# Module 1: Section 1D: A Closer Look at the Standards for Mathematical Content: Fifth Grade Sample Tasks

## Task 1:

Solve the word problems using the RDW strategy. Show all of your work.

1. In a race, the second place finisher crossed the finish line $1\frac{1}{3}$ minutes after the first-place finisher. The third-place finisher was $1\frac{3}{4}$ minutes behind the second-place finisher. The third-place finisher took $34\frac{2}{3}$ minutes. How long did the first-place finisher take?

2. John used $1\frac{3}{4}$ kg of salt to melt the ice on his sidewalk. He then used another $3\frac{4}{5}$ kg on the driveway. If he originally bought 10 kg of salt, how much does he have left?

3. Sinister Stan stole $3\frac{3}{4}$ oz of slime from Messy Molly, but his evil plans require $6\frac{3}{8}$ oz of slime. He stole another $2\frac{3}{5}$ oz of slime from Rude Ralph. How much more slime does Sinister Stan need for his evil plan?

4. Gavin had 20 minutes to do a three-problem quiz. He spent $9\frac{3}{4}$ minutes on question 1 and $3\frac{4}{5}$ minutes on question 2. How much time did he have left for question 3? Write the answer in minutes and seconds.

5. Matt wants to save $2\frac{1}{2}$ minutes on his 5K race time. After a month of hard training, he managed to lower his overall time from $21\frac{1}{5}$ minutes to $19\frac{1}{4}$ minutes. By how many more minutes does Matt need to lower his race time?



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## Task 2:

Practice & Homework

Complete the statement with *equal to, greater than,* or *less than.*

1. $\frac{2}{5} \times \frac{5}{7}$ will be ____less than____ $\frac{5}{7}$ .

Think: 5/7 is multiplied by a number less than 1;
So the product will be less than 5/7.

2. $4 \times \frac{3}{4}$ will be __greater__ $\frac{3}{4}$ .

$$\frac{4}{1} \times \frac{3}{4} = \frac{12}{4} \qquad 4\overline{)12} \atop {-12}$$

3. $8 \times \frac{3}{9}$ will be __greater__ $\frac{3}{9}$ .

$$\frac{8}{1} \times \frac{3}{9} = \frac{24}{9} \qquad 9\overline{)24} \atop {\underline{-18}} \atop 6 \qquad 2\tfrac{6}{9}$$

4. $\frac{2}{7} \times 1$ will be __equal__ $\frac{2}{7}$ .

$$\frac{2}{7} \times \frac{1}{1} = \frac{2}{7}$$

5. $\frac{1}{8} \times \frac{7}{9}$ will be __less__ $\frac{1}{8}$ .

$$\frac{1}{8} \times \frac{7}{9} = \frac{7}{72}$$

6. $\frac{6}{7} \times \frac{5}{6}$ will be __less__ $\frac{5}{6}$ .

$$\frac{6}{7} \times \frac{5}{6} = \frac{30}{42}$$

7. Larry is making apple cider. He plans to multiply the recipe by 3 to make sure that he has enough for his whole family. The recipe called for ¾ cup apple juice. Will Larry need more than or less than ¾ cup apple juice to make all of the apple cider?

