in the development of curriculum and the development and scoring of assessments**. Scoring processes are moderated to ensure consistency and to enable teachers to deeply understand the standards and to develop stronger curriculum and instruction leading to greater student proficiency. The moderated scoring process is a strong professional learning experience that helps drive the instructional improvements that enable student learning, as teachers become more skilled at their own assessment practices and their development of curriculum to teach the standards. The assessment systems are designed to increase the capacity of teachers to prepare students for the contemporary demands of college and career.

4) **Assessments are structured to <u>continuously improve teaching and learning</u>**. Assessment *as*, *of*, and *for* learning is enabled by several features of assessment systems:

- The use of school-based, curriculum-embedded assessments provides teachers with models of good curriculum and assessment practice, enhances curriculum equity within and across schools, and allows teachers to see and evaluate student learning in ways that can feed back into instructional and curriculum decisions.

- Close examination of student work and moderated teacher scoring of both school-based components and externally developed open-ended examinations are sources of ongoing professional development that improve teaching.

- Developing both school-based and external assessments around learning progressions allows teachers to see where students are on multiple dimensions of learning and to strategically support their progress.

5) Assessment and accountability systems are designed to <u>improve the quality of learning and schooling.</u> Assessments aim to encourage and support the learning of ambitious intellectual skills in the way they are designed and used for informing teaching, learning, and schooling. Accountability systems publicly report outcomes and take these into account, along with other indicators of school performance, in a well-designed system focused on continual improvement for schools.

6) Assessment and accountability systems <u>use multiple measures</u> to evaluate students and schools.

Multiple measures of learning and performance are used to evaluate skills and knowledge. Students engage in a variety of tasks and tests that are both curriculum-embedded and on-demand, providing many ways to demonstrate and evaluate their learning. These are combined in reporting systems at the school and beyond the school level. School reporting and accountability are also based on multiple measures. Assessment data are combined with other information about schools' resources, capacities, practices, and outcomes to design intensive professional development supports and interventions that improve school performance.

7) <u>New technologies enable greater assessment quality</u> and information systems that support accountability.

New technologies enhance and transform the way the assessment process is developed, delivered, and used, providing adaptive tools and access to information resources for students to demonstrate their learning, and providing appropriate feedback by supporting both teacher scoring and computer-based scoring (now possible for both selected response and some forms of constructed-response items). By using technology to reduce costs for delivery of more open-ended assessment formats, scoring, and reporting, resources can be redirected to improvements in assessment quality.

Technology also organizes data about student learning, enhancing system accountability for instruction and reporting by providing more efficient, accurate, and timely information to teachers, parents, administrators, and policymakers. Technology helps to integrate information at as part of longitudinal data systems, contributing to a rich profile of accomplishment for every student.

<u>State and Local Roles within a Consortium</u>

States working within the Consortium would:

- Adopt and augment the Common Core standards as appropriate to their context.

- Create and deploy curriculum frameworks that address the standards—drawing on exemplars and tested curriculum models.
- Build and manage an assessment system that includes both on-demand and curriculum-embedded assessments that evaluate the full range of standards and allow evaluation of student progress. The Consortium may develop both joint assessments (commonly implemented by states) as well as other assessment tasks and items linked to the standards (and grounded in curriculum units) that can be incorporated into states' individual assessment plans for formative or summative purposes.
- Develop rubrics that embody the standards, and clear examples of good work, benchmarked to performance standards.
- Create oversight / moderation / audit systems for ensuring the comparability of locally managed and scored assessment components.
- Ensure that teacher and leader education and development infuse knowledge of learning, curriculum, and assessment.
- Implement high-quality professional learning focused on examination of student work, curriculum and assessment development, and moderated scoring.

Districts and schools would:

- Examine the standards and evaluate current curriculum, assessment, and instructional practice in light of the standards.
- Evaluate state curriculum guidance, and further develop and adapt curriculum to support local student learning, select and augment curriculum materials, and continually evaluate and revise curriculum in light of student learning outcomes.
- Incorporate formative assessments into the curriculum, organized around the standards, curriculum, and learning sequences to inform teaching and student learning.
- Participate in administering and scoring relevant portions of the on-demand and curriculum-embedded components of the assessment system, and examining student work and outcomes.
- Help design and engage in professional development around learning, teaching, curriculum, & assessment.
- Engage in review and moderation processes to examine assessments and student work, within and beyond the school.

Tasks the Consortium Would Undertake

The consortium of states would build on successful efforts already launched in a number of states, seeking to integrate the best knowledge and exemplars from existing efforts, so as to use resources efficiently, take advantage of well-tested approaches, and avoid reinventing the wheel. It would bring together leading curriculum and assessment experts to advise and support efforts to create a system for evaluating the Common Core, building on the most credible and well-vetted knowledge available in the field. With these supports, the Consortium could:

1. Support the Development of Curriculum Frameworks: When the Common Core standards have been released, vetted, and adopted, consortia of states would work with curriculum and assessment experts to develop (or adapt from previously successful work) curriculum frameworks, syllabi, and other materials mapped to the standards. There has been enormous investment in the United States in high-quality curriculum, for example through NSF and other

organizations at the national level, and in many states and districts. Other English-speaking nations have also developed high quality curriculum materials linked to standards and learning progressions that could be evaluated in this process. This effort would inventory and cull from efforts with a strong evidence base of success to support states in building out curriculum frameworks around which they can organize deeper curriculum development at the local level, state and local assessment development, instructional supports, and professional development.

2. Create a Digital Curriculum and Assessment Library: The results of this effort should ultimately be made available on-line in a digital platform that offers materials for curriculum building and, eventually, model syllabi for specific courses linked to the standards, formative and summative assessment tasks and instruments linked to the curriculum materials, and materials for training teachers and school leaders in both strategies for teaching specific curriculum concepts / units and assessment development and scoring. In addition, as described below, an electronic scoring platform supporting training, calibrating, benchmarking, and reporting would be developed and made available across the states.

3. Develop State and Local Assessments: The state consortium would work to create a **common reference examination, which includes selected-response, constructed response and performance components** aimed at higher-order skills, linked to the Common Core standards for grades 3-8, like the NECAP assessment recently developed by a set of New England states. This assessment would be designed to incorporate more rigorous and analytic multiple-choice and open-ended items than many tests currently include and would include strategically selected curriculum-embedded performance assessments at the classroom level that can be part of the summative evaluation, while also providing formative information.

These curriculum-embedded components would be developed around core concepts or major skills that are particularly salient in evaluating students' progress in English language arts and mathematics. (Eventually, work on science could be included.) Exemplars to evaluate and build upon are already available in many states and in nations like England that have developed a set of "tests and tasks" for use in classrooms that help teachers evaluate students' learning in relation to well-described learning progressions in reading, writing, mathematics, and other subjects.

Curriculum-embedded components would link to the skills evaluated in the "on-demand" test, allowing for more ambitious tasks that take more time and require more student effort than can be allocated in a 2 or 3-hour test on a single day; these components would evaluate skills in ways that expect more student-initiated planning, management of information and ideas, interaction with other materials and people, and production of more extended responses that reveal additional abilities of students (oral presentations, exhibitions, and product development, as well as written responses) that are associated with college and career success.

In the context of summative assessments, curriculum-embedded tasks would be standardized, scored in moderated fashion, and scores would be aggregated up to count as part of the external assessment. Curriculum-embedded assessments would also include marker tasks that are designed to be used formatively to check for essential understandings and to give teachers useful information and feedback as part of ongoing instruction. Thoughtful curriculum guidance would outline the scaffolding and formative assessment needed to prepare students to succeed on the summative assessments.

All components of the system would incorporate **principles of universal design** that seek to remove construct-irrelevant aspects of tasks that could increase barriers for non-native English speakers and students with other specific learning needs. In addition, designers who are skilled at developing linguistically supportive assessments and tests for students with learning disabilities would be engaged from the beginning in considering how to develop the assessments for maximum access, as well as how to design appropriate accommodations and modifications to enable as many students as possible to be validly assessed within the system.

The emphasis on evaluating **student growth over time** and on tying standards to a conception of learning progressions should encourage a growth oriented frame for both the "on-demand" examination and the more extended classroom assessments. The Consortium may consider the viability of incorporating computer-based adaptive testing that creates vertically scaled assessments based on the full range of learning progressions in ELA and math. This would allow students to be evaluated in ways that give greater information about their abilities and their growth over time. This approach would not preclude the evaluation of grade-level standards, which could be part of any students' assessment, nor would it preclude a significant number of constructed response, open-ended items, as the technology for machine-scoring structured open-ended items is now fairly well-developed. Strategic use of partial teacher scoring for these items would also be a desirable element of the system to support teachers' understanding of the standards and assessments, and their planning for instruction.

The emphasis on evaluating student growth should also inform the development of the curriculum-embedded elements of the system, which should be selected or developed to strategically evaluate students' progress along the learning continuum. Centrally developed tasks administered and scored by teachers with moderation (see below), using common rubrics, would be part of the set of reported scores. In states with experience and capacity, it may be possible to begin to incorporate information about student learning that teachers develop from their own classroom evidence, linked to the standards and learning progressions and guided by the curriculum frameworks. This could be an optional aspect of the Consortium's work for states and communities with interest and capacity.

At the **high school level**, the Consortium might explore one or both of two options for assessment:

- **Course- or syllabus-based systems** like those in England, Australia, Singapore, Hong Kong, Alberta (Canada), as well as the International Baccalaureate. Generally conceptualized as end-of-course-exams in this country, this approach should become a more comprehensive course assessment approach like that pursued in these other countries. Such an approach would include within-course performance assessments that count toward the examination score, as well as high-quality assessment end-of-course components that feature constructed response as well as selected response items. Within-course performance assessments would tap central modes of inquiry in the disciplines, ensuring that students have the opportunity to engage in scientific investigations, literary analyses and other genres of writing, speaking and listening; mathematical modeling and applications; social scientific research. Such an approach might require an ELA and math assessment at a key juncture that evaluates an appropriate benchmark level for high school standards, and then, as in high-achieving nations, allow for pursuit of other courses/ assessments that are selected by students

according to their interests and expertise. These could serve as additional information on the diploma for colleges and employers.

- **Standards-driven systems** that might include a more comprehensive benchmark assessment in ELA and mathematics complemented by collections of evidence that demonstrate students' abilities to meet certain standards within and across the disciplines. This set of assessments would allow more curriculum flexibility in how to meet the standards. Systems like these are used in some provinces in Canada and Australia, in states like Rhode Island, Wyoming, Nebraska, and New Hampshire, and in systems of schools like the New York Performance Standards Consortium, the Asia Society, and Envision Schools. Sometimes these sets of evidence are organized into structured portfolios, such as the Technology portfolio in New Hampshire and the broader Graduation portfolios in these sets of schools that require specific tasks in each content area, scored with common rubrics and moderation.

- **A mixed model** could combine elements of both course- and standards-driven models, allowing some demonstrations of proficiency to occur in any one of a range of courses (rather than a single, predetermined course) or even outside the bounds of a course, like the efforts by some states to allow students to pass courses via demonstrations of competence rather than seat time (e.g. NH, OH). Such a system could also include specific components intended to develop and display research and inquiry skills that might also be interdisciplinary, such as the Project Work requirements in England, Singapore, and the International Baccalaurate, and the Senior Project requirements in Pennsylvania and Ohio.

4. Develop Moderation and Auditing Systems for Teacher-Scored Work: The consortium would develop protocols for managing moderation and auditing systems and training scorers so as to enable comparable, consistent scoring of performance assessments. In other nations' and states' systems that include these features routinely, procedures have been developed to ensure both widespread teacher involvement – often as part of professional development time – and to create common standards and high levels of reliability in evaluating student work. A range of models are possible, and the consortium would serve as a resource to individual states in developing and implementing strong, efficient approaches.

5. Develop Technology to Support the Assessment System: Technology should be used to enhance these assessments in a number of ways: by delivering the assessments; in on-line tasks of higher-order abilities, allowing students to search for information or manipulate variables and tracking information about the students' problem-solving processes; in some cases, scoring the results or delivering the responses to trained scorers / teachers to assess from an electronic platform. Such a platform may also support training and calibration of scorers and moderation of scores, as well as efficient aggregation of results in ways that support reporting and research about the responses. This use of technology is already being used in the International Baccalaureate assessment system, which includes both on-demand and classroom-based components.

In order to gain the efficiency and cost benefits of machine scoring and the teaching and learning benefits of teachers' moderated scoring, a mixed system could be developed where computer-based scoring is incorporated on constructed response tasks where useful – though teachers would score some of these tasks for anchoring and learning purposes – while other tasks that require human scoring engage most teachers in scoring to support improvements in instruction.

RESPONSIBILITIES OF ALL SEAs PARTICIPATING IN THE CONSORTIUM

1) Each participating SEA in the Consortium will appoint a key contact person.

2) These key contacts from each State will maintain frequent communication with the parties administering the Balanced Assessment Consortium to facilitate cooperation under this MOU.

3) Participating SEA grant personnel will work together to determine appropriate timelines for project updates and status reports throughout the whole grant period.

This Non-binding Memorandum of Understanding shall be effective beginning with the date of the last signature hereon:

SEA Superintendent/- Participating State Chief/Commissioner (or equivalent authorized signatory)

	January 7, 2010
Signature	Date
Virginia Barry	Commissioner of Education
Print Name	Title

Please email this signed page to

Tammy Morrill
Tammy.Morrill@maine.gov

****PLEASE email this signed page only by January 7, 2010****

Consortium for Balanced and Comprehensive Assessment

Member States

Alabama
Arizona
Arkansas
California
Connecticut
Delaware
Illinois
Indiana
Kansas
Kentucky
Maine
Maryland
Massachusetts
Michigan
Mississippi
Missouri
Montana
New Hampshire
New Jersey
North Dakota
Ohio
Pennsylvania
Rhode Island
South Carolina
South Dakota
Utah
Washington, D.C.
West Virginia
Wisconsin
Wyoming

The New England Common Assessment Program: Notes on the Collaboration Among Four New England States

compiled by Charles A. DePascale
Center for Assessment (NCIEA)

on behalf of the NECAP states:
Maine, New Hampshire, Rhode Island, and Vermont

November 2009

Educational and economic factors have intersected to make the concept of collaboration among states to produce common standards and common assessments a high-profile topic at the national level as well as at the regional level. Eight years into No Child Left Behind, there is a growing belief that the disparity in performance across states (i.e., percentage of proficient students) can best be addressed through common standards and common assessments. Current economic conditions combined with concerns about international competitiveness in a global economy also make common standards and common assessments attractive approaches to save money in the short-term and produce students better prepared to compete globally in the long-term.

