College and Career Readiness Standards-in-Action

Foundational Unit

3

WORKSHOP MATERIALS
MATHEMATICS

ENGAGING THE THREE COMPONENTS OF RIGOR

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For Participants

For Facilitators

Directions for Participants

1. Check the component(s) of rigor that are likely to be required in a lesson, activity, or task that targets each CCR Standard on the Engaging the Three Components of Rigor worksheet. Make notes about your rationales.

2. Discuss your reasoning at your table, using these questions to guide your discussion:

   - What makes you think a particular component of rigor applies?
   - Are there certain words or phrases in the standard that provide clues?
   - Which components of rigor might appear together in a single standard? Explain.
   - Which components of rigor are not likely to appear together in a single standard? Explain.

Worksheet: Engaging the Three Components of Rigor

Coding Guide:

CU = Conceptual Understanding
PSF = Procedural Skill and Fluency
A = Application

Note: More than one component of rigor may apply for a standard.

	CCR Standard	Component of Rigor			Rationale
		CU	PSF	A	
1	Understand that a set of data collected to answer a statistical question has a distribution, which can be described by its center, spread, and overall shape. (6.SP.2; Level C)				
2	Fluently multiply multi-digit whole numbers using the standard algorithm. (5.NBT.5; Level C)				
3	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement. (4.MD.5; Level C)				

		CU	PSF	A	
4	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (6.SP.2; Level C)	CU	PSF	A	
5	Solve multi-step word problems posed with whole numbers and having whole number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (4.OA.3; Level C)	CU	PSF	A	
6	Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. (7.NS.2d; Level D)	CU	PSF	A	
7	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. (6.NS.1; Level C)	CU	PSF	A	

		CU	PSF	A	
8	Understand solving an equation or inequality as a process of answering a question: Which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. (6.EE.5; Level C)				
9	Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real-world problems. (5.MD.5c; Level C)				
10	Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. (5.NF.3; Level C)				

Answer Key: Engaging the Three Components of Rigor

Coding Guide:

CU = Conceptual Understanding
PSF = Procedural Skill and Fluency
A = Application

Note: Some of the standards used in this activity also were used in the coherence unit, and so they should look familiar. Some standards may address more than one component of rigor.

CCR Standard		Component of Rigor			Rationale
		CU	**PSF**	**A**	
1	**Understand** that a set of data collected to answer a statistical question has a distribution, which can be described by its center, spread, and overall shape. (6.SP.2; Level C)	√	--	--	*The focus of this standard is on the conceptual understanding of the variability of quantitative data.*
2	**Fluently** multiply multi-digit whole numbers using the standard algorithm. (5.NBT.5; Level C)		√	--	*This standard focuses on fluency with multiplication of whole numbers.*
3	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and **understand** concepts of angle measurement. (4.MD.5; Level C)	√	--	--	*This standard focuses on developing an understanding of angle measurement.*
4	**Understand** the concept of a ratio and **use ratio language to describe** a ratio relationship between two quantities. (6.SP.2; Level C)	√	--	--	*This standard focuses on developing an understanding of ratios.*

	CCR Standard	Component of Rigor			Rationale
		CU	PSF	A	
5	**Solve multi-step word problems** posed with whole numbers and having whole number answers using the four operations, including problems in which **remainders must be interpreted.** Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (4.OA.3; Level C)	√	--	√	*This standard asks for understanding the concept of remainders and expressions, but also for applications that use them.*
6	Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. (7.NS.2d; Level D)	--	√	--	*This standard focuses on the procedural skill of converting fractions to decimals. (Note: This example does not use the word "fluent.")*
7	**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. (6.NS.1; Level C)	√	--	√	*This standard asks for understanding (to interpret), and also applications that require division of fractions.*
8	**Understand** solving an equation or inequality as a process of answering a question: Which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. (6.EE.5; Level C)	√	--	--	*This standard focuses on developing an understanding of solving an equation or inequality.*
9	**Recognize** volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to **solve real-world problems.** (5.MD.5c; Level C)	√	--	√	*This standard asks for understanding of the additive quality of volume and also solving problems involving volume.*

CCR Standard	Component of Rigor			Rationale
	CU	**PSF**	**A**	
10 **Interpret** a fraction as division of the numerator by the denominator (a/b = a ÷ b). **Solve word problems** involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. (5.NF.3; Level C)	√	--	√	*This standard asks for understanding of a fraction as a division problem (and the connection between remainders and solutions as mixed numbers), and also solving problems involving division with mixed number solutions.*

The compound standards in 5, 7, 9, and 10 are likely to have two components of rigor present in a lesson.