Most Misunderstood Standards in Grades 6-8

Brian Dean & Rebecca Few

@FLMathNinja
@few_Rebecca
Who I Am

- Brian Dean (he/him/his)
- Associate Director of Instructional Support for Instruction Partners
- Former Senior Instructional Specialist, Instructional Coach and Classroom Teacher
- Known as Husband \( (-i^2) \) and Daddy to \( \sqrt[3]{8} \)
- Lover of learning and becoming better today than I was yesterday
Who I Am

- Rebecca (she/her/hers)
- Senior Content Lead, Instruction Partners
- Former Instructional Coach and Teacher
- My favorite quote is... “if only we listened with the same passion that we feel about being heard.”
- Author of Most Misunderstood Standards 3-5 Blog
List one feeling or emotion you are bringing into this space tonight.
Goal for Our Time Together

Understand the mathematical and pedagogical implications of some misunderstood standards in Grades 6-8 in order to help teachers make great instructional decisions as well as to support equitable instruction for all students.
What content knowledge is needed to teach *students* this concept?

Domains of Mathematical Knowledge for Teaching

**Source:** Content Knowledge for Teaching: What makes it Special?  
Ball, Thames, Phelps (2008)
Moving from Common Content Knowledge to Specialized Content Knowledge

You are stuck in a big traffic jam on the freeway and you are wondering how long it will take to get to the next exit, which is 1½ miles away. You are timing your progress and find that you can travel 2/3 of a mile in one hour (obviously you are traveling on I-4). If you continue to make progress at this rate, how long will it be until you reach the exit?

https://tasks.illustrativemathematics.org/content-standards/6/NS/A/1/tasks/464
6.NS.A.1

Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

What might be misunderstood about this standard?

What instructional decisions about this standard would support or hinder an equitable mathematics lesson?
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Moving from Common Content Knowledge to Specialized Content Knowledge

https://tasks.illustrativemathematics.org/content-standards/6/NS/A/1/tasks/464
Moving from Common Content Knowledge to Specialized Content Knowledge

Solution: Number line solution

A number line shows points marked at intervals of one hour. The intervals are labeled from 0 to 13, with each whole number and half-hour marked. The line is divided into segments, each labeled as 1 hour.
LOOKING AT A PROGRESSION OF THE MOST MISUNDERSTOOD STANDARDS IN GRADES 6-8
Looking at the progression

7.RP.A.2
Recognize and represent proportional relationships between quantities.

7.RP.A.2.a
Decide whether two quantities are in a proportional relationship, e.g., by testing for...

7.RP.A.2.b

7.RP.A.2.c
Identify the constant of proportionality (unit rate) in tables, graphs, equations...

7.RP.A.2.d
Represent proportional relationships by equations. For example, if total cost t is...
Grade 6 | 6.RP.A.3

- **6.RP.A.3**: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

- **6.RP.A.3c**: Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
Jasmine has taken an online boating safety course and is now completing her end-of-course exam. As she answers each question, the progress bar at the bottom of the screen shows what portion of the test she has finished. She has just completed Question 16, and the progress bar shows she is 20% complete. How many total questions are on the test?
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What would you expect to see in terms of student work in order to demonstrate mastery of this standard through this task?

https://nysed-prod.engageny.org/resource/grade-6-mathematics-module-1/file/110561
What would you expect to see in terms of student work in order to demonstrate mastery of this standard through this task?
Grade 6 | 6.RP.A.3c

Tape Diagram

14 | The rest
20%

5 x 14 = 80
80 questions
Grade 6 | 6.RP.A.3c

Ratio Reasoning

Questions : Percent

16 : 20
8 : 10
80 : 100

80 questions
Grade 6 | 6.RP.A.3c

<table>
<thead>
<tr>
<th>Percent</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>40</td>
<td>32</td>
</tr>
<tr>
<td>60</td>
<td>64</td>
</tr>
<tr>
<td>100</td>
<td>80</td>
</tr>
</tbody>
</table>
-grade 6 | 6.rp.a.3c

**Double Number Line**

- **Questions:** 0, 10, 32, 48, 64, 80
- **Percent:** 0, 20, 40, 60, 80, 100

[Circle around 80 questions]
Grade 6 | 6.RP.A.3c

\[
\text{Equation}
\]

\[
0.20q = 16
\]

\[
\frac{0.20q}{0.20} = \frac{16}{0.20}
\]

\[q = 80\]

80 questions
6.RP.A.3c

Jasmine has taken an online boating safety course and is now completing her end-of-course exam. As she answers each question, the progress bar at the bottom of the screen shows what portion of the test she has finished. She has just completed Question 16, and the progress bar shows she is 20% complete. How many total questions are on the test?

