Rigor
Alternative Module Using Webb’s Depth of Knowledge

KEY CONCEPTS

INTRODUCTION & PURPOSE

Define what RIGOR means for the purpose of these modules
Use the VERBS in standards and tools that teachers have available 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
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**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”
- Relay Graduate School of Education, Designing and Evaluating Assessments (2014)
- Rhode Island Department of Education, “Deepening Assessment Literacy.”
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.

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

→ Interpret whole-number quotients of whole numbers.

KEY CONCEPTS

What is 12 ÷ 3?

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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

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
KEY CONCEPTS

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 $56 \div 8$. 

"Division Standard"
Use the relationship between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.
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KEY CONCEPTS

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
KEY CONCEPTS

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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?


Read the passage below. Then answer the question.

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

KEY CONCEPTS

Tools to Help You Think About Rigor
Rigor
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Level One (Recall):
- Describe
- Explain
- 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
- Identify
- 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 Three (Strategic Thinking):
- Describe
- Explain
- Interpret
- Level Three (Strategic Thinking)
- 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
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Level Two (Skill/Concept):
- Describe
- Explain
- Interpret
- Level Two (Skill/Concept)
- Design
- Synthesize
- Connect
- Apply Concepts
- Critique
- Analyze
- Create
- Prove
- Arrange
- Calculate
- Draw
- Repeat
- Tabulate
- Recognize
- Memorize
- Identify
- Who, What, When, Where, Why
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- Revise
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- Critique
- Compare
- Formulate
- Draw Conclusions
- Explain
- Differentiate
- Use Concepts to Solve Non-Routine Problems

Level Four (Extended Thinking):
- Describe
- Explain
- Interpret
- Level Four (Extended Thinking)
- 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
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- Identify
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KEY CONCEPTS

Describe
Explain
Interpret

LEVEL ONE
(Recall)

LEVEL THREE
(Strategic Thinking)

LEVEL TWO
(Skill/Concept)

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 FOUR
(Extended Thinking)

KEY CONCEPTS

Which of the following words is an antonym of “tense”? 

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

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?

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.
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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.

KEY CONCEPTS
How to Measure a Range of Student Thinking and Understanding

KEY CONCEPTS
Assessment Items
"Stretch" Items & Lower-Level Items
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KEY CONCEPTS

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).
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KEY CONCEPTS
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. What are their new overall shooting percentages? Who had a 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.


KEY CONCEPTS
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
How to Use the Assessment Blueprint
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KEY CONCEPTS

1. Primary Purpose of the Assessment
   Summative

2. Standard(s) (one per row)
   Reading Informational Text 1:
   - Quote accurately from the text when explaining what the text says explicitly and when drawing inferences from the text.

3. Skill(s) (one per row)
   - Quote accurately from the text (explicitly and making inferences).

4. Level(s) of Rigor
   - 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.

5. Possible Type(s) of Items
   - Determine the meaning of new vocabulary words.

6. Writing 1:
   - Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).

7. Writing 2:
   - Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

8. Writing 3:
   - Support your point of view with evidence.

9. Write and/or Select Assessment Items
   - Item #
   - Standard(s) and/or Skill(s)
   - Type of Item
   - Level(s) of Rigor
   - # of Points
   - % of Assessment

TOTAL
Rigor
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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 a text when explaining what the text says explicitly and when drawing inferences from the text.

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.

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
Item # Standard(s) and/or Skill(s) Type of Item Level(s) of Rigor % of Assessment

TOTAL
Rigor

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CHECK FOR UNDERSTANDING

Define what RIGOR means for the purpose of these modules

Use the VERBS in standards and tools that teachers have available 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

Assessment Items
1. Using Webb’s Depth of Knowledge levels, 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 2 skill, and “analyze” is a level 4 skill.
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CHECK FOR UNDERSTANDING

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.
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CONCLUSION