__Greater__

8. Maria will spend ½ as many minutes practicing guitar this week as she did last week. Will she spend more minutes or fewer minutes practicing this week?
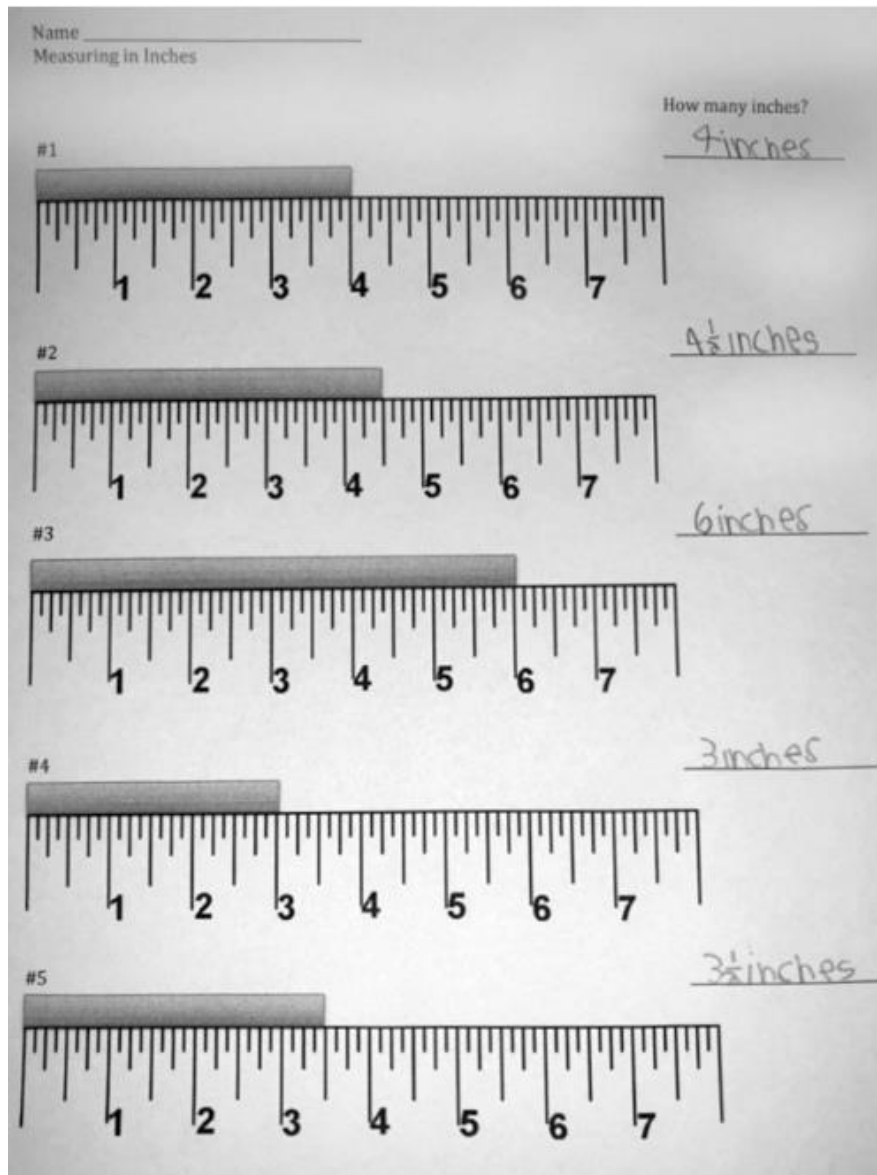
__fewer__

9. Write: Explain how you can determine if a product will be greater than or less than the factors when multiplying fractions without actually doing the multiplication. Include a model.

?
.

_____

## Task 3:



Name _____
Measuring in Inches

How many inches?

**#1**  ___9 inches___

**#2**  ___4½ inches___

**#3**  ___6 inches___

**#4**  ___3 inches___

**#5**  ___3½ inches___

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**Participant Guide**

| Student Work Sample | Standard of Mathematical Content Focus | Degree of Alignment | Standards of Mathematical Practice (SMP) Focus |
|---|---|---|---|
| **Sample Task 1:**<br> | Can you identify the targeted content standard(s) for this task? | • None/Weak<br>• Partial<br>• Strong | Can you identify the targeted practice standard(s) for this task? |

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| Student Work Sample | Standard of Mathematical Content Focus | Degree of Alignment | Standards of Mathematical Practice (SMP) Focus |
|---|---|---|---|
| **Sample Task 2:**<br> | Can you identify the targeted content standard(s) for this task? | • None/Weak<br>• Partial<br>• Strong | Can you identify the targeted practice standard(s) for this task? |
| **Sample Task 3:**<br> | Can you identify the targeted content standard(s) for this task? | • None/Weak<br>• Partial<br>• Strong | Can you identify the targeted practice standard(s) for this task? |

