Rigor

Introduction & Purpose

- Define what RIGOR means for the purpose of these modules
- Use the VERBS in standards, and other tools, to identify the COGNITIVE COMPLEXITY in standards
- Explain why assessments with an appropriate level of rigor also measure a RANGE OF STUDENT THINKING AND UNDERSTANDING
- Use the ASSESSMENT BLUEPRINT to document the level of rigor of each skill

Key Concepts

- Alignment
- Scoring
- Bias
- Precision
- RIGOR
Rigor

KEY CONCEPTS

**Rigor**

the cognitive complexity of a skill within a standard or of an assessment item

Sources:
- Kansas State Department of Education, "Assessment Literacy Project"
- Ohio Department of Education, "Assessment Literacy: Identifying and Developing Valid and Reliable Assessments" (2013)
- Relay Graduate School of Education, "Designing and Evaluating Assessments" (2014)
- Rhode Island Department of Education, "Deepening Assessment Literacy"
KEY CONCEPTS

How to Match the Rigor of Assessment Items to the Rigor of Skills

Source: Tennessee Department of Education, "Tennessee's State Mathematics Standards: Grade 3" (2010).

Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.
KEY CONCEPTS

Interpret whole-number quotients of whole numbers, e.g., \( \frac{56}{8} \) as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 \( \div \) 8.

→ Interpret whole-number quotients of whole numbers.

What is \( 12 \div 3 \)?
KEY CONCEPTS

Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.

What is 12 ÷ 3?

Suppose there are 4 tanks and 3 fish in each tank. The total number of fish in this situation can be expressed as 4 × 3 = 12.

a. Describe what is meant in this situation by 12 ÷ 3 = 4
b. Describe what is meant in this situation by 12 ÷ 4 = 3
Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as $56 \div 8$.
Use the relationship between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

Source: New York State Department of Education, "New York State P-12 Common Core Learning Standards for English Language Arts & Literacy" (2010).
Use the relationship between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

Which of the following words is an antonym of "tense"?

a. troubled  
b. calm  
c. concerned  
d. smooth
Last year my family went to a national park for our vacation. We saw wild animals that we had seen only in books, and we were amazed by the landscape of trees and rivers. The highlight of the trip was an arduous hike we took to the top of a small mountain. Though the hike was not easy, due to all the loose rocks and exposed roots on the path, the spectacular view from the top was worth it!

What does the word “arduous” mean in this passage?
Rigor

**KEY CONCEPTS**

1. Describe
2. Explain
3. Interpret

**LEVEL ONE** (Recall)
- Design
- Synthesize
- Connect
- Apply Concepts
- Critique
- Analyze
- Create
- Prove
- Arrange
- Calculate
- Draw
- Repeat
- Tabulate
- Recognize
- Memorize
- Identify
- Who, What, When, Where, Why
- List
- Name
- Use
- Illustrate
- Measure
- Define
- Recall
- Match
- Graph
- Classify
- Cause/Effect
- Estimate
- Compare
- Relate
- Infer
- Categorize
- Organize
- Interpret
- Predict
- Modify
- Summarize
- Show
- Construct
- Develop a Logical Argument
- Assess
- Revise
- Hypothesize
- Investigate
- Critique
- Compare
- Formulate
- Draw Conclusions
- Explain
- Differentiate
- Use Concepts to Solve Non-Routine Problems

**LEVEL TWO** (Skill/Concept)

**LEVEL THREE** (Strategic Thinking)

**LEVEL FOUR** (Extended Thinking)


**Source:** Moody, Michael, and Jason Stricker, *Strategic Design for Student Achievement* (2008).
Rigor

KEY CONCEPTS

1. Remember
2. Understand
3. Apply
4. Analyze
5. Evaluate
6. Create

Remember
Information
Explain Ideas or Concepts
Use Information in a New Way
Distinguish Between Parts
Justify a Position or Decision
Create a New Product or Point of View

Source: Words, Michael, and Jason Stricker, Strategic Design for Student Achievement (2008).


Read the passage below. Then answer the question.

Last year my family went to a national park for our vacation. We saw wild animals that we had seen only in books, and we were amazed by the landscape of trees and rivers. The highlight of the trip was an arduous hike we took to the top of a small mountain. Though the hike was not easy, due to all the loose rocks and exposed roots on the path, the spectacular view from the top was worth it!

What does the word "arduous" mean in this passage?

Which of the following words is an antonym of "tense"?

a. troubled
b. calm
c. concerned
d. smooth

Integrate information presented in different media or formats [e.g., visually, quantitatively] as well as in words to develop a coherent understanding of a topic or issue.

Adapt
Rigorous
Design
Development
Change
Innovation
Integrate
Process
Plan
Product
Planning
Validation
Translation
Rigor

**KEY CONCEPTS**

Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

<table>
<thead>
<tr>
<th>Remember Information</th>
<th>Understand Information or Concepts</th>
<th>Apply Information in a New Way</th>
<th>Analyze Information Between Parts</th>
<th>Evaluate Justify a Position or Decision</th>
<th>Create a New Product or Point of View</th>
</tr>
</thead>
</table>

**KEY CONCEPTS**

How to Measure a Range of Student Thinking and Understanding

**KEY CONCEPTS**

Assessment Items

"Stretch" Items & Lower-Level Items
The student solves problems involving direct proportional relationships. The student is expected to estimate and find solutions to application problems involving percent; and estimate and find solutions to application problems involving proportional relationships such as similarity, scaling, unit costs, and related measurement units.

Source: Texas Education Agency Student Assessment Division, "Grade 7 Mathematics Assessment" (2010).
1. What is 67 percent of 81?
2. Shawn got 7 correct answers out of 10 possible answers on his science test. What percentage of questions did he answer correctly?
3. Adam was on pace to set a high-school basketball record for free throw percentage. Going into his senior year, he had made 97 of 104 free throw attempts. What percentage of free throws had he made?
4. Adam and Jamie were competing for the best free throw percentage. Adam made 94 percent of his first 103 shots, whereas Jamie made 47 of 51 shots.
   a. Which one had a better shooting percentage?
   b. In the next game, Adam made only 2 of 10 shots, and Jamie made 7 of 10 shots. Who has the current shooting percentage? Who is the better shooter?
   c. Christine argued that if Adam and Jamie each made their next 10 shots, their shooting percentages would go up the same amount. Is this true? Why or why not? Describe in detail how you arrived at your answers.


The student solves problems involving direct proportional relationships. The student is expected to estimate and find solutions to application problems involving percent; and estimate and find solutions to application problems involving proportional relationships such as similarity, scaling, unit costs, and related measurement units.
### KEY CONCEPTS

#### 5th Grade

**Reading and Writing about Informational Texts**

- **Main Concepts**
  - Summative
  - Reading Informational Text 1:
    - Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
    - Quote accurately from the text (explicitly and making inferences).
  - Reading Informational Text 2:
    - Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
    - Identify main ideas and how key details support them.
  - Reading Informational Text 4:
    - Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.
    - Determine the meaning of new vocabulary words.
  - Reading Informational Text 8:
    - Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).
    - Explain how the author uses evidence to support his or her claims.
  - Writing 1:
    - Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
    - Write an opinion piece on texts.
    - Support your point of view with evidence.

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### Writing and Selecting Assessment Items

<table>
<thead>
<tr>
<th>Item #</th>
<th>Standard(s) and/or Skill(s)</th>
<th>Type of Item</th>
<th>Level(s) of Rigor</th>
<th># of Points</th>
<th>% of Assessment</th>
</tr>
</thead>
</table>

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**TOTAL**

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**Rigor**
KEY CONCEPTS

1. Primary Purpose of the Assessment
   - Summative

2. Standard(s) (one per row)
3. Skill(s) (one per row)
4. Level(s) of Rigor
5. Possible Type(s) of Items

Reading Informational Text 1:
- Quote accurately from the text when explaining what the text says explicitly and when drawing inferences from the text.

Reading Informational Text 2:
- Identify main ideas and how key details support them.

Reading Informational Text 4:
- Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

Reading Informational Text 8:
- Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).

Writing 1:
- Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

6. Write and/or Select Assessment Items

<table>
<thead>
<tr>
<th>Item #</th>
<th>Standard(s) and/or Skill(s) Type of Item Level(s) of Rigor</th>
<th># of Points</th>
<th>% of Assessment</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>TOTAL</td>
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</tr>
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<td>Standard(s) and/or Skill(s)</td>
<td>Type of Item</td>
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<tr>
<td>--------</td>
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</tr>
<tr>
<td>1</td>
<td>Reading Informational Text 1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.</td>
<td></td>
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<tr>
<td>2</td>
<td>Reading Informational Text 2: Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.</td>
<td></td>
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<tr>
<td>3</td>
<td>Reading Informational Text 4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.</td>
<td></td>
<td>2</td>
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<tr>
<td>4</td>
<td>Reading Informational Text 8: Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Writing 1: Write opinion pieces on topics or texts, supporting a point of view with reasons and information.</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

6. Write and/or Select Assessment Items

**Higher-Order Thinking**

1. Remembering
2. Understanding
3. Applying
4. Analyzing
5. Evaluating
6. Creating
<table>
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<th>Item #</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Reading Informational Text 1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.</td>
<td>Quote accurately from the text (explicitly and making inferences).</td>
<td>SR</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Reading Informational Text 2: Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.</td>
<td>Identify main ideas and how key details support them.</td>
<td>CR</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Reading Informational Text 4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.</td>
<td>Determine the meaning of new vocabulary words.</td>
<td>SR</td>
<td>2</td>
<td></td>
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<tr>
<td>8</td>
<td>Reading Informational Text 8: Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).</td>
<td>Explain how the author uses evidence to support his or her claims.</td>
<td>CR</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Writing 1: Write opinion pieces on topics or texts, supporting a point of view with reasons and information.</td>
<td>Write an opinion piece on texts.</td>
<td>CR, PT</td>
<td>5</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Support your point of view with evidence.</td>
<td>CR, PT</td>
<td>5</td>
<td></td>
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CHECK FOR UNDERSTANDING

Define what RIGOR means for the purpose of these modules

- Use the VERBS in standards, and other tools, to identify the COGNITIVE COMPLEXITY in standards
- Explain why assessments with an appropriate level of rigor also measure a RANGE OF STUDENT THINKING AND UNDERSTANDING
- Use the ASSESSMENT BLUEPRINT to document the level of rigor of each skill

CHECK FOR UNDERSTANDING

Assessment Items
Using Bloom's Taxonomy, identify the level or levels of rigor in this standard from Iowa. Remember to pay close attention to the verbs.

Understand the use of geographic tools to locate and analyze information about people, places, and environments.

The key verbs in the skills in this standard are "use" and "analyze," which are associated with lower- and higher-order skills. "Understand" is a level 1 skill, and "analyze" is a level 4 skill.
2. Explain in your own words why well-designed assessments should measure a range of student thinking and understanding.

Well-designed assessments include items with various levels of rigor to ensure that they measure what all students know and can do. If assessments are too easy, some students may not have the opportunity to demonstrate the upper bounds of what they know and can do. I should include items in my assessment that challenge all of my students.

On the other hand, if assessments are too complex, some students may not be able to showcase their knowledge and skills at all. I can include items that require lower-level thinking to reveal where learning breaks down among students struggling to master a standard.