What would you expect to see in terms of student work in order to demonstrate mastery of this standard?

What did we not see?
What would you expect to see in terms of student work in order to demonstrate mastery of this standard?

Why We Don’t Cross Multiply

KATE NOWAK
DIRECTOR OF CURRICULUM

FEATUR ED BLOG POST
Why We Don’t Cross Multiply

By Kate Nowak
(co-authored with Kristin Gray)

https://illustrativemathematics.blog/2018/02/06/why-we-dont-cross-multiply/
Pause and Reflect

How can building our specialized content knowledge for teaching students mathematics support equitable instruction for each and every learner?
How can building our specialized content knowledge for teaching students mathematics support equitable instruction for each and every learner?
Looking at the progression

Ratios And Proportional Relationships

Analyze Proportional Relationships And Use Them To Solve Real-World And Mathematical Problems.

MAJOR CLUSTER

7.RP.A.2

Recognize and represent proportional relationships between quantities.

7.RP.A.2.a

Decide whether two quantities are in a proportional relationship, e.g., by testing for

7.RP.A.2.b

Identify the constant of proportionality (unit rate) in tables, graphs, equations

7.RP.A.2.c

Represent proportional relationships by equations. For example, if total cost t is
7.RP.A.2a: Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

7.RP.A.2d: Explain what a point \((x, y)\) on the graph of a proportional relationship means in terms of the situation, with special attention to the points \((0, 0)\) and \((1, r)\) where \(r\) is the unit rate.
Classwork

Example 1: Pay by the Ounce Frozen Yogurt

A new self-serve frozen yogurt store opened this summer that sells its yogurt at a price based upon the total weight of the yogurt and its toppings in a dish. Each member of Isabelle’s family weighed his dish, and this is what they found. Determine if the cost is proportional to the weight.

<table>
<thead>
<tr>
<th>Weight (ounces)</th>
<th>12.5</th>
<th>10</th>
<th>5</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost ($)</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>3.20</td>
</tr>
</tbody>
</table>

The cost _________________________________ the weight.
Carli’s class built some solar-powered robots. They raced the robots in the parking lot of the school. The graphs below are all line segments that show the distance, in meters, that each of three robots traveled after seconds.

Each graph has a point labeled. What does the point tell you about how far that robot has traveled?

Carli said that the ratio between the number of seconds each robot travels and the number of meters it has traveled is constant. Is she correct? Explain.

How fast is each robot traveling? How did you compute this from the graph?

https://tasks.illustrativemathematics.org/content-standards/7/RP/A/2/tasks/181
Looking at the progression

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**MAJOR CLUSTER**

7.RP.A.2

Recognize and represent proportional relationships between quantities.

- 7.RP.A.2.a

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- 7.RP.A.2.d

Decide whether two quantities are in a proportional relationship. e.g., by testing for

Identify the constant of proportionality (unit rate) in tables, graphs, equations.

Represent proportional relationships by equations. For example, if total cost t is
Grade 8 | 8.EE.B.6

Use similar triangles to explain why the slope $m$ is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at $b$. 
Student-Facing Task Statement

1. The figure shows three right triangles, each with its longest side on the same line.

Your teacher will assign you two triangles. Explain why the two triangles are similar.
Student-Facing Task Statement

1. The figure shows three right triangles, each with its longest side on the same line.

Your teacher will assign you two triangles. Explain why the two triangles are similar.

How does specialized content knowledge for teaching students the concept of slope using similar triangles support equitable instruction for each and every learner?
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Goal for Our Time Together

Understand the mathematical and pedagogical implications of some misunderstood standards in Grades 6-8 in order to help teachers make great instructional decisions as well as to support equitable instruction for all students.
So what? Now what?
Recommendations moving forward

Attend to the language of the standard and design instruction that highlights the true intent of the standard

Know the progression of content and be able to identify the essential prerequisite knowledge needed for all students to have access to the grade-level standard

We are better together!
Where can I learn more?
Contact Info

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Or just send the math bat signal