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# Module 1: Section 1D: A Closer Look at the Standards for Mathematical Content:  Fifth Grade Sample Tasks

## Facilitator's Guide

Throughout facilitation of this activity it will be important to remind participants:
- Use the grade-level overview to determine the relevant cluster(s) to look at more closely
- Questions regarding Standards for Mathematical Practices will only be indicated where specific practices were identified within the source of the task alignment.  Additionally, emphasize to participants the statement at the end of each cluster within the *KAS for Mathematics*, "The identified mathematical practices, coherence connections, and clarifications are possible suggestions; however, they are not the only pathways."

## Sample Task 1:
This assignment is strongly aligned to the standards.

### OVERVIEW
Fifth-grade students solve word problems involving subtraction of mixed fractions with unlike denominators. This assignment is strong because it requires students to interpret real-world scenarios and represent and solve them mathematically, while giving students practice with grade-level operations with fractions.

### RELATED STANDARDS
We looked at how well the assignment aligned to the following standards:

KY.5.NF.1 Efficiently add and subtract fractions with unlike denominators (including mixed numbers) by
> a. using reasoning strategies, such as counting up on a number line or creating visual fraction models
> b. finding common denominators

KY.5.NF.2 Solve word problems involving addition and subtraction of fractions.
> a. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators.
> b. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

### WHY IS THIS ASSIGNMENT STRONGLY ALIGNED?
This assignment is well-aligned with fifth-grade standard KY.5.NF.2. The standard requires students to solve word problems involving addition and subtraction of fractions, including fractions with unlike denominators, and this assignment contains multi-step word problems about subtracting fractions with unlike denominators. Standard KY.5.NF.1 also requires that students represent problems visually or symbolically. The lesson that accompanied this assignment used tape diagrams to represent problems visually and the directions for this assignment prompted students to use the read-draw-write (RDW) strategy to solve each problem.

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This assignment builds students' application skills, outlined in standard KY.5.NF.2. The standard calls for students to solve word problems involving addition and subtraction of fractions, and all five problems in this assignment are word problems that involve real-world situations. Standard KY.5.NF.1 also indirectly targets conceptual understanding because it requires students to represent problems visually and symbolically. The directions for the assignment asked students to represent each word problem with a drawing, which builds students' conceptual understanding of fractional size as it relates to the same whole.

## Practice Standards

This assignment allows students to engage with two mathematical practice standards. Interpreting what the word problems are asking them to do gives students the chance to engage with Mathematical Practice Standard #1 ("Make sense of problems and persevere in solving them"). Although all five problems involved subtraction, students had to determine how many steps were needed to solve each problem and the order in which they should be completed. The directions for the assignment also prompted students to create drawings to represent each real-world scenario, which gives students the chance to engage with Mathematical Practice Standard #4 ("Model with mathematics").

## Sample Task 2:

This assignment is partially aligned to the standards.

### OVERVIEW

Fifth-grade students identify whether multiplication problems involving at least one fraction will result in a product greater than, less than, or equal to one of the factors. This assignment is partially aligned with a fifth-grade standard because it involves interpreting the products of whole numbers and fractions, but it only superficially builds students' conceptual understanding of multiplication as scaling or resizing.

### RELATED STANDARDS

We looked at how well the assignment aligned to the following standard:

KY.5.NF.5 Interpret multiplication as scaling (resizing), by:
   a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
   b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n x a)/(n x b) to the effect of multiplying a/b by 1.

### WHY IS THIS ASSIGNMENT PARTIALLY ALIGNED?

The content of this assignment aligns with fifth-grade standard KY.5.NF.5, which requires students to multiply fractions with both whole numbers and with other fractions, and to compare the size of the product to the size of the factors.

