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

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KEY CONCEPTS

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

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.

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What is 12 ÷ 3?
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What is 12 ÷ 3?

Source: "Fish Tanks," Illustrative Mathematics.

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

\[ 4 \times 3 = 12. \]

a. Describe what is meant in this situation by 12 ÷ 3 = 4
b. Describe what is meant in this situation by 12 ÷ 4 = 3
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KEY CONCEPTS

How to Use Verbs to Determine a Skill’s Level of Rigor

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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).
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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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KEY CONCEPTS

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?

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KEY CONCEPTS

1. Remembering
2. Understanding
3. Applying
4. Analyzing
5. Evaluating
6. Creating

Lower-Order Thinking
Higher-Order Thinking

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

KEY CONCEPTS

1. Recognize
2. Memorize
3. Identify
5. List
6. Name
7. Use
8. Illustrate
9. Measure
10. Define
11. Recall
12. Match
13. Graph
14. Classify
15. Cause/Effect
16. Estimate
17. Compare
18. Relate
19. Infer
20. Categorize
21. Organize
22. Interpret
23. Predict
24. Modify
25. Summarize
26. Show
27. Construct
28. Develop a Logical Argument
29. Assess
30. Revise
31. Hypothesize
32. Investigate
33. Critique
34. Compare
35. Formulate
36. Draw Conclusions
37. Explain
38. Differentiate
39. Use Concepts to Solve Non-Routine Problems
40. Draw
41. Calculate
42. Tabulate
43. Arrange
44. Prove
45. Create
46. Analyze
47. Critique
48. Apply Concepts
49. Synthesize
50. Connect
51. Design
52. Explain
53. Interpret

LEVEL ONE (Recall)

LEVEL TWO (Skill/Concept)

LEVEL THREE (Strategic Thinking)

LEVEL FOUR (Extended Thinking)

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KEY CONCEPTS

LEVEL ONE (Recall)
- 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
- List
- Name
- Use
- Illustrate
- Measure
- Define
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LEVEL THREE (Strategic Thinking)
- Design
- Synthesize
- Connect
- Apply Concepts
- Critique
- Analyze
- Create
- Prove
- Arrange
- Calculate
- Draw
- Repeat
- Tabulate
- Recognize
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- Who, What, When, Where, Why
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- Explain
- Differentiate
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LEVEL FOUR (Extended Thinking)
- Design
- Synthesize
- Connect
- Apply Concepts
- Critique
- Analyze
- Create
- Prove
- Arrange
- Calculate
- Draw
- Repeat
- Tabulate
- Recognize
- Memorize
- Identify
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What does the word “arduous” mean in this passage?

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**

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.
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. What are the current shooting percentages? 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.

How to Use the Assessment Blueprint
### Rigor

**Alternative Module Using Webb’s Depth of Knowledge**

<table>
<thead>
<tr>
<th>Key Concepts</th>
<th>3. Skill(s) (one per row)</th>
<th>4. Level(s) of Rigor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quote accurately from the text (explicitly and making inferences).</td>
<td>Level(s) of Rigor</td>
</tr>
<tr>
<td></td>
<td>Identify main ideas and how key details support them.</td>
<td>Level(s) of Rigor</td>
</tr>
<tr>
<td></td>
<td>Determine the meaning of new vocabulary words.</td>
<td>Level(s) of Rigor</td>
</tr>
<tr>
<td></td>
<td>Explain how the author uses evidence to support his or her claims.</td>
<td>Level(s) of Rigor</td>
</tr>
<tr>
<td></td>
<td>Write an opinion piece on texts.</td>
<td>Level(s) of Rigor</td>
</tr>
<tr>
<td></td>
<td>Support your point of view with evidence.</td>
<td>Level(s) of Rigor</td>
</tr>
</tbody>
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# Rigor

## Alternative Module Using Webb’s Depth of Knowledge

### Key Concepts

<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>
<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>1</td>
<td>1</td>
<td>1</td>
<td>1</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>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<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>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<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>3</td>
<td>3</td>
<td>3</td>
<td>3</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>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

### 6. Write and/or Select Assessment Items

- **Summative**
- **Level(s) of Rigor**
- **Possible Type(s) of Items**
<table>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.</td>
<td>SR</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Identify main ideas and how key details support them.</td>
<td>CR</td>
<td>2</td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>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>SR</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>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>CR</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Write opinion pieces on topics or texts, supporting a point of view with reasons and information.</td>
<td>CR, PT</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Support your point of view with evidence.</td>
<td>CR, PT</td>
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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.

CHECK FOR UNDERSTANDING

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.

Check for Understanding

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Answer

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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.
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.