Recent frenetic activity at the national and federal levels, particularly with regard to the Common Core State Standards Initiative (CCSSI) sponsored by CCSSO and NGA, the USED $350 million Race to the Top assessment grant, and the possible interrelationship between those two projects have raised interest in issues related to cross-state collaboration and assessment consortia to a new level.

Currently, four New England states Maine, New Hampshire, Rhode Island, and Vermont serve as a national model of the positive potential of collaboration among states. The high-profile New England Common Assessment Program (NECAP) has drawn national interest since its inception in 2004. The success of Rhode Island, New Hampshire, and Vermont on the recently released NAEP 2009 Mathematics tests is being touted as evidence of the efficacy of and need for common standards and assessments.

Introduction: Desperation, Innovation, Collaboration

The relationship among desperation, innovation, and collaboration is well-established, and cannot be underestimated in the case of the collaboration among states that has resulted in the New England Common Assessment Program. In 2001, states were faced with increasing their statewide testing programs from three grades to seven grades to meet the requirements of impending No Child Left Behind Act (NCLB). New Hampshire, Rhode Island, and Vermont concluded that it would be impossible for them to maintain the type of state assessment program they desired across seven grade levels.

Like many states, during the 1990s New Hampshire, Rhode Island, and Vermont implemented state assessment programs that went beyond traditional, norm-referenced, standardized, multiple-choice tests. Rhode Island and Vermont adopted the standards

and assessments of the New Standards Project as their state assessment. Although perhaps falling short of the project's original goals, the New Standards exams available in 2002 still included broad-based tasks designed to measure problem solving and other high level skills. The states were also involved in landmark efforts in portfolio assessment and direct writing assessment. In the early 1990s, New Hampshire began development of the New Hampshire Educational Improvement and Assessment Program (NHEIAP) which included a custom-developed state assessment at grades 3, 6, and 10. In addition to constructed-response items, the NHEIAP tests also included innovations such as a video-based listening test.

Even with additional federal funding provided under NCLB, the states were left with two options in 2002-2003:

1. Switch to primarily multiple-choice tests that were commercially available.
2. Explore options for collaboration with other states that would allow them to continue to offer the type of assessments they valued.

Developing and administering custom state assessments as individual states was not an option. With no attractive, alternative options available the will to succeed and the commitment to make the collaboration work was strong within each of the states.

It is worth noting that New Hampshire, Rhode Island, and Vermont were not alone in initial discussion regarding a collaborative effort among New England states. Preliminary discussions included all six New England states. Connecticut and Massachusetts, with custom state assessment programs and the ability to scale to seven grades to meet NCLB requirements were not in the same position as New Hampshire, Rhode Island, and Vermont and quickly left the conversation. Maine remained in the conversation through the initial development of common content standards but left the discussion of common assessments in an attempt to preserve the well-established Maine Educational Assessment (MEA) at grades 4, 8, and 11. After several cost-saving adjustments to the MEA across five years, Maine ultimately was faced with the same "multiple-choice or collaboration" decision as the other states. In November 2008, Maine became the fourth partner state participating in the New England Common Assessment Program.

Level of Collaboration, Control, and Commitment

After deciding to collaborate on a common assessment, the states were faced with a series of decisions regarding the level of collaboration that they intended, the amount of control they expected to exercise with regard to the development and administration of the common assessment, and the level of commitment each partner state would make to the consortium. The initial meetings among the states to discuss and resolve these issues played a major role in defining the partnership and establishing the principles that have guided the operation of the consortium during the last six years. The investment of start-up time is essential to building clear expectations, common language, strong lines of communication, and partner trust, as well as indentifying the differing strengths among the states that can be used to meet the needs of the consortium as a whole.

Level of Collaboration

Having agreed to collaborate on a common assessment program, the states had to define what was and what was not included in that program – what's on the table. At an initial meeting, the states decided that their accountability systems and alternate assessment programs (AA-AAS) would not be included in the collaboration. It was also decided that this collaboration would not impinge on individual data warehouse projects that each state had already started. In part, this decision reflected and respected the differences in approaches and philosophies the states had in these areas (e.g., percent proficient v. proficiency index as the basis for accountability, level of emphasis on progress v. status on the alternate assessment). In part, however, the decision also reflected recognition on the part of the states of the need to limit their task to areas directly related to producing a series of operational tests for the 2005-2006 school year. In that same spirit, the states decided to delay collaboration on a common high school assessment and to defer a decision on collaboration on a common science assessment[1]. The consortium agreed that the initial collaborative assessment effort would be limited to grade 3 through 8 tests in reading, mathematics, and writing (grades 5 and 8) – not coincidentally, the areas in which the states' collaborative development and dissemination of common content standards was well underway.

At this point in the process, the states also reached agreement on what would be *common* in their common assessment program. Prior to often intense discussions surrounding specific details, it was not always clear which aspects of the program needed to be common, which components it was desirable to have in common, and which could be kept unique across the states. Critical, high-level, components that would be common among the states included:

- All test materials (e.g., test booklets, answer documents, manuals) would be common and would include the program name rather than individual state names.
- There would be a single set of achievement standards across the states.
- There would be common administration procedures across the states.
- There would be a common policy on the use of accommodations and a single table of allowable standard test accommodations[2].
- There would be a single set of reports – although compromise led to an expansion of what is included in the single set of reports and variation in the emphasis/use of the particular reports across the partner states.

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[1] Development of common high school standards began immediately and a common high school assessment was administered operationally during the 2007-2008 school year. Joint meetings among the states' science specialists to review existing content standards also led to the decision to collaborate on a common assessment program at grades 4, 8, and 11 that also had its first operational administration during the 2007-2008 school year.

[2] Within the common table of Standard Test Accommodations, there was an option for schools to request state DOE approval for accommodations not included on the list. Approval of these requests was granted at the state level with the understanding that state decisions would not contradict consortium policy explicitly or implicitly expressed through the table of Standard Test Accommodations.

- There would be a common administration period – although the period became slightly expanded to accommodate the variety of locally observed holidays, teacher workshop days, etc. across the three states.

There was also agreement on some key components regarding the program that would not be common:

- Although there would be a single contractor, there would be individual contracts with each state rather than a single contract across states[3].
- Although all technical analyses such as item calibration, scaling, equating, standard setting would be conducted with data combined across the states, there would be no reporting of combined NECAP results. Results would only be reported at the individual state level.
- The purpose of the program was not to make comparisons across states, and there would be no reports directly comparing the results across states.
- The release of results would be handled individually by each state.

Finally, there was also agreement on the general principle that the states would continue to work together to keep as much common across the consortium as possible.

Level of Control

A key decision that the states had to make as a consortium was the level of ownership and control that they wished to have over the design, development, and implementation of the common assessment program. Rhode Island and Vermont were part of the New Standard Project – a collaborative in which they were involved in some aspects of the development of the tests but exerted little direct control over the program and did not own the assessments. New Hampshire had a custom-developed state assessment in which working with their assessment contractor they were deeply involved in almost all aspects of the program and owned all materials developed for the program.

The states determined that for the purposes of this assessment program they would be working with an assessment contractor to design, develop, and administer a set of custom assessments that would be jointly owned by the states[4]. In many respects, the program would operate in the same manner as a single state implementing a custom state assessment. It should be noted that the size of the consortium, the states, and departments of education in this collaborative played a role in the execution of this decision. With the consortium consisting of three (and now four) small states with small numbers of assessment staff within each state the size of the program and the total number of state staff involved in the process was comparable to some single-state assessment efforts. The physical proximity of the consortium states and the contractor also played a key role in the execution of this decision.

[3] The task of determining how to enter into a single multi-state contract was too daunting and time-consuming for the New England consortium.
[4] Like many aspects of this consortium, a legal definition of joint ownership has not been established.

Level of Commitment

From the very beginning of the collaboration, the states had to make a decision on the level of commitment that they were willing to make to the project. Beyond their commitment to the success of the project, this decision involved the commitment of staff time and related resources to the ongoing operation of the project. As discussed in the previous sections, the decision to form a consortium and collaborate on a common assessment program can require various levels of effort and responsibility on the part of the partner states.

The states determined that the assessment and content staff from each of the consortium states would be fully involved in the administration of the New England Common Assessment Program – consistent with their decision to treat this project as a custom state assessment. This decision required the ongoing involvement of the state assessment directors in the management of NECAP and the ongoing involvement of the state content specialists in the test development process throughout the test development cycle. From the beginning, this decision placed additional, significant burdens on the state staff in terms of the time and effort needed to reach agreement with their counterparts in other states as well as the additional physical demands of meeting with counterparts in departments across states rather than across offices within a department.

Although cost was a key factor influencing the states decision to collaborate to attain the quality assessments that they desired, available staff resources was also a critical factor. With their existing staff, it was not feasible for the states to consider developing the type of custom assessments that they desired at grades 3 through 8 and high school in reading and mathematics – as well as additional assessments in writing and science. There was an expectation that collaboration across states would lead to an overall increase in the number of state staff available to participate in the process, and that the act of working together with colleagues from other states to discuss issues related to the assessment development would result in a better product than could be produced by a single state even with the same number of staff (i.e., the whole is greater than the sum of its parts). For the collaboration to achieve this expectation and be maximally effective, however, a division of labor among states is essential. This division of labor (e.g., allowing other states to take the lead on particular tasks), however, requires a fair degree of trust among participants that can only be developed over time and fostered through careful planning, facilitation, and the development of a common understanding of which aspects of the project require full review and approval by all states.

Layers of Support

One lesson learned through the initial work on the development of common standards, subsequent work over the last six years on the common assessment program, and additional collaborative efforts that have emerged during that period (e.g., Enhanced Assessment Grants, WIDA, secondary school reform/restructuring efforts) is that layers of support from within and outside of the departments of education are needed to make the project successful. Within each state, support from the legislature, governor's office, board of education, commissioner, and critical units within the Department of Education is needed to implement a collaborative project that requires giving up some local control

and policies and practices in support of the common goals. Maintaining bottom-up design principles and local involvement/buy-in a regional, collaborative effort that by its nature tends to favor a top-down rather than bottom-up approach also requires tremendous support. Finally, finding the appropriate external partners to support each phase of the projects has been a critical factor in their success. In addition to specific content expertise, the importance of external support in organizing, facilitating, and negotiating among the partner states cannot be underestimated.

As a matter of best practice, and as required by law, state boards of education (and to some extent legislatures and Governors) are directly involved in the adoption of state content and achievement standards as well as in policy shaping the design, purposes, and uses of the state assessment. In a collaborative program such as NECAP, those groups must join the assessment staff from the Department of Education in their willingness to cede some degree of individual control over issues such as the development of achievement standards and the establishment of cut scores on the individual tests. Although there are real and perceived benefits of collaboration that are readily obvious to policy makers within each state, it is necessary to devote sufficient time and resources to developing an understanding of the impact of collaboration on local control. The policy makers also have an understanding of smaller issues such as the need to remain supportive of cross-state efforts at times when out-of-state travel is curtailed or eliminated as a routine cost-savings measure in an historically insular economic and political environment such as a state.

At least as important as the commitment to the project of state policy makers is the support, buy-in, and participation of local educators and other stakeholders in the project. One of the key lessons learned during the last two decades of development and implementation of high quality content standards and standards-based assessments is that local educators are critical to the successful implementation of standards and assessments. The importance of significant stakeholder involvement in development and implementation of content standards and the importance of efforts to disseminate those content standards have been documented across states. With regard to assessment, each of the partner states involved in NECAP has long histories of teacher participation in the assessment program through membership on committees, participation in scoring institutes, and related professional development activities. The level of understanding and acceptance of the assessment program that results from these efforts is substantial.

Participation in a consortium limits the availability and feasibility of many traditional opportunities for teacher involvement in the assessment process. For example, at the state level item review committees often involve the participation of 20-25 teachers per committee. With multiple committees and teachers participating on a rotating basis, several hundred teachers and schools across the state are directly participating in the assessment program within a relatively short period of time. Scoring institutes in which teachers participate in the operational scoring of assessments has been another common activity in some of the states – particularly in the case of the writing assessment. Operating within a consortium, however, given that the number and size of the committees cannot simply be increased, the number of participants per state must be

reduced[5]. Consequently, the number of educators actively participating in the assessment program within a year and across years is reduced, and the exposure and understanding of the program across the state is diminished. It then becomes necessary for the states to develop and offer other avenues for local educators to participate in the assessment.

Managing the Collaboration

Another lesson learned through the last eight years is that although collaboration among several New England states to develop a custom common assessment program has many benefits, the mere consideration of collaboration is a process that requires planning, organization, and a great commitment from each of the partner states. Further, the shift from a conceptual discussion of collaboration to an operational implementation of a program such as NECAP requires an exponential increase in planning, organization, and commitment along with the additional element of compromise. To a large extent, the success or failure of a multi-state collaborative is dependent on the up-front decision that are made on how the project will govern itself and the processes and procedures that are established to manage the project. From their initial efforts in the development of common standards through their shared management of NECAP, the partner states in the consortium have incorporated external support from organizations such as Education Development Center, Inc. (EDC) and the Center for Assessment (NCIEA) into the management of the consortium.

During the process of developing the initial assessment RFP, the states determined that it would be necessary for them to have someone serving in a program management role to coordinate the efforts of the states. The primary function of this person would be to coordinate the efforts among the states and to serve as a liaison between the states and their assessment contractor. Note that this is different from the project management role served by staff of the assessment contractor. A key part of the states' program management effort is reaching consensus on major program issues before placing demands on the assessment contractor. The states considered multiple options for this management function including a) on a rotating basis, assigning a single state assessment director or staff person as project director for a specified period, and b) hiring a permanent employee as consortium project director through one of the state departments of education, before deciding to contract with an external organization to provide management services in support of the consortium.

As the process of designing, developing, and implementing a common assessment program began, it quickly became clear that several procedural and governance decisions would have to be made. One of the first decisions was whether the consortium would exist as a separate legal entity or as loosely coupled association of individual state departments of education working together for a common purpose. Having decided to move ahead as an informal federation of states committed to the success of a common assessment project, the consortium states had to make a series of key procedural decisions that would shape the consortium, including:

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[5] As the size of the consortium increases, participation on some committees may be limited to state department staff or a single local educator.

- Will there be some decisions that require unanimous agreement and others based on majority opinion?
- On issues where there is not a clear consensus among the states, how will each state have an equal vote in making the decision or will voting be proportional based on a factor such as K-12 enrollment? Although New Hampshire has twice as many students as Vermont, the relatively small and similar size of each of the states helped make the desired solution of one state/one vote feasible. That decision may have been more difficult with the addition of a state such as Massachusetts where the combined K-12 enrollment of the four NECAP states is only 70 percent of the K-12 enrollment of Massachusetts or a state such as California with a K-12 enrollment more than10 times greater than the combined K-12 enrollment of the NECAP states.
- How will fiscal and contractual requirements be handled? Which costs will be shared equally and which costs will be divided proportionally?

Summary

Beyond the formal procedures and rules established for governance, however, the operation of the consortium has been based on a shared sense of purpose of coming together toward a common cause and a sense of trust that an individual state's willingness to compromise on one issue will be met by a similar willingness by the other states on subsequent issues – without the need for formal quid pro quo agreements among all of the states, or worse yet, subgroups of states. There has also been an understanding of the importance of not requiring each state to abandon all of its unique practices and traditions. Of course, there have been cases where different opinions or philosophies of assessment, instruction, or a particular discipline, in general, make it clear that a debate on an issue is not going to end with a clear consensus. For those cases, norms have been established to end debates and either make a decision or, in the case of content committees, defer a decision to the management team.

The discussion presented in this document has focused almost exclusively on the role of the states in the operation of an assessment consortium. Before concluding, it is important to note that the assessment contractor(s) working with the consortium also play a critical role in determining the success or failure of the consortium. The contractor must be strong and flexible enough to engage in the work of the consortium with an understanding of which areas of the assessment program require complete uniformity across states and those areas in which the consortium might be strengthened by slight variations across states that do not damage the quality of the product or impact the overall cost of the project. It can require a substantially different set of skills to function as a general contractor serving multiple states on a common project than to function as a vendor selling the same product to multiple, individual states.

As a final point, it is also important to note that the experiences of the states in the management and operation of NECAP are shaped by the particular context of that assessment – that is, the NCLB requirements, size of the program, physical proximity of the states, etc. The NECAP states are also active participants in the WIDA consortium and administer the ACCESS for ELLs tests of English language proficiency. The

management and operation of that consortium has some similarities to and some differences from the NECAP consortium that are better suited to its context. It would be a mistake to conclude that all consortia must operate in a similar manner or that a state cannot effectively participate in multiple consortia.

No Appendix for Section C

Appendix D
Table of Contents

Attachment Title	Relevant Selection Criterion	Page #
D1 – List of Critical Shortage Areas	D (1)(iii) Areas of teachers and principal critical shortage	
D2 - The Framework for Teaching; The Skillful Teacher	D (2)(ii) Design and implement evaluation systems for teachers	
D3 – Educational Leadership Policy Standards: ISLLC 2008	D (2)(ii) Design and implement evaluation systems for teachers	
D4 - Brief Summaries of Teacher Evaluation Methods	D (2)(ii) Design and implement evaluation systems for teachers	
D5 – Matching Measures to Specific Purposes	D (2)(ii) Design and implement evaluation systems for teachers	

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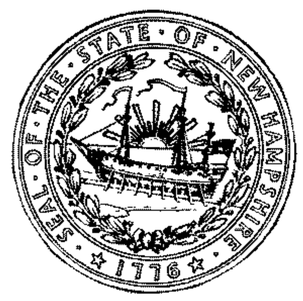

STATE OF NEW HAMPSHIRE
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TO: Superintendents and Other Interested Parties

FROM: Dr. Judith D. Fillion, Director, Division of Program Support
Dr. Denise B. Littlefield, Administrator, Bureau of Credentialing

DATE: November 19, 2009

SUBJECT: ***CRITICAL SHORTAGE LIST 2009 – 2010 SCHOOL YEAR***

The Department of Education has completed an analysis of teacher supply and demand for the 2009-2010 school year. Based on the results of a survey and other data available to the Department, the following endorsements have been identified as critical shortage areas:

- Blind and Vision Disabilities
- Comprehensive Family & Consumer Science
- Comprehensive Technology Education (formerly Industrial Arts)
- Computer Technology Educator
- Deaf and Hearing Disabilities
- Early Childhood Special Education
- English for Speakers of Other Languages
- World Languages (Classical and Modern)
- General Special Education
  Special Education Categorical Areas:
  - Emotional and Behavioral Disabilities *
  - Intellectual and Developmental Disabilities *
  - Physical and Health Disabilities *
  - Specific Learning Disabilities *
- Library Media Specialist
- Mathematics (5-8)
- Mathematics (7-12)
- Sciences:
  - Chemistry (7-12),
  - Earth/Space Science (7-12)
  - Life Science
  - Middle School Science
  - Physics (7-12)
- Special Education Administrator
- Speech Language Specialist

**** Categorical Areas that require certification in General Special Education or Early Childhood Special Education.***

In order to fill an opening in a critical shortage area, superintendents or agency heads may hire a candidate who holds a Statement of Eligibility to pursue Alternative 4. Once a person holding a Statement of Eligibility has been hired, the superintendent must notify the Bureau of Credentialing of the appointment. Upon request, the Bureau of Credentialing will forward the requisite materials.

CAREER AND TECHNICAL SPECIALTY endorsements and SCHOOL BUSINESS ADMINISTRATOR remain available through Alternative 4.

For further information contact The Bureau of Credentialing at 603-271-2408

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FIGURE 1.1

Domains, Components, and Elements of the Framework for Teaching

Domain 1: Planning and Preparation

Component 1a: Demonstrating Knowledge of Content and Pedagogy
- Knowledge of content and the structure of the discipline
- Knowledge of prerequisite relationships
- Knowledge of content-related pedagogy

Component 1b: Demonstrating Knowledge of Students
- Knowledge of child and adolescent development
- Knowledge of the learning process
- Knowledge of students' skills, knowledge, and language proficiency
- Knowledge of students' interests and cultural heritage
- Knowledge of students' special needs

Component 1c: Setting Instructional Outcomes
- Value, sequence, and alignment
- Clarity
- Balance
- Suitability for diverse learners

Component 1d: Demonstrating Knowledge of Resources
- Resources for classroom use
- Resources to extend content knowledge and pedagogy
- Resources for students

Component 1e: Designing Coherent Instruction
- Learning activities
- Instructional materials and resources
- Instructional groups
- Lesson and unit structure

Component 1f: Designing Student Assessments
- Congruence with instructional outcomes
- Criteria and standards
- Design of formative assessments
- Use for planning

Domain 2: The Classroom Environment

Component 2a: Creating an Environment of Respect and Rapport
- Teacher interaction with students
- Student interactions with other students

Component 2b: Establishing a Culture for Learning
- Importance of the content
- Expectations for learning and achievement
- Student pride in work

Component 2c: Managing Classroom Procedures
- Management of instructional groups
- Management of transitions
- Management of materials and supplies
- Performance of noninstructional duties
- Supervision of volunteers and paraprofessionals

Component 2d: Managing Student Behavior
- Expectations
- Monitoring of student behavior
- Response to student misbehavior

Component 2e: Organizing Physical Space
- Safety and accessibility
- Arrangement of furniture and use of physical resources

(figure continues)

Danielson, C. (2007). Enhancing Professional Practice: A Framework for Teaching. Alexandria, VA: Association for Supervision and Curriculum Development

FIGURE 1.1

Domains, Components, and Elements of the Framework for Teaching *(continued)*

Domain 3: Instruction

Component 3a: Communicating with Students
- Expectations for learning
- Directions and procedures
- Explanations of content
- Use of oral and written language

Component 3b: Using Questioning and Discussion Techniques
- Quality of questions
- Discussion techniques
- Student participation

Component 3c: Engaging Students in Learning
- Activities and assignments
- Grouping of students
- Instructional materials and resources
- Structure and pacing

Component 3d: Using Assessment in Instruction
- Assessment criteria
- Monitoring of student learning
- Feedback to students
- Student self-assessment and monitoring of progress

Component 3e: Demonstrating Flexibility and Responsiveness
- Lesson adjustment
- Response to students
- Persistence

Domain 4: Professional Responsibilities

Component 4a: Reflecting on Teaching
- Accuracy
- Use in future teaching

Component 4b: Maintaining Accurate Records
- Student completion of assignments
- Student progress in learning
- Noninstructional records

Component 4c: Communicating with Families
- Information about the instructional program
- Information about individual students
- Engagement of families in the instructional program

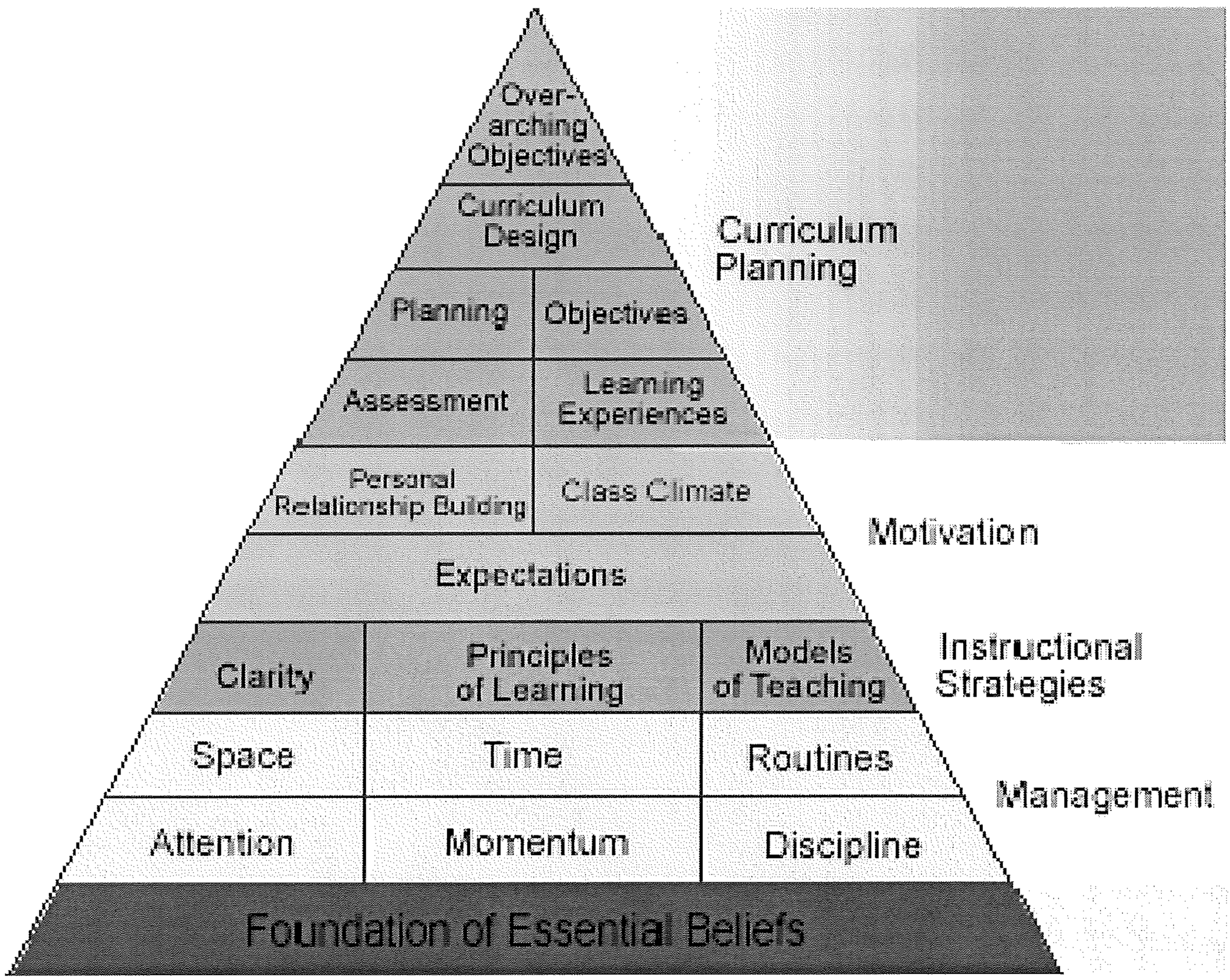
Component 4d: Participating in a Professional Community
- Relationships with colleagues
- Involvement in a culture of professional inquiry
- Service to the school
- Participation in school and district projects

Component 4e: Growing and Developing Professionally
- Enhancement of content knowledge and pedagogical skill
- Receptivity to feedback from colleagues
- Service to the profession

Component 4f: Showing Professionalism
- Integrity and ethical conduct
- Service to students
- Advocacy
- Decision making
- Compliance with school and district regulations

Danielson, C. (2007). Enhancing Professional Practice: A Framework for Teaching. Alexandria, VA: Association for Supervision and Curriculum Development

The Skillful Teacher: Parameters for Effective Teaching



Saphier, J., Haley-Speca, M. & Gower, R. (2008). The Skillful Teacher: Building Your Teaching Skills. Acton, MA: Research for Better Teaching.

Danielson, C. (2007). Enhancing Professional Practice: A Framework for Teaching.
Alexandria, VA: Association for Supervision and Curriculum Development

Educational Leadership Policy Standards: ISLLC 2008

as adopted by the National Policy Board for Educational Administration (NPBEA) on December 12, 2007

STANDARD 1

An education leader promotes the success of every student by facilitating the development, articulation, implementation, and stewardship of a vision of learning that is shared and supported by all stakeholders.

Functions:

A. Collaboratively develop and implement a shared vision and mission

B. Collect and use data to identify goals, assess organizational effectiveness, and promote organizational learning

C. Create and implement plans to achieve goals

D. Promote continuous and sustainable improvement

E. Monitor and evaluate progress and revise plans

STANDARD 2

An education leader promotes the success of every student by advocating, nurturing and sustaining a school culture and instructional program conducive to student learning and staff professional growth.

Functions:

A. Nurture and sustain a culture of collaboration, trust, learning, and high expectations

B. Create a comprehensive, rigorous, and coherent curricular program

C. Create a personalized and motivating learning environment for students

D. Supervise instruction

E. Develop assessment and accountability systems to monitor student progress

F. Develop the instructional and leadership capacity of staff

G. Maximize time spent on quality instruction

H. Promote the use of the most effective and appropriate technologies to support teaching and learning

I. Monitor and evaluate the impact of the instructional program

STANDARD 3

An education leader promotes the success of every student by ensuring management of the An education leader promotes the success of every student by ensuring management of the organization, operation, and resources for a safe, efficient, and effective learning environment.

Functions:

A. Monitor and evaluate the management and operational systems

B. Obtain, allocate, align, and efficiently utilize human, fiscal, and technological resources

C. Promote and protect the welfare and safety of students and staff

D. Develop the capacity for distributed leadership

E. Ensure teacher and organizational time is focused to support quality instruction and student learning

STANDARD 4

An education leader promotes the success of every student by collaborating with faculty and community members, responding to diverse community interests and needs, and mobilizing community resources.

Functions:

A. Collect and analyze data and information pertinent to the educational environment

B. Promote understanding, appreciation, and use of the community's diverse cultural, social, and intellectual resources

C. Build and sustain positive relationships with families and caregivers

D. Build and sustain productive relationships with community partners

STANDARD 5

An education leader promotes the success of every student by acting with integrity, fairness, and in an ethical manner.

Functions:

A. Ensure a system of accountability for every student's academic and social success

B. Model principles of self-awareness, reflective practice, transparency, and ethical behavior

C. Safeguard the values of democracy, equity, and diversity

D. Consider and evaluate the potential moral and legal consequences of decision-making

E. Promote social justice and ensure that individual student needs inform all aspects of schooling

STANDARD 6

An education leader promotes the success of every student by understanding, responding to, and influencing the political, social, economic, legal, and cultural context.

Functions:

A. Advocate for children, families, and caregivers

B. Act to influence local, district, state, and national decisions affecting student learning

C. Assess, analyze, and anticipate emerging trends and initiatives in order to adapt leadership strategies

. Summary of Measures

Measure	Description	Research	Strengths	Cautions
Value-Added Models	Statistical models used to determine teachers' contributions to students' test score gains. May also be used as a research tool (e.g., determining the distribution of "effective" teachers by student or school characteristics).	Little is known about the validity of value-added scores for identifying effective teaching, though research using value-added models suggests that teachers differ markedly in their contributions to students' test score gains. However, correlating value-added scores with teacher qualifications, characteristics, or practices has yielded mixed results and few significant findings. Teachers vary in effectiveness, but research has not determined why.	• Provides a way to evaluate teachers on their contribution to student learning, which most measures do not. • Requires no classroom visits because linked student/teacher data can be analyzed at a distance. • Entails little burden at the classroom or school level because most data are already collected for NCLB purposes. • May be useful for identifying outstanding teachers whose classrooms can serve as "learning labs" as well as struggling teachers in need of support.	• Models are not able to sort out *teacher* effects from *classroom* effects. • Vertical test alignment is assumed (i.e., tests are measuring essentially the same thing from grade to grade). • Value-added scores are not useful for formative purposes because teachers learn nothing about how their practices contributed to (or impeded) student learning. • Value-added measures are controversial because they measure *only* teachers' contributions to student achievement gains on standardized tests.
Classroom Observation	Classroom observations are used to measure observable classroom processes, including specific teacher practices, holistic aspects of instruction, and interactions between teachers and students. They can measure broad, overarching aspects of teaching, or subject-specific or context-specific aspects of practice.	Some highly researched protocols have been linked to student achievement, though associations are sometimes modest. Research and validity findings are highly dependent on the instrument used, sampling procedures, and the training of raters. There is a lack of research on observation protocols as used in context for teacher evaluation.	• Provides rich information about classroom behaviors and activities. • Is credible—generally considered a fair and direct measure by stakeholders. • Depending on the protocol, can be used in various subjects, grades, and contexts. • Can provide information useful for both formative and summative purposes.	• Choosing or creating a valid and reliable protocol and training and calibrating raters are essential to obtaining valid results. • Expensive due to cost of observers' time; intensive training and calibrating of observers adds to expense but is necessary for validity. • Assesses observable classroom behaviors, but not as useful for assessing beliefs, feelings, intentions, or out-of-classroom activities.

Measure	Description	Research	Strengths	Cautions
Principal Evaluation	Are generally based on classroom observation, may be structured or unstructured; procedures and uses vary widely by district. Generally used for summative purposes, most commonly for tenure or dismissal decisions for beginning teachers.	Studies comparing subjective principal ratings to student achievement find mixed results. Little evidence exists on validity of evaluations as they occur in schools, but evidence indicates that training for principals is limited and rare, which would impair validity of their evaluations.	• Represents a useful perspective based on principals' knowledge of their school and context. • Is generally feasible and can be one useful component in a system used to make summative judgments and provide formative feedback.	• Evaluation instruments used without proper training or regard for their intended purpose will impair validity. • Principals may not be qualified to evaluate teachers on measures highly specialized for certain subjects or contexts.
Analysis of Classroom Artifacts	Structured protocols used to analyze classroom artifacts in order to determine the quality of instruction in a classroom. Artifact examples: lesson plans, teacher assignments, assessments, scoring rubrics, and student work.	Pilot research has linked artifact ratings to observed measures of practice, quality of student work, and student achievement gains. More work is needed to establish scoring reliability and determine the ideal amount of work to sample. Lack of research exists on the use of structured artifact analysis in practice.	• Can be a useful measure of instructional quality if a validated protocol is used, if raters are well-trained for reliability, and if assignments show sufficient variation in quality. • Is practical and feasible because artifacts have already been created for the classroom.	• More validity and reliability research is needed. • Training knowledgeable scorers can be costly but is necessary to ensure validity. • This measure may be a compromise in terms of feasibility and validity between full observation and less direct measures such as self-report.

Measure	Description	Research	Strengths	Cautions
Portfolios	A collection of teaching materials and artifacts assembled by the teacher to document a large range of teaching behaviors and responsibilities. Has been used widely in teacher education programs and in states for assessing the performance of teacher candidates and beginning teachers.	Research on validity and reliability is ongoing, and concerns have been raised about consistency of scoring. There is a lack of research linking portfolios to observed changes in teaching practice or student achievement. Some studies have linked NBPTS certification (which includes a portfolio) to student achievement, but other studies have found no relationship.	• Is comprehensive; can measure aspects of teaching that are not readily observable in the classroom. • Can be used with teachers of all fields. • Has a high level of credibility among stakeholders. • Is a useful tool for teacher reflection and improvement.	• This measure is time-consuming for teachers and scorers; scorers should have content knowledge of the portfolios they score. • Stability of scores may not be high enough to use for high-stakes assessment. • Portfolios are difficult to standardize (compare across teachers or schools). • Portfolios represent teachers' exemplary work but may not reflect everyday classroom activities.
Self-Report of Practice	Teacher reports of their practices, techniques, intentions, beliefs, and other teaching elements assessed through surveys, instructional logs, or interviews. Measures cover a broad spectrum and can vary widely in focus and level of detail.	Studies on the validity of teacher self-report measures present mixed results. Highly detailed measures of practice may be better able to capture actual teaching practices but may be more difficult to establish reliability or may result in very narrowly focused measures.	• Can measure unobservable factors that may affect teaching, such as knowledge, intentions, expectations, and beliefs. • Provides the unique perspective of the teacher. • Is feasible and cost-efficient; can collect large amounts of information at once.	• Reliability and validity of self-report has not been fully established and depends on instrument used. • Using or creating a well-developed and validated instrument will decrease cost-efficiency but will increase accuracy of findings. • This measure should not be used as the sole or primary measure in teacher evaluation.

Measure	Description	Research	Strengths	Cautions
Student Evaluation	Surveys or rating scales used to gather student opinions or judgments about teaching practice and to provide information about teaching as perceived by students. Measures can vary widely in focus and level of detail.	Several studies show that student ratings of teachers may be as valid as judgments made by college students and other groups and, in some cases, may correlate with measures of student achievement; thus students can provide useful information about teaching. Validity is dependent on the instrument used and its administration and is generally recommended for formative use only.	• Provides perspective of students, who have the most experience with teachers. • Can provide formative information to help teachers improve practice in a way that will connect with students. • Can potentially provide ratings as accurate as those provided by adult raters.	• Student ratings have not been validated for use in summative assessment and should not be used as the sole or primary measure of teacher evaluation. • Students cannot provide information on aspects of teaching such as a teacher's content knowledge, curriculum fulfillment, or professional activities.

Table 1. Matching Measures to Specific Purposes

Purpose of Evaluation of Teacher Effectiveness	Value-Added	Classroom Observation	Analysis of Artifacts	Portfolios	Teacher Self-Reports	Student Ratings	Other Reports
Find out whether grade-level or instructional teams are meeting specific achievement goals.	x						
Determine whether a teacher's students are meeting achievement growth expectations.	x		x				
Gather information in order to provide new teachers with guidance related to identified strengths and shortcomings.		x	x	x			x
Examine the effectiveness of teachers in lower elementary grades for which no test scores from previous years are available to predict student achievement (required for value-added models).		x	x	x			x
Examine the effectiveness of teachers in nonacademic subjects (e.g., art, music, and physical education).		x		x		x	x
Determine whether a new teacher is meeting performance expectations in the classroom.		x	x	x		x	x
Determine the types of assistance and support a struggling teacher may need.		x	x		x	x	
Gather information to determine what professional development opportunities are needed for individual teachers, instructional teams, grade-level teams, etc.	x	x			x		x
Gather evidence for making contract renewal and tenure decisions.	x	x					x
Determine whether a teacher's performance qualifies him or her for additional compensation or incentive pay (rewards).	x	x					
Gather information on a teacher's ability to work collaboratively with colleagues to evaluate needs of and determine appropriate instruction for at-risk or struggling students.				x	x		x
Establish whether a teacher is effectively communicating with parents/guardians.				x			x
Determine how students and parents perceive a teacher's instructional efforts.						x	
Determine who would qualify to become a mentor, coach, or teacher leader.	x	x	x	x			x

Note. "X" indicates appropriate measures for the specified purpose.

. Summary of Measures

Measure	Description	Research	Strengths	Cautions
Value-Added Models	Statistical models used to determine teachers' contributions to students' test score gains. May also be used as a research tool (e.g., determining the distribution of "effective" teachers by student or school characteristics).	Little is known about the validity of value-added scores for identifying effective teaching, though research using value-added models suggests that teachers differ markedly in their contributions to students' test score gains. However, correlating value-added scores with teacher qualifications, characteristics, or practices has yielded mixed results and few significant findings. Teachers vary in effectiveness, but research has not determined why.	• Provides a way to evaluate teachers on their contribution to student learning, which most measures do not. • Requires no classroom visits because linked student/teacher data can be analyzed at a distance. • Entails little burden at the classroom or school level because most data are already collected for NCLB purposes. • May be useful for identifying outstanding teachers whose classrooms can serve as "learning labs" as well as struggling teachers in need of support.	• Models are not able to sort out *teacher* effects from *classroom* effects. • Vertical test alignment is assumed (i.e., tests are measuring essentially the same thing from grade to grade). • Value-added scores are not useful for formative purposes because teachers learn nothing about how their practices contributed to (or impeded) student learning. • Value-added measures are controversial because they measure *only* teachers' contributions to student achievement gains on standardized tests.
Classroom Observation	Classroom observations are used to measure observable classroom processes, including specific teacher practices, holistic aspects of instruction, and interactions between teachers and students. They can measure broad, overarching aspects of teaching, or subject-specific or context-specific aspects of practice.	Some highly researched protocols have been linked to student achievement, though associations are sometimes modest. Research and validity findings are highly dependent on the instrument used, sampling procedures, and the training of raters. There is a lack of research on observation protocols as used in context for teacher evaluation.	• Provides rich information about classroom behaviors and activities. • Is credible—generally considered a fair and direct measure by stakeholders. • Depending on the protocol, can be used in various subjects, grades, and contexts. • Can provide information useful for both formative and summative purposes.	• Choosing or creating a valid and reliable protocol and training and calibrating raters are essential to obtaining valid results. • Expensive due to cost of observers' time; intensive training and calibrating of observers adds to expense but is necessary for validity. • Assesses observable classroom behaviors, but not as useful for assessing beliefs, feelings, intentions, or out-of-classroom activities.

Measure	Description	Research	Strengths	Cautions
Principal Evaluation	Are generally based on classroom observation, may be structured or unstructured; procedures and uses vary widely by district. Generally used for summative purposes, most commonly for tenure or dismissal decisions for beginning teachers.	Studies comparing subjective principal ratings to student achievement find mixed results. Little evidence exists on validity of evaluations as they occur in schools, but evidence indicates that training for principals is limited and rare, which would impair validity of their evaluations.	• Represents a useful perspective based on principals' knowledge of their school and context. • Is generally feasible and can be one useful component in a system used to make summative judgments and provide formative feedback.	• Evaluation instruments used without proper training or regard for their intended purpose will impair validity. • Principals may not be qualified to evaluate teachers on measures highly specialized for certain subjects or contexts.
Analysis of Classroom Artifacts	Structured protocols used to analyze classroom artifacts in order to determine the quality of instruction in a classroom. Artifact examples: lesson plans, teacher assignments, assessments, scoring rubrics, and student work.	Pilot research has linked artifact ratings to observed measures of practice, quality of student work, and student achievement gains. More work is needed to establish scoring reliability and determine the ideal amount of work to sample. Lack of research exists on the use of structured artifact analysis in practice.	• Can be a useful measure of instructional quality if a validated protocol is used, if raters are well-trained for reliability, and if assignments show sufficient variation in quality. • Is practical and feasible because artifacts have already been created for the classroom.	• More validity and reliability research is needed. • Training knowledgeable scorers can be costly but is necessary to ensure validity. • This measure may be a compromise in terms of feasibility and validity between full observation and less direct measures such as self-report.

Measure	Description	Research	Strengths	Cautions
Portfolios	A collection of teaching materials and artifacts assembled by the teacher to document a large range of teaching behaviors and responsibilities. Has been used widely in teacher education programs and in states for assessing the performance of teacher candidates and beginning teachers.	Research on validity and reliability is ongoing, and concerns have been raised about consistency of scoring. There is a lack of research linking portfolios to observed changes in teaching practice or student achievement. Some studies have linked NBPTS certification (which includes a portfolio) to student achievement, but other studies have found no relationship.	• Is comprehensive; can measure aspects of teaching that are not readily observable in the classroom. • Can be used with teachers of all fields. • Has a high level of credibility among stakeholders. • Is a useful tool for teacher reflection and improvement.	• This measure is time-consuming for teachers and scorers; scorers should have content knowledge of the portfolios they score. • Stability of scores may not be high enough to use for high-stakes assessment. • Portfolios are difficult to standardize (compare across teachers or schools). • Portfolios represent teachers' exemplary work but may not reflect everyday classroom activities.
Self-Report of Practice	Teacher reports of their practices, techniques, intentions, beliefs, and other teaching elements assessed through surveys, instructional logs, or interviews. Measures cover a broad spectrum and can vary widely in focus and level of detail.	Studies on the validity of teacher self-report measures present mixed results. Highly detailed measures of practice may be better able to capture actual teaching practices but may be more difficult to establish reliability or may result in very narrowly focused measures.	• Can measure unobservable factors that may affect teaching, such as knowledge, intentions, expectations, and beliefs. • Provides the unique perspective of the teacher. • Is feasible and cost-efficient; can collect large amounts of information at once.	• Reliability and validity of self-report has not been fully established and depends on instrument used. • Using or creating a well-developed and validated instrument will decrease cost-efficiency but will increase accuracy of findings. • This measure should not be used as the sole or primary measure in teacher evaluation.

Measure	Description	Research	Strengths	Cautions
Student Evaluation	Surveys or rating scales used to gather student opinions or judgments about teaching practice and to provide information about teaching as perceived by students. Measures can vary widely in focus and level of detail.	Several studies show that student ratings of teachers may be as valid as judgments made by college students and other groups and, in some cases, may correlate with measures of student achievement; thus students can provide useful information about teaching. Validity is dependent on the instrument used and its administration and is generally recommended for formative use only.	• Provides perspective of students, who have the most experience with teachers. • Can provide formative information to help teachers improve practice in a way that will connect with students. • Can potentially provide ratings as accurate as those provided by adult raters.	• Student ratings have not been validated for use in summative assessment and should not be used as the sole or primary measure of teacher evaluation. • Students cannot provide information on aspects of teaching such as a teacher's content knowledge, curriculum fulfillment, or professional activities.

No Appendix for Section E

Status of Charter Schools Approved by the State Board of Education, December 2009

Charter School/Location/Date Opened	Fall 2009 Enrollment	Students/ Grades Served	Focus	Evidence of Effectiveness
North Country Charter School Littleton and Lancaster Opened: July 2004 NH Pilot Charter School Program	58	Grades 7-12; recent dropouts or at-risk of dropping out of school	Plato Education Services curriculum	• Significant grade-level growth each year as demonstrated by BASI Assessment Inventory • 153 graduates since 2004, including 27% dropouts; 30% matriculated to post-secondary education • 90% average attendance rate for 5 years • 100% student enrolled in Extended Learning Opportunities
Seacoast Charter School Kingston Opened: July 2004 NH Pilot Charter School Program	63	Grades 1-6	Core academics and the arts with thematic approach to curriculum	• Exceeds NECAP results for region by 23 percent; 88 percent of students are at proficiency level in math and English on NECAP
Cocheco Arts and Technology Academy Dover Opened: January 2005 NH Pilot Charter School Program	77	Grades 9-12; underserved students who don't meet standard social norms	Arts and technology; personalized educational plans; community service	• Of 34 graduates, 31 are in college and three are working. Many arts awards: NH Theater Festival award, national Maya Angelou award

Charter School/Location/Date Opened	Fall 2009 Enrollment	Students/ Grades Served	Focus	Evidence of Effectiveness
				received by student, and one student commissioned by San Francisco Symphony to compose piece
Great Bay e-Learning Charter School Exeter Opened: January 2005 NH Pilot Charter School Program	144	Grades 8-12; mid-range of students whose needs are not adequately met in traditional programs	Blends on-line learning and video-conferencing technology using project-based curriculum	• Graduated 61 students in Classes of 2008 and 2009, all of whom were accepted to post-secondary programs
New Hampshire Equestrian Academy Charter School Rochester Opened: September 2006 NH Pilot Charter School Program	28	Grades 9-12	College academic preparation and training in equine industry; apprenticeships in equestrian industry businesses	• 100 percent of graduates are in college
Surry Village Charter School Opened: September 2006 NH Pilot Charter School Program	64	K-8	Multi-age, multi-grade teaching; science and social studies taught through projects	• 80 percent of students were proficient in math and English on NECAP assessments
CSI Charter School Penacook Opened: July 2007 NH Pilot Charter School Program	42	Grades 9-12; disenfranchised students and dropouts	Non-traditional, competency-based educational program; individualized educational plans; flexible schedule (three days/week from 9-11 am and 5-7 pm)	• 39 students, who were disenfranchised, met 92 competencies and graduated. • 10 students awarded community Technical scholarships to complete college work

Charter School/Location/Date Opened	Fall 2009 Enrollment	Students/ Grades Served	Focus	Evidence of Effectiveness
				while at CSI.
Academy for Science and Design Charter School Merrimack Opened: September 2007 NH Pilot Charter School Program	110	Grades 7-12	Science, math, engineering, and design	• First in state science and math NECAP scores in 2009; second in state in 2008. • State Champion for Spelling Bee, 2009; Future Problem Solvers First Place Senior and Middle Divisions, 2009; First Lego League First Place in State in Presentation • First graduating class has a National Merit Semi-finalist who is also candidate for US Air Force and Naval Academy.
Strong Foundations Charter School Pembroke Opened: September 2007 NH Pilot Charter School Program	92	Grades K-4; approximately 33 percent students with disabilities	Build early literacy through Orton-Gillingham approach	• Strong progress in formative growth assessment. • One student exited special education status.
Virtual Learning Academy Charter School Exeter Opened: January 2008 NH Pilot Charter School Program	560	Grades 9-12	Use of new, emerging distance learning technologies to provide rigorous, personalized education anywhere,	• No evidence yet, just opened.

Charter School/Location/Date Opened	Fall 2009 Enrollment	Students/ Grades Served	Focus	Evidence of Effectiveness
			anytime for part-time high school students	
Ledyard Charter Academy Lebanon Opened: January 2009 NH Pilot Charter School Program	29	Grades 9-12; underperform-ing and/or disengaged students	Strong academic core with service learning in community and internships	• No evidence yet, just opened.

Status of Charter Schools Authorized by LEAs, December 2009

Charter School/Location	Fall 2009 Enrollment	Students/ Grades Served	Focus	Evidence of Effectiveness
Deerfield Community Charter School Deerfield Will open: Fall 2010	NA	K-6	Interdisciplinary approach to learning	NA

BUDGET PART I: BUDGET SUMMARY NARRATIVE

Overall Budget Structure:

NH's RttT Grant Budget has been divided into seven grant projects aligned to the four assurance areas, with grant staff, both state agency full time equivalents and contracted consultants managing the overall grant to achieve the outcome of a transformed public education system in NH. Our expectations are that the four years will allow for capacity and systems to be built and put in place by the end of the 4 year grant cycle, and for tremendous growth to begin to be made.

The seven projects are:

- Lowest 5% Persistently Achieving Schools
- Standards and Assessment;
- Board Examination/Move on When Ready;
- High School Redesign;
- Leadership;
- Great Teachers and Leaders
- Science, technology, engineering and mathematics (STEM);

Four State Department full time equivalents are requested to oversee the administrative and fiscal functions of the grant:

- *Race to the Top Director*: The role for this position is to coordinate all RttT efforts, convene and coordinate with all vendors, external partners and in-state collaborators, oversee the fiscal management of the RttT initiative, and supervise SEA RttT personnel.
- *Administrative Assistant to the Race to the Top Director:* The primary function of this position is to provide project support to the RttT Director, including fiscal management of grants and contracts to providers and districts.
- *Race to the Top Auditor:* The role for this position will be to work in conjunction with the Office of Business Management to manage all fiscal matters with regard to the RttT.
- *Longitudinal Data System Administrator:* The charge of this position will be to oversee the expansion of the NH Data Warehouse to include longitudinal student data Pre-K to K-12 to Higher Education, as well as to capture Systems of Care

information regarding individual students from such systems as Juvenile Justice, Child and Family Services, Mental Health, and Substance Abuse Prevention. Additionally, this administrative position will oversee the linking of student growth data contained in Performance Plus to the proposed NH Educator Evaluation model, a new component of the NH Educator Information System.

Resources for salary, benefits, equipment, travel, and supplies for these positions are found on lines 1 – 5 of the budget summary

Fiscal management of the grant will be coordinated with the department's Office of Business Management. The RttT Director will report to the Commissioner and will be a member of the commissioner's extended cabinet.

Contractual services (line 6) for the grant are found on line 6. Key functions to ensure effective oversight and implementation of New Hampshire's RttT strategies that will be contracted with outside vendors include: Director of K-12 Assessment and High School Redesign, Director of Teacher and Leader Effectiveness, Director of STEM, and Coordinator of Early Learning. The reason for contracting these crucial positions is to connect them directly with both districts and the major technical assistance providers in each project area of their responsibility. They will be responsible to the RttT Administrator and be charged with accomplishing the major goals and objectives of their respective projects, including timelines, reports, and deliverables. They will also coordinate with the four assurance groups established in the Department, including Department specialists addressing the content area of the project. Particular coordination will be in place for the lowest achieving school districts, which will be overseen by the Director of the Division of Instruction and the Title I Office. This will assure integrated programming, resource management, and project deliverables between RttT, SIG and Title I programs. One additional support area to be contracted is for the Lead Researcher of the Study Group. The Study Group will be a formalized capacity that will play an intergral role with the various projects and with the Department overall in ensuring field work is based on evidence, in creating a research agenda to build a feedback system that will allow for the independent assessment of projects and feedback on what is working, in order to provide more useful information to the field. Beyond these on-going

management consultants, two research and technical assistance contracts are anticipated (further specified on line 6 of 5% lowest achieving schools and teacher development, respectively), one for contracting with a highly respected national organization specializing in designing turnaround school models to review and evaluate New Hampshire conditions for turnaround at both the local and state level, including review of statutes, regulations, district, school, and community conditions that effect overall success in turnaround activities. This report will be presented to key decision makers at the state and local level to further NH's ability to apply Turnaround principles in NH's strongly local control environment. The second contractor will be responsible for facilitating the completion of the NH educator evaluation project, convening major stakeholders, e.g. school boards, educator unions, NHDOE staff, representatives from higher education.

Additionally, contractors have been vetted for provision of direct service, technical assistance, and research in the various projects, 5% lowest Achieving Schools (to provide external partners for each of the members of the Transformation consortium supporting the 10 Participating LEAs, Standards and Assessments , Board Exams and Move on When Ready, HS Redesign, Leadership, Great Teachers and Leaders, and STEM. Districts will engage with these contractors as they plan and implement their overall projects.

No Construction or Other costs are anticipated. (lines 7 and 8)

The indirect cost rate used for this project is 5.4% per year.

Funding for Involved LEAs (line 11) is planned for years 3 and 4 specifically for the following projects: Standards and Assessments, Board Exams and Move on When Ready, Leadership, and Great Teachers and Leaders Effectiveness, to create regional professional development opportunities regarding new standards and aligned assessments, the emerging Board Exam systems, and the State model for educator development and evaluation.

Supplemental Funding (line 12) is specified in the detail of the various projects and will be awarded to those districts with projects that exceed their Title I allotment and have state wide implications for accomplishing the state plan.

Funding for subgrants to participating districts is based on their Title I formula for both regular Title I and ARRA Title I Supplements for the last fiscal year factored to 50% of the total grant.

There are a number of additional revenue sources that the State will leverage in their biennial budget to enhance the transformation of NH Education. The State budgets $985,000.00 for local education improvement. In addition, $600,000 support special education programs, $226,500 for career and technical education and 6 million to support the assessment work. All of these local funds allow the NHDOE to work with local districts to support the efforts to achieve the goals for student achievement.

With local monies the NH DOE has leveraged federal entitlements to address the multiple needs of school districts, personnel and students. During the past year, using the Title I School Improvement Grant, 20 schools were identified for funding to address leadership training in their district. This project is currently ongoing with preliminary reports of evidence of success. This grant enhanced the capability of districts with high poverty to exceed the expectation for leadership. We anticipate using the 2010 SIGs in a manner to focus on improvement in the eligible Title I schools and LEAs that agree to participate in the conditions of one of the four models, such as the 10 LEAs that have signed onto the MOU with NH in this RtttT grant application.

Using State awarded funds from the Title II grants, including the II D Educational Technology grant, the NH DOE has worked with districts across the state to provide training in RtI, Coaching, Assessment and 21st Century classrooms. Currently the Nellie Mae Education Foundation supports competency based assessment at the secondary level. This work is ongoing at the secondary level.

In anticipation of awards for the Investing in Innovation Fund (I3), TQE, TIF and the State Longitudinal Data Systems, the State has focused these funding sources with the four assurances as outlined in the Race to the Top Application. Teacher Certification funds will also support this initiative. The source of this funding is fees paid by educators for certification and recertification.

New Hampshire Budget Justification

Project: 5% Lowest Achieving LEA's

1. Personnel

Four State Department full time equivalents are requested to oversee the administrative and fiscal functions of the entire grant. The budget for these four positions is identified here, however, it should be noted that they will be working across all seven defined projects.

The four positions include: Race to the Top Director, Auditor, Administrative Assistant and an Administrator for the Longitudinal Data System office for the term of this project. The Race to the Top Director will oversee all grant functions and report to the Commissioner's Office. The Auditor will examine and verify the use of funds and ensure transparency. The Administrative Assistant will provide administrative services to the Director and also to Race to the Top project staff. The Longitudinal Data System Administrator will oversee the Longitudinal Data System project team, including budgeting and will oversee new projects as it relates to the Race to the Top initiatives.

	Yr 1	Yr 2	Yr 3	Yr 4	Total
1. Personnel	**$223,529**	**$234,705**	**$246,440**	**$258,762**	**$963,436**
Race to the Top Director	$76,187	$79,996	$83,996	$88,195	**$328,373**
Auditor	$34,866	$36,609	$38,440	$40,362	**$150,277**
Administrative Assistant	$36,290	$38,104	$40,009	$42,010	**$156,412**
Administrator IV - Longitudinal Data Coordinator	$76,187	$79,996	$83,996	$88,195	**$328,373**

2. Fringe Benefits:

Fringe benefits for the 4 requested positions is calculated at 48% to include the costs of FICA, Medicare, the state's portion of retirement, and health and dental insurance.

	Yr 1	Yr 2	Yr 3	Yr 4	Total
2. Fringe Benefits (DOE rate 48%)	**$107,294**	**$112,658**	**$118,291**	**$124,206**	**$462,449**
Race to the Top Director	$36,570	$38,398	$40,318	$42,334	**$157,619**
Auditor	$16,736	$17,572	$18,451	$19,374	**$72,133**
Administrative Assistant	$17,419	$18,290	$19,204	$20,165	**$75,078**
Administrator IV - Longitudinal Data Coordinator	$36,570	$38,398	$40,318	$42,334	**$157,619**

3. Travel:

We anticipate department staff working on this project will travel to conferences, out of state meetings and general travel within the state.

It has been assumed that the cost of airfare will be $750 roundtrip, per diem cost for the average hotel room $200, and per diem cost for meals $60. The per person cost for a 2 day or 4 day conference or course is as follows:

Trip Costs

Airfare: $750
Hotel: $200/night
Meals: $60/day
2-day trip: $750 + (2 x ($200 + 60)) = $1,270 per person
3-day trip: $750 + (3 x ($200 + 60)) = $1,530 per person
4-day trip: $750 + (4 x ($200 + 60)) = $1,790 per person

Year 1 through Year 4 Travel:

- In state travel to visit the school districts - $4,000 per year
- The extended cost for 4 department staff to attend 2-day national meetings is 4 x $1,270/person = $5,080 per meeting or $10,160 for 2 meetings per year
- The extended cost for 2 department staff to attend 3-day national meetings is 2 x $1,530/person = $3,060 per year
- Misc conferences and/or travel for training for 2 department staff = $2,780 (could be a two or 3 day trip) per year

Per Year Cost: In state travel $4,000; Out of state Travel $16,000

Grand Total of Years 1 through 4: In state travel $16,000; Out of state Travel $64,000

4. Equipment

Year 1:

4 Laptops for new positions including standard software (Microsoft Office Suite, etc.), $2,500*4 = $10,000

20 Laptops for existing positions including standard software (Microsoft Office Suite, etc.), $2,500*20 = $50,000. State staff will be working more in the field more extensively under all projects defined within this grant for the duration of the grant.

Printers = $2000

Application server with software, licensing and maintenance support = $20,000.

Total Year 1: $82,000

Year 4:

Reporting Server with software, licensing and maintenance support = $20,000.

Total Year 4: $20,000

Grand Total of Years 1 through 4: $102,000

5. Supplies

The costs of office supplies for the project team (wipe boards, markers, pens, paper, printer cartridges, etc.) and phone have been budgeted as follows:

Year 1- 4: $6,000 per year

Grand Total of Years 1 through 4: $24000

6. Contractual

The State will follow procedures for procurement under 34 CFR Parts 74.40 – 74.48 and Part 80.36.

Contractors will be vetted to provide partnerships (partner with the 10 Participating NH school districts in this project) to provide assistance in the following areas:

- Guide the overall transformation approach for the LEA and the participating school(s) including support to carry out the agreed to tasks in the MOU: replace the building principal(s); engage in targeted professional development supports that ate being provided in the leadership academy, the 4 year mentoring and induction program, using data and participation in selected Innovation Networks, as determined.

- provide training and support to school districts in community involvement for parents and students with disabilities and for students who are underserved. These services will also include support for community based education and extended learning time for students.

- provide technical assistance and support in conjunction with the induction and mentoring system for teachers statewide. The consultants will also provide external professional development and systemic support to the persistently lowest achieving schools K-12 and assist in school improvement planning and implementation process.

- provide a differentiated, comprehensive statewide system of support to schools or districts designated in need of improvement for the purpose of improving student performance. Services provided will include consultation and coaching in the areas of

assessment literacy, , curriculum alignment and professional learning teams. The program should cover general education, special education, and ELL educators in best assessment practices across grades and content areas. Partners will be vetted by the state for track record in turning around schools and ability to support areas of improvement. Coaches will have content expertise.

- provide assistance to struggling and marginal teachers and follow-up by non-district observer/evaluators. Provide instruction on instructional management, effective lesson planning, and instructional strategies specific to grade level. For all participating districts.
- Consultant services will also be required to work with the Longitudinal Data System team as it applies to all aspects of Race to the Top projects. Services will include user requirements, research and analysis, and reporting services.
- Support to review and evaluate NH conditions for turnaround at both state and local level, including regulations and systems to recommend targeted areas to address to make change to support conditions for turnaround.
- Support for Research Group (and identified lead researcher vetted by the State) to lead the research and improvement agenda.

$200,000 per year per elementary and middle school
$250,000 per year per high school

Year 1: $3,000,000
Year 2: $3,000,000
Year 3: $3,000,000
Year 4: $2,000,000
Grand Total of Years 1 through 4: $11,000,000

7. Construction
n/a

8. Other
n/a

10. Indirect Costs

The indirect cost rate used for this project is 5.4% per year.

The formula used is (Direct Cost – Contractual – Equipment) X 5.4%

Year 1: $19,268
Year 2: $20,162
Year 3: $21,099
Year 4: $22,084
Grand Total: $ 82,614

11. Funding for Involved LEA's

n/a

12. Supplemental Funding for Participating LEA's

a)

Activity	Purpose	Cost	# of LEA's
▪ Work with an external partner and engage in a four-year, Transformational Model ▪ Replace the building principal(s) ▪ Engage in targeted professional development supports: ➢ 18 month leadership academy ➢ four-year mentoring and induction program ➢ using data workshop/institute series ▪ Collaborate in the development of the state teacher and leader evaluation system and participate in the pilot model ▪ Pilot the expansion of the statewide longitudinal data system ▪ Participate in the Transformation consortium Participate in one or more of the NH Innovation networks	To provide intensive, comprehensive assistance to the lowest performing schools (cuts across all four reform areas)	$14,196,248	10

b)

LEA	Rationale	Supplemental Subgrant cost	Total
Epping	Based on its Title I share, this LEA would receive $277,468 of the State's RttT grant; this subgrant from the State's 50%	$68,133 per year X 4	$272,532

	increases the LEA's funding to allow it to fully participate in all state plans. Although Epping is turning around its high school, efforts with professional development and educator support and evaluation will be district wide.		
Milton/Nute HS	Based on its Title I share, this LEA would receive $498,959 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans. Milton will be turning around two of its three schools, and significant professional development and school day redesign is anticipated. Extended day and Community School components will also be implemented.	$250,260 per year X 4	$1,001,040
Pittsfield	Based on its Title I share, this LEA would receive $208,176 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans. Pittsfield HS has much ground to make up in terms of technology, professional support and evaluation, the use of data to continuously improve curriculum and instruction, and creating conditions for greater student engagement.	$52,044 per year X 4	$208, 176

13. Total Costs:

	Yr 1	Yr 2	Yr 3	Yr 4	Total
9. Total Direct Costs (lines 1-8)	$3,438,822	$3,373,363	$3,410,731	$2,408,968	$12,631,885
10. Indirect Costs**	$19,268	$20,162	$21,099	$22,084	$82,614
					$0
11. Funding for Involved LEAs	$0	$0	$0	$0	$0
					$0
12. Supplemental Funding for Participating LEAs	$444,525	$444,525	$296,350	$296,350	$1,481,749
13. Total Costs (lines 9-12)	$3,902,615	$3,838,050	$3,728,181	$2,727,402	$14,196,248

New Hampshire Budget Justification

Project: Standards and Assessment

1. Personnel

Four State Department full time equivalents are requested to oversee the administrative and fiscal functions of the entire grant. Staff in these positions will be working across all seven defined projects. Full funding for these positions, including salary, benefits and equipment, has been identified and allocated in the "Lowest 5% Persistently Achieving Schools" project and will not be repeated here. The four positions include: Race to the Top Director, Auditor, Administrative Assistant and an Administrator for the Longitudinal Data System office for the term of this project.

2. Fringe Benefits

n/a

3. Travel:

We anticipate department staff working on the Standards and Assessment Project will travel to conferences, out of state meetings and general travel within the state.

It has been assumed that the cost of airfare will be $750 roundtrip, per diem cost for the average hotel room $200, and per diem cost for meals $60. The per person cost for a 2 day or 4 day conference or course is as follows:

Trip Costs

Airfare: $750
Hotel: $200/night
Meals: $60/day
2-day trip: $750 + (2 x ($200 + 60)) = $1,270 per person
3-day trip: $750 + (3 x ($200 + 60)) = $1,530 per person
4-day trip: $750 + (4 x ($200 + 60)) = $1,790 per person

Year 1 through Year 4 Travel:

- In state travel to visit the school districts - $2,000 per year
- The extended cost for 4 department staff to attend 2-day national meetings is 4 x $1,270/person = $5,080 per meeting or $10,160 for 2 meetings per year
- The extended cost for 2 department staff to attend 3-day national meetings is 2 x $1,530/person = $3,060 per year
- Misc conferences and/or travel for training for 2 department staff = $2,780 (could be a two or 3 day trip) per year

Per Year Cost: In state travel $2,000; Out of state Travel $16,000

Grand Total of Years 1 through 4: In state travel $8,000; Out of state Travel $64,000

4. Equipment

n/a

5. Supplies

The costs of office supplies for the project team (wipe boards, markers, pens, paper, printer cartridges, etc.) and phone have been budgeted as follows:

Year 1- 4: $2,000 per year

Grand Total of Years 1 through 4: $8,000

6. Contractual

The State will follow procedures for procurement under 34 CFR Parts 74.40 – 74.48 and Part 80.36.

The NHDOE will hire a consulting firm to provide project management and technical assistance for standards and assessment development and the development of a growth model.

Year 1

K-12 Assessment and High School Redesign Project Manager: 1800 hrs X $75 per hour = $135,000

Year 1 total: $135,000

Year 2
K-12 Assessment and High School Redesign Project Manager: 1800 hrs X $75 per hour = $135,000

Year 2 total: $135,000

Year 3
K-12 Assessment and High School Redesign Project Manager: 1050 hrs X $100 per hour = $105,000

Year 3 total: $105,000

Year 4

K-12 Assessment and High School Redesign Project Manager: 1050 hrs X $100 per hour = $105,000

Year 4 total: $105,000

Total Years 1 through 4: $480,000

7. Construction

Not applicable

8. Other

10. Indirect Costs
The indirect cost rate used for this project is 5.4% per year.

The formula used is (Direct Cost – Contractual – Equipment) X 5.4%

Year 1: $1080
Year 2: $1080
Year 3: $1080
Year 4 $1080
Grand Total: $ 4320.00

11. Funding for Involved LEA's

Year 1 and year 2 activities for this project will include research and design of the overall project. Involved schools will be making sure curriculum is aligned with common core standards.

The new summative assessment for common core and a growth model will be implemented statewide in years 3 and 4. Professional development, training and infrastructure needs will be introduced and implemented.

NH has 163 involved LEA's.

Activities:

1. Professional development around the use of summative assessment.
2. Professional development and understanding of the growth model.
3. Improve infrastructure including additional hardware and software for districts.

Costs:

Costs will include imbedded professional development as well as statewide professional development events.

Year 3: $200,000

Year 4: $300,000

Total for years 1 through 4: $500,000

12. Supplemental Funding for Participating LEA's

a)

Activities	Purpose	Total Project Cost	# of LEA's
• Adopt Common core standards • Implement aligned Common Assessments(member of Balanced Assessment Consortium, ACHIEVE Consortium and others) • Disseminate learning from district projects to inform common work • Pilot Board Exam/Move on when Ready Innovation Network • Participate in High School Transformation Network	To implement a new summative assessment for common core and a growth model state wide.	$2,157,525	3

b)

LEA	Rationale	Supplemental Subgrant cost	Total
Hollis/Brookline Coop	Based on its Title I share, this LEA would receive $25,515 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans. Hollis/Brookline will implement a data management system that provides timely information on student achievement, develop curriculum maps aligned to standards, create a system of formative and summative assessments, and use data to inform instructional decisions.	$56,121 per year X 4	$224,484
Raymond	Based on its Title I share, this LEA would receive $624,686 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans. Raymond will develop and pilot an evaluation system for teachers to make decisions regarding tenure, certification, professional development, and removal that can be taken state wide.	$24,078 per year X 4	$96,313
Pembroke	Based on its Title I share, this LEA would receive $527,593 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans. Pembroke will develop a technical environment that helps to organize teaching and learning material to tailor individual learning plans for students.	$193,101 per year X 4	$772,406

13. Total Costs:

	Yr 1	Yr 2	Yr 3	Yr 4	Total
9. Total Direct Costs (lines 1-8)	$155,000	$155,000	$125,000	$125,000	$560,000
10. Indirect Costs**	$1,080	$1,080	$1,080	$1,080	$4,320
					$0
11. Funding for Involved LEAs	$0	$0	$200,000	$300,000	$500,000
					$0
12. Supplemental Funding for Participating LEAs	$327,961	$327,961	$218,641	$218,641	$1,093,205
13. Total Costs (lines 9-12)	$484,041	$484,041	$544,721	$644,721	$2,157,525

New Hampshire Budget Justification

Project: Board Examinations and Move On When Ready

1. Personnel

Four State Department full time equivalents are requested to oversee the administrative and fiscal functions of the entire grant. Staff in these positions will be working across all seven defined projects. Full funding for these positions, including salary, benefits and equipment, has been identified and allocated in the "Lowest 5% Persistently Achieving Schools" project and will not be repeated here. The four positions include: Race to the Top Director, Auditor, Administrative Assistant and an Administrator for the Longitudinal Data System office for the term of this project.

2. Fringe Benefits

n/a

3. Travel:

We anticipate department staff working on the Board Examination and Move on When Ready Project will travel to conferences, out of state meetings and general travel within the state.

It has been assumed that the cost of airfare will be $750 roundtrip, per diem cost for the average hotel room $200, and per diem cost for meals $60. The per person cost for a 2 day or 4 day conference or course is as follows:

Trip Costs

Airfare: $750
Hotel: $200/night
Meals: $60/day
2-day trip: $750 + (2 x ($200 + 60)) = $1,270 per person
3-day trip: $750 + (3 x ($200 + 60)) = $1,530 per person
4-day trip: $750 + (4 x ($200 + 60)) = $1,790 per person

Year 1 through Year 4 Travel:

- In state travel to visit the school districts - $1,000 per year
- The extended cost for 2 department staff to attend 2-day national meetings is 2 x $1,270/person = $2,540 per meeting
- The extended cost for 2 department staff to attend 3-day national meetings is 2 x $1,530/person = $3,060 per year
- Out of state travel for meetings (no overnight) = $400 per year

Per Year Cost: In state travel $1,000; Out of state Travel $6,000

Grand Total of Years 1 through 4: In state travel $4,000; Out of state Travel $24,000

4. Equipment

n/a

5. Supplies

The costs of supplies for state staff working on this project includes (wipe boards, markers, pens, paper, printer cartridges, etc.) also meeting supplies.

Year 1- 4: $2,000 per year

Grand Total of Years 1 through 4: $8,000

6. Contractual

The State will follow procedures for procurement under 34 CFR Parts 74.40 – 74.48 and Part 80.36.

The NHDOE will hire consulting services to provide project management and leadership in the implementation of a statewide Board Examination System, and will support other District initiatives that are focused on competency approaches to assessing when students are ready to move on to the next level of instruction, including participation in IHE programs. Consulting services will be responsible for, among other items,:

- Conducting planning and research to establish base line, and follow effective results (as part of the Research Group)
- Developing a strategy for increasing the proportion of high school students ready for college without remediation
- Organizing and leading an outreach effort
- Installing a system based on international best practice
- Assisting districts through the Innovation Network in sharing work on Board Exam, the adoption of International Baccalaureate Programs, working on personalized learning agendas, and other multiple pathways projects.

Year 1:

Project Manager: 1500 hrs X $100 per hour = $150,000
Consultants: 10,084 hrs X $75 per hour = $756,300

Total for Year 1: $906,300

Year 2:

Project Manager: 1500 hrs X $100 per hour = $150,000
Consultants: 10,084 hrs X $75 per hour = $756,300

Total for Year 2: $906,300

Year 3:

Project Manager: 1500 hrs X $100 per hour = $150,000
Consultants: 5678 hrs X $80 per hour = $454,240

Total for Year 3: $604,240

Year 4:

Project Manager: 1500 hrs X $100 per hour = $150,000
Consultants: 5678 hrs X $80 per hour = $454,240

Total for Year 4: $604,240

Grand Total of Years 1 through 4: $3,021,080

7. Construction

Not applicable

8. Other
n/a

10. Indirect Costs
The indirect cost rate used for this project is 5.4% per year.

The formula used is (Direct Cost – Contractual – Equipment) X 5.4%

Year 1: $486
Year 2: $486
Year 3: $486
Year 4: $486

Grand Total: $ 1,944

11. Funding for Involved LEA's

Piloting of Board Examinations and training will be implemented in years 3 and 4.

NH has 163 involved LEA's.

Activities:

1. Provide professional development on the multiple curricula options for the Board Exam for teaching staff, administration, guidance, and community members.

2. Provisions for dialogue and collaboration with post secondary institutions on student transitions.

3. Student exposure to understanding the overall goals of board examination.

Costs will include imbedded professional development, as statewide professional development events and community outreach.

Year 3: $200,000

Year 4: $300,000

Total for years 1 through 4: $500,000

12. Supplemental Funding for Participating LEA's

a)

Activities	Purpose	Total Project Cost	# of LEA's
• Conduct planning and research • Develop a strategy for increasing the proportion of high school students ready for college without remediation • Organize and lead an outreach effort	High school transformation. Students ready for college. Alternative ways to graduation and to attaining post secondary education.	$6,252,067	6

• Install a system based on international best practice • Pilot Board Examination • Take Board Examination statewide			

b)

LEA	Rationale	Supplemental Subgrant cost	Total
Bedford	Based on its Title I share, this LEA would receive $67,839 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans. Bedford and Windham are developing partnerships to improve and enhance quality of program in respective high school: International Baccalaureate and Technology Integration	$33,040 per year X 4	$132,161
Windham	Based on its Title I share, this LEA would receive $36,822 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans. Windham and	$40,794.4 per year X 4	$163,177.61

	Bedford are developing partnerships to improve and enhance quality of program in respective high school: International Baccalaureate and Technology Integration		
Kearsage Regional	Based on its Title I share, this LEA would receive $399,295.60 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans. Kearsage plans for a new school with regional involvement, will pilot Board Examination that can be taken statewide.	$599,426.10 per year X 4	$2,397,704.40

13. Total Costs:

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
9. Total Direct Costs (lines 1-8)	**$915,300**	**$915,300**	**$613,240**	**$613,240**	**$3,057,080**
10. Indirect Costs**	**$486**	**$486**	**$486**	**$486**	**$1,944**
					$0
11. Funding for Involved LEAs	**$0**	**$0**	**$200,000**	**$300,000**	**$500,000**
					$0
12. Supplemental Funding for Participating LEAs	**$807,913**	**$807,913**	**$538,609**	**$538,609**	**$2,693,043**
					$0
13. Total Costs (lines 9-	**$1,723,699**	**$1,723,699**	**$1,352,335**	**$1,452,335**	**$6,252,067**

12)					

New Hampshire Budget Justification

Project: High School Transformation/Redesign

1. Personnel

Four State Department full time equivalents are requested to oversee the administrative and fiscal functions of the entire grant. Staff in these positions will be working across all seven defined projects. Full funding for these positions, including salary, benefits and equipment, has been identified and allocated in the "Lowest 5% Persistently Achieving Schools" project and will not be repeated here. The four positions include: Race to the Top Director, Auditor, Administrative Assistant and an Administrator for the Longitudinal Data System office for the term of this project.

2. Fringe Benefits

n/a

3. Travel:

We anticipate department staff working on the High School Redesign Project will travel to conferences, out of state meetings and general travel within the state.

It has been assumed that the cost of airfare will be $750 roundtrip, per diem cost for the average hotel room $200, and per diem cost for meals $60. The per person cost for a 2 day or 4 day conference or course is as follows:

Trip Costs

Airfare: $750
Hotel: $200/night
Meals: $60/day
2-day trip: $750 + (2 x ($200 + 60)) = $1,270 per person
3-day trip: $750 + (3 x ($200 + 60)) = $1,530 per person
4-day trip: $750 + (4 x ($200 + 60)) = $1,790 per person

Year 1 through Year 4 Travel:

- In state travel to visit the school districts - $2,000 per year
- The extended cost for 4 department staff to attend 2-day national meetings is 4 x $1,270/person = $5,080 per meeting
- The extended cost for 2 department staff to attend 3-day national meetings is 2 x $1,530/person = $3,060 per meeting
- Misc conferences and/or travel for training for 2 department staff = $3,060 (could be a two or 3 day trip) per year
- Out of state travel for meetings (no overnight) = $800 per year

Per Year Cost: In state travel $2,000; Out of state Travel $12,000

Total of Years 1 through 4: In state travel $8,000; Out of state Travel $48,000

Total: $56,000

4. Equipment

5. Supplies

The costs of supplies for state staff working on this project includes (wipe boards, markers, pens, paper, printer cartridges, etc.) also meeting supplies.

Year 1- 4: $2,000 per year

Grand Total of Years 1 through 4: $8,000

6. Contractual

The State will follow procedures for procurement under 34 CFR Parts 74.40 – 74.48 and Part 80.36.

The NH DOE will contract for services that will provide partnerships with high schools in the state to support a state-wide Innovation Network for high school redesign, as well as support to several individual LEA projects focused on high school re-design. The vendor(s) will be responsible for creating and mentoring a network of high schools, holding monthly meetings with supporting teams from the high schools, and provide leadership on instruction and innovative practices. The vendor(s) work closely with the Race to the Top Director, the Research Group and with other relevant Innovation Networks to insure practices are being vetted and evaluated, based on evidence and supporting the continuously improving cycle of best practice in this area

Expected procurement costs for vendor services are listed below:

Year 1 total: $310,000
Year 2 total: $310,000
Year 3 total: $210,000
Year 4 total: $200,000

Total Years 1 through 4: $1,030,000

7. Construction

Not applicable

8. Other
n/a

10. Indirect Costs
The indirect cost rate used for this project is 5.4% per year.

The formula used is (Direct Cost – Contractual – Equipment) X 5.4%

Year 1: $864
Year 2: $864
Year 3: $864
Year 4: $864
Grand Total: $ $3,348

11. Funding for Involved LEA's

n/a

12. Supplemental Funding for Participating LEA's

a)

Activities	Purpose	Total Project Cost	# of LEA's
• Participate in a network of high schools that are re-designing • Participate in monthly meetings with supporting teams from the high schools • Provide leadership on instruction and innovative practices. • Expand programs to provide multiple pathways to graduation • Pilot programs such as online courses. • Participate in all evaluation and learning from research in	To provide partnerships with high schools in the state to support a state-wide network for high school redesign that will provide multiple pathways to graduation.	$3,438,265	2

implementing new approaches			

b)

LEA	Rationale	Supplemental Subgrant cost	Total
Littleton	Based on its Title I share, this LEA would receive $649,688 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans. The Littleton project is a regional program that includes expansion of the charter school to double in size and to provide multiple pathways to graduation. Also, develop a non-traditional, evening school that uses competency-based assessments.	$313,827 per year X 4	$1,255,311
Mascenic Regional	Based on its Title I share, this LEA would receive $472,394 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans. The Mascenic project supports high school transformation and includes courses	$271,901 per year X 4	$1,087,605

	online using new software. This will be a pilot program for the state.		

13. Total Costs:

	Yr 1	Yr 2	Yr 3	Yr 4	Total
9. Total Direct Costs (lines 1-8)	**$326,000**	**$326,000**	**$226,000**	**$214,000**	**$1,092,000**
10. Indirect Costs**	**$864**	**$864**	**$864**	**$756**	**$3,348**
					$0
11. Funding for Involved LEAs	**$0**	**$0**	**$0**	**$0**	**$0**
					$0
12. Supplemental Funding for Participating LEAs	**$702,875**	**$702,875**	**$468,583**	**$468,583**	**$2,342,917**
					$0
13. Total Costs (lines 9-12)	**$1,029,739**	**$1,029,739**	**$695,447**	**$683,339**	**$3,438,265**

New Hampshire Budget Justification

Project: Leadership Development

1. Personnel

Four State Department full time equivalents are requested to oversee the administrative and fiscal functions of the entire grant. Staff in these positions will be working across all seven defined projects. Full funding for these positions, including salary, benefits and equipment, has been identified and allocated in the "Lowest 5% Persistently Achieving Schools" project and will not be repeated here. The four positions include: Race to the Top Director, Auditor, Administrative Assistant and an Administrator for the Longitudinal Data System office for the term of this project.

2. Fringe Benefits

n/a

3. Travel:

We anticipate department staff working on the Leadership Development Project will travel to conferences, out of state meetings and general travel within the state.

It has been assumed that the cost of airfare will be $750 roundtrip, per diem cost for the average hotel room $200, and per diem cost for meals $60. The per person cost for a 2 day or 4 day conference or course is as follows:

Trip Costs

Airfare: $750
Hotel: $200/night
Meals: $60/day
2-day trip: $750 + (2 x ($200 + 60)) = $1,270 per person
3-day trip: $750 + (3 x ($200 + 60)) = $1,530 per person
4-day trip: $750 + (4 x ($200 + 60)) = $1,790 per person

Year 1 through Year 4 Travel:

- In state travel to visit the school districts - $2,000 per year
- The extended cost for 4 department staff to attend 2-day national meetings is 4 x $1,270/person = $5,080 per meeting
- The extended cost for 2 department staff to attend 3-day national meetings is 2 x $1,530/person = $3,060 per meeting
- Misc conferences and/or travel for training for 2 department staff = $3,060 (could be a two or 3 day trip) per year
- Out of state travel for meetings (no overnight) = $800 per year

Per Year Cost: In state travel $2,000; Out of state Travel $12,000

Grand Total of Years 1 through 4: In state travel $8,000; Out of state Travel $48,000

4. Equipment

n/a

5. Supplies

The costs of supplies for state staff working on this project includes (wipe boards, markers, pens, paper, printer cartridges, etc.) also meeting supplies.

Year 1- 4: $2,000 per year

Grand Total of Years 1 through 4: $8,000

6. Contractual

The State will follow procedures for procurement under 34 CFR Parts 74.40 – 74.48 and Part 80.36.

Contractors will be vetted to provide partnerships with NH school districts to provide assistance in the following areas:

- Cultivate state networks of leaders capable of "leading innovation and reform; achieving significant improvement in student outcomes including making substantial gains in student achievement, closing achievement gaps, improving high school graduation rates and ensuring student preparation for success in college and careers.
- Create a professional learning community for principals and assistant principals to lead continuous school improvement. The formation and cultivation of leadership networks will enhance the capacity of individual members to lead school continuous improvement.
- Create a train the trainer model to increase the capacity of effective leaders throughout New Hampshire, so the training model can be sustained in the years beyond the project.
- Provide a mentoring program that would train a cohort of experienced special education teachers who would then mentor new/inexperienced special education teachers.
- Provide support to the Leadership Innovation Network that will also include participating LEAs with projects aimed at leadership development
- Participate and coordinate with the RttT Director and the Research Group on vetting effective practices so that a cycle of continuous improvement can be implemented

The consulting services would include a Teacher Leadership project manager, specialists in education leadership, facilitators for leadership networks, and training specialists.

Year 1:

Project Manager: 1500 hrs X $75 per hour = $112,500

Consultants: 806.6 hrs X $75 per hour = $60,495

Total = $172,995

Year 2:

Project Manager: 1500 hrs X $75 per hour = $112,500
Consultants: 806.6 hrs X $75 per hour = $60,495

Total = $172,995

Year 3:

Project Manager: 1500 hrs X $80 per hour = $120,000
Consultants: 594.4 hrs X $75 per hour = $44,580

Total = $164,580

Year 4:

Project Manager: 1500 hrs X $80 per hour = $120,000
Consultants: 594.4 hrs X $75 per hour = $44,580

Total = $164,580

Grand Total of Years 1 through 4: $ $675,150

7. Construction

Not applicable

8. Other

10. Indirect Costs
The indirect cost rate used for this project is 5.4% per year.

The formula used is (Direct Cost – Contractual – Equipment) X 5.4%

Year 1: $864
Year 2: $864
Year 3: $864
Year 4: $864
Grand Total: $ $3,456

11. Funding for Involved LEA's

n/a

12. Supplemental Funding for Participating LEA's

a)

Activities	Purpose	Total Project Cost	# of LEA's
• Cultivate state networks of leaders, including the Innovation Network on Leadership. • Create a professional learning community for principals and assistant principals to lead continuous school improvement. • Create a train the trainer model to increase the capacity of effective leaders throughout New Hampshire. • Provide a mentoring program for leaders in special circumstances • Support the LEAs with leadership practices. • Participate in Research Group studies and refinements of practice; dissemination.	Leadership is key to success in all schools. Provide principals and assistant principals with ongoing training to ensure the success of our students and schools.	$778,800	8

b)

LEA	Rationale	Supplemental Subgrant cost	Total
Alton	Based on its Title I share, this LEA would receive $191,456 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans. Alton is part of a leadership network that will pilot leadership models and collaborate with Research Group to assess effectiveness of models. Model can then be applied state wide.	$9,048 per year X 4	$36,193

13. Total Costs:

	Yr 1	Yr 2	Yr 3	Yr 4	Total
9. Total Direct Costs (lines 1-8)	**$188,995**	**$188,995**	**$180,580**	**$180,580**	**$739,150**
10. Indirect Costs**	**$864**	**$864**	**$864**	**$864**	**$3,456**
					$0
11. Funding for Involved LEAs	**$0**	**$0**	**$0**	**$0**	**$0**
					$0
12. Supplemental Funding for Participating LEAs	**$10,858**	**$10,858**	**$7,239**	**$7,239**	**$36,194**
13. Total Costs (lines 9-12)	**$200,717**	**$200,717**	**$188,683**	**$188,683**	**$778,800**

New Hampshire Budget Justification

Project: Great Teachers and Leaders

1. Personnel

Four State Department full time equivalents are requested to oversee the administrative and fiscal functions of the entire grant. Staff in these positions will be working across all seven defined projects. Full funding for these positions, including salary, benefits and equipment, has been identified and allocated in the "Lowest 5% Persistently Achieving Schools" project and will not be repeated here. The four positions include: Race to the Top Director, Auditor, Administrative Assistant and an Administrator for the Longitudinal Data System office for the term of this project.

2. Fringe Benefits

n/a

3. Travel:

We anticipate department staff working on the Great Teachers and Leaders Project will travel to conferences, out of state meetings and general travel within the state.

It has been assumed that the cost of airfare will be $750 roundtrip, per diem cost for the average hotel room $200, and per diem cost for meals $60. The per person cost for a 2 day or 4 day conference or course is as follows:

Trip Costs

Airfare: $750
Hotel: $200/night
Meals: $60/day
2-day trip: $750 + (2 x ($200 + 60)) = $1,270 per person
3-day trip: $750 + (3 x ($200 + 60)) = $1,530 per person
4-day trip: $750 + (4 x ($200 + 60)) = $1,790 per person

Year 1 through Year 4 Travel:

- In state travel to visit the school districts - $2,000 per year
- The extended cost for 2 department staff to attend 2-day national meetings is 2 x $1,270/person = $2,540 per meeting
- The extended cost for 2 department staff to attend 3-day national meetings is 2 x $1,530/person = $3,060 per year
- Out of state travel for meetings (no overnight) = $400 per year

Per Year Cost: In state travel $2,000; Out of state Travel $6,000

Grand Total of Years 1 through 4: In state travel $8,000; Out of state Travel $24,000

4. Equipment

n/a

5. Supplies

The costs of supplies for state staff working on this project includes (wipe boards, markers, pens, paper, printer cartridges, etc.) also meeting supplies.

Year 1- 4: $2,000 per year

Grand Total of Years 1 through 4: $8,000

6. Contractual

The State will follow procedures for procurement under 34 CFR Parts 74.40 – 74.48 and Part 80.36.

Contractors will be vetted based on expertise and capacity to provide partnerships with NH to provide assistance in the following areas:

- To implement a state-wide mentoring and induction program as an overall approach to school transformation and turnaround.
- Work with the six exiting regional professional development centers in the state to build capacity to support effective teacher practice at all levels
- Lead coordination on the development of Teacher Effectiveness Standards, involving all stakeholders and through all necessary channels to establish but the standards and a Statewide approach to evaluating teacher effectiveness based on those standards
- Establish and coordinate (in conjunction with work in the other Innovation Networks) the Teacher Effectiveness Innovation Network to share and vet practices and support implementation
- Connect closely with the foci of the other Innovation Networks, esp in STEM and Leadership
- To work in close coordination with the Study Group to participate in evaluation, research and further refinement of effective practice.

NH also plans to procure consulting services for an Early Education Specialist for the duration of the project. The Early Education Specialist will focus on NH's youngest citizens, children birth

through age 8 and will coordinate services and programs that will promote a healthy start as well as readiness to enter school. This Early Childhood support will initiative and carry out the plans in the invitational priority.

Year 1:

Early Education Specialist: 1500 hrs X $75 per hour = $112,500
Project Manager: 2000 hours x $100 per hour = $200,000
Consultants: 8000 hours X $100 per hour = $800,000
Consultants: 4140 hours X $75 per hour = $310,500

Year 1 Total: $1,423,000

Year 2:

Early Education Specialist: 1500 hrs X $75 per hour = $112,500
Project Manager: 2000 hours x $100 per hour = $200,000
Consultants: 8000 hours X $100 per hour = $800,000
Consultants: 4140 hours X $75 per hour = $310,500

Year 2 Total: $1,423,000

Year 3:

Early Education Specialist: 1500 hrs X $80 per hour = $120,000
Project Manager: 2000 hours x $100 per hour = $200,000
Consultants: 7500 hours X $100 per hour = $750,000

Year 3 Total: $1,070,000

Year 4:

Early Education Specialist: 1500 hrs X $80 per hour = $120,000
Project Manager: 2000 hours x $100 per hour = $200,000
Consultants: 7500 hours X $100 per hour = $750,000

Year4 Total: $1,070,000

Total of Years 1 through 4: $4,986,000

7. Construction

n/a

8. Other
n/a

10. Indirect Costs
The indirect cost rate used for this project is 5.4% per year.

The formula used is (Direct Cost – Contractual – Equipment) X 5.4%

Year 1: $540
Year 2: $540
Year 3: $540
Year 4: $540
Grand Total: $2,160

11. Funding for Involved LEA's

The teacher evaluation model will be implemented statewide in years 3 and 4.

NH has 163 involved LEA's.

Activities:

1. Professional development for effective teacher models

- Demonstration of research on effective teachers
- Knowledge regarding student learning

2. Professional development for training using the model with teachers, principals, system leaders and teacher educators.

3. Development of professional portfolios for staff to demonstrate their own professional growth.

Costs will include embedded professional development :

Year 3: $200,000

Year 4: $300,000

Total for years 1 through 4: $500,000

12. Supplemental Funding for Participating LEA's

a)

Activities	Purpose	Total Project Cost	# of LEA's
• Adopt effective teacher standards • Implement teacher standards in district policy • Adopt Statewide evaluation model for teachers and leaders with a significant factor being student growth • Pilot and implement cohesive, coherent model for mentoring/coaching and induction of teachers and leaders • Link student achievement to professional development plans • Disseminate district projects to inform common work • Participate in Teacher Effectiveness Network • Participate in research and evaluation with the Stduy Group	Professional development and teacher evaluation for student and teacher success.	$7,423,019	7

b)

LEA	Rationale	Supplemental Subgrant cost	Total
Fremont	Based on its Title I share, this LEA would receive $89,873 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans.	$288,491 per year X 4	$1,153,966
Souhegan Cooperative	Based on its Title I share, this LEA would receive $16,264 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans. Souhegan, Mont Vernon, and Amherst School Districts will focus on student growth in all subject areas, using literacy as founding practice, through Career Growth Process— inquiry-based action research.	$58,433 per year X 4	$233,735
Winniesquam Regional	Based on its Title I share, this LEA would receive $592,843 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans. Winnisquam Regional will develop and implement a coaching model, based on data, for classroom instruction and leadership.	$126,789 per year X 4	$507,156

13. Total Costs:

	Yr 1	Yr 2	Yr 3	Yr 4	Total
9. Total Direct Costs (lines 1-8)	$1,433,000	$1,433,000	$1,080,000	$1,080,000	$5,026,000
10. Indirect Costs**	$540	$540	$540	$540	$2,160
					$0
11. Funding for Involved LEAs	$0	$0	$200,000	$300,000	$500,000
					$0
12. Supplemental Funding for Participating LEAs	$568,458	$568,458	$378,972	$378,972	$1,894,859
13. Total Costs (lines 9-12)	$2,001,998	$2,001,998	$1,659,512	$1,759,512	$7,423,019

New Hampshire Budget Justification

Project: STEM

1. Personnel:

Four State Department full time equivalents are requested to oversee the administrative and fiscal functions of the entire grant. Staff in these positions will be working across all seven defined projects. Full funding for these positions, including salary, benefits and equipment, has been identified and allocated in the "Lowest 5% Persistently Achieving Schools" project and will not be repeated here. The four positions include: Race to the Top Director, Auditor, Administrative Assistant and an Administrator for the Longitudinal Data System office for the term of this project.

2. Fringe Benefits

n/a

3. Travel:

We anticipate department staff working on the STEM Project will travel to conferences, out of state meetings and general travel within the state.

It has been assumed that the cost of airfare will be $750 roundtrip, per diem cost for the average hotel room $200, and per diem cost for meals $60. The per person cost for a 2 day or 4 day conference or course is as follows:

Trip Costs

Airfare: $750
Hotel: $200/night
Meals: $60/day
2-day trip: $750 + (2 x ($200 + 60)) = $1,270 per person
3-day trip: $750 + (3 x ($200 + 60)) = $1,530 per person
4-day trip: $750 + (4 x ($200 + 60)) = $1,790 per person

Year 1 through Year 4 Travel:

- In state travel to visit the school districts - $2,000 per year
- The extended cost for 2 department staff to attend 2-day national meetings is 2 x $1,270/person = $2,540 per meeting
- The extended cost for 2 department staff to attend 3-day national meetings is 2 x $1,530/person = $3,060 per year
- Out of state travel for meetings (no overnight) = $400 per year

Per Year Cost: In state travel $2,000; Out of state Travel $6,000

Grand Total of Years 1 through 4: In state travel $8,000; Out of state Travel $24,000

4. Equipment

n/a

5. Supplies

The costs of supplies for state staff working on this project includes (wipe boards, markers, pens, paper, printer cartridges, etc.) also meeting supplies.

Year 1- 4: $2,000 per year

Grand Total of Years 1 through 4: $8,000

6. Contractual

The State will follow procedures for procurement under 34 CFR Parts 74.40 – 74.48 and Part 80.36.

The state will contract with vendors to provide statewide partnerships with districts and communities to implement a comprehensive plan to increase achievement in and access to science, technology, engineering and mathematics education. Responsibilities include increasing access to high quality STEM-related courses; recruiting and retaining effective teachers, adopting standards based models for STEM teaching; and increasing student preparedness for college-level math, thus reducing the need for remediation.

These vendors will work closely with connected projects in Teacher Effectiveness, Leaderhip, and High School transformation, for example. Participation in standards and assessment will also be a part of this work, with a focus on STEM. The STEM initiatives will also be part of the work of the Research Group, to promote and support best practice.

The vendor(s) will lead the STEM Innovation Network.

Where possible, funds with Math Science Partnerships and other possible National Science Foundation funded initiatives (e.g., uch as those at UNH) will also be leveraged to support improvement in STEM.

Year 1:

Stem Project Manager: 1500 hrs X $75 per hour = $112,500
Consultants: 8000 hours X $100 per hour = $800,000

Consultants: 8400 hours X $75 per hour = $630,000

Year 1 Total: $1,542,500

Year 2:

Stem Project Manager: 1500 hrs X $75 per hour = $112,500
Consultants: 8000 hours X $100 per hour = $800,000
Consultants: 8400 hours X $75 per hour = $630,000

Year 2 Total: $1,542,500

Year 3:

Stem Project Manager: 1500 hrs X $80 per hour = $120,000
Consultants: 5000 hours X $100 per hour = $500,000
Consultants: 6101 hours X $75 per hour = $457,575

Year 3 Total: $1,077,575

Year 3:
Year 4:

Stem Project Manager: 1500 hrs X $80 per hour = $120,000
Consultants: 5000 hours X $100 per hour = $500,000
Consultants: 6101 hours X $75 per hour = $457,575

Year 4 Total: $1,077,575

Grand Total of Years 1 through 4: $5,240,150

7. Construction

n/a

8. Other
n/a

10. Indirect Costs
The indirect cost rate used for this project is 5.4% per year.

The formula used is (Direct Cost – Contractual – Equipment) X 5.4%

Year 1: $540
Year 2: $540
Year 3: $540
Year 4: $540
Grand Total: $ 2,160

11. **Funding for Involved LEA's**

n/a

12. Supplemental Funding for Participating LEA's

a)

Activities	Purpose	Total Project Cost	# of LEA's
• Develop statewide partnerships with districts and communities to implement a comprehensive plan to increase achievement in and access to science, technology, engineering and mathematics education. • Develop strategies for recruitment and retention of effective teachers in STEM, including compensation strategies. • Increasing student preparedness for college-level math, thus reducing the need for remediation.	To increase student success in science, technology, engineering and mathematics and successful preparation for post secondary education.	$7,502,283	6

b)

LEA	Rationale	Supplemental Subgrant cost	Total

Marlborough	Based on its Title I share, this LEA would receive $77,532 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans. Marlborough will partner with Keene State College on enhancing student learning and teacher quality in science, technology, engineering, mathematics and world language disciplines. Also piloting a mentoring and residency program to be taken statewide.	$451,576 per year X 4	$1,806,307
Andover	Based on its Title I share, this LEA would receive $66,333 of the State's RttT grant; this subgrant from the State's 50% increases the LEA's funding to allow it to fully participate in all state plans.	$103,416 per year X 4	$413,666

13. Total Costs:

	Yr 1	Yr 2	Yr 3	Yr 4	Total
9. Total Direct Costs (lines 1-8)	**$1,552,500**	**$1,552,500**	**$1,087,575**	**$1,087,575**	**$5,280,150**

10. Indirect Costs**	**$540**	**$540**	**$540**	**$540**	**$2,160**
					$0
11. Funding for Involved LEAs	**$0**	**$0**	**$0**	**$0**	**$0**
					$0
12. Supplemental Funding for Participating LEAs	**$665,992**	**$665,992**	**$443,995**	**$443,995**	**$2,219,973**
13. Total Costs (lines 9-12)	**$2,219,032**	**$2,219,032**	**$1,532,110**	**$1,532,110**	**$7,502,283**

Budget: Indirect Cost Information

To request reimbursement for indirect costs, please answer the following questions:

Does the State have an Indirect Cost Rate Agreement approved by the Federal government?

YES ✓
NO ○

If yes to question 1, please provide the following information:

Period Covered by the Indirect Cost Rate Agreement (mm/dd/yyyy):

From: 07/01/2009_ To: 06/30/2011_____

Approving Federal agency: _✓_ED ___Other

(Please specify agency): _____

Directions for this form:

1. Indicate whether or not the State has an Indirect Cost Rate Agreement that was approved by the Federal government.

2. If "No" is checked, ED generally will authorize grantees to use a temporary rate of 10 percent of budgeted salaries and wages subject to the following limitations:
   (a) The grantee must submit an indirect cost proposal to its cognizant agency within 90 days after ED issues a grant award notification; and
   (b) If after the 90-day period, the grantee has not submitted an indirect cost proposal to its cognizant agency, the grantee may not charge its grant for indirect costs until it has negotiated an indirect cost rate agreement with its cognizant agency.

If "Yes" is checked, indicate the beginning and ending dates covered by the Indirect Cost Rate Agreement. In addition, indicate whether ED, another Federal agency (Other) issued the approved agreement. If "Other" was checked, specify the name of the agency that issued the approved agreement.

New Hampshire Race to the Top Application

Table of Contents (of the CD and accompanying documents)

1. Signatures and Assurances: Included as originals and one set of copies with the package containing this CD

    - Application page 12, Race to the Top Application Assurances: Signatures of Governor; Chief State School Officer; and, President of the State Board of Education
    - Application page 13, State Attorney General Certification: Signature of Attorney General
    - Application page 14-16, Accountability, Transparency, Reporting, and Other Assurances and Certifications: Signatures of Governor or authorized representative
2. Section A: State Success Factors
3. Section B: Standards and Assessments
4. Section C: Data Systems to Support Instruction
5. Section D: Great Teachers and Leaders
6. Section E: Turning Around the Lowest-Achieving Schools
7. Section F: General
8. Competitive Priorities:
    - Priority 1: Comprehensive Approach to Education Reform (addressed throughout proposal)
    - Priority 2: Emphasis on Science, Technology, Engineering and Mathematics (STEM) included
    - Priority 3: Innovations for Improving Early Learning Outcomes included
    - Priority 4: Expansion and Adaptation of Statewide Longitudinal Data Systems included
    - Priority 5: P-20 Coordination, Vertical and Horizontal Alignment included
    - Priority 6: School-Level Conditions for Reform, Innovation, and Learning, not included
9. Budget Part I: Budget Summary Table –Evidence for (A) (2)(i)(d)
10. Budget Part II: Project-Level Budget Summary

Appendices:

11. Appendix A
12. Appendix B
13. Appendix C: There is no Appendix C
14. Appendix D
15. Appendix E: There is no Appendix E
16. Appendix F
17. Appendix H: Budget Narrative for Budget Part I
18. Appendix I: Budget Narratives for Projects
19. Appendix J: Budget Indirect Cost Information