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The assignment problems provide two factors and ask students to interpret whether the product will be greater than, less than, or equal to one of the factors without actually doing the multiplication (as standard KY.5.NF.5A requires). The assignment includes the appropriate types of numbers, with five problems that involve multiplying a whole number by a fraction and three problems that involve multiplying a fraction by a fraction. The assignment also asks students to explain how to determine if the product of a multiplication problem involving fractions will be greater or less than the factors (as standard KY.5.NF.5.B requires).

This assignment attempts to build students' conceptual understanding (required by standard KY.5.NF.5) of multiplication as scaling or resizing, but it does so in a superficial way.

To prepare fifth-grade students to work with ratios and proportional reasoning in sixth grade, they must learn to see multiplication (for example, 3 x ½) in terms of a quantity (3) and a scaling factor (½) and to interpret products in terms of scaling (3 x ½ is half the size of 3).  Students were exposed to the related concept of multiplicative comparison in fourth grade (standard KY.4.OA.1), but fifth-grade students build upon that understanding by using fractions as both quantities and scaling factors. Students should know that multiplying a quantity by a fraction smaller than one produces a smaller quantity (8 x 3/9 < 8), and multiplying a quantity by a fraction equivalent to one leaves a quantity unchanged (8 x 9/9 = 8).

This assignment is structured in such a way that students can complete it procedurally by following a pattern rather than truly demonstrating understanding of the concept of multiplication as scaling: most of the problems follow the same fill-in-the-blank structure as the example in problem #1, so students only have to identify whether one of the factors is a fraction or a whole number and then write "less than" or "greater than" in the corresponding blank.

## Practice Standards

This assignment allows students to superficially engage with two mathematical practice standards. Asking students to explain how to determine if the product of a multiplication problem involving fractions will be greater or less than the factors gives students the chance to engage with Mathematical Practice Standard #3 ("Construct viable arguments and critique the reasoning of others") and Mathematical Practice Standard #6 ("Attend to precision"), but students should be doing this in the context of actual multiplication problems, not in isolation. There is limited space provided on the worksheet for the model and explanation that students are directed to include in problem #9, which indicates that students are only expected to provide a simple explanation and keeps them from deeply engaging with the mathematical practice standards.

## Sample Task 3:

This assignment is weakly aligned to the standards.

### OVERVIEW

Fifth-grade students use a ruler to measure the length of several bars in inches. This assignment is weak because it is more closely aligned with second- and third-grade standards. There are no fifth-grade standards about measuring length.

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We looked at how well the assignment aligned to the following standards:

KY.5.MD.1 Convert among different size measurement units (mass, weight, liquid volume, length, time) within one system of units (metric system, U.S. standard system and time).

KY.5.MD.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

a. Find the volume of a right rectangular prism with whole number side lengths by packing it with unit cubes and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes.

b. Apply the formulas V= l x w x h and V = B x h for rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.

c. 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.

## WHY IS THIS ASSIGNMENT WEAKLY ALIGNED?

This assignment is not aligned with any fifth-grade standards. The only fifth-grade standards that relate to length require students to convert between different measurement units (standard KY.5.MD.1) and find the volume of right rectangular prisms using the (length x width x height) formula (standard KY.5.MD.5). This assignment only requires students to measure the length of several bars in inches and most closely aligns with second-grade standard KY.2.MD.1 (measure the length of an object by selecting and using appropriate tools such as rulers) and third-grade standard KY.3.MD.4.b (generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch).

## Practice Standards

In this assignment, students use rulers to measure length, which is related to Mathematical Practice Standard #5 ("Use appropriate tools strategically"). However, this is not a meaningful fifth-grade opportunity to use a tool because students are working with below-grade-level content, they don't have to select which tool would be most appropriate to use given the objects to be measured, and the "objects" (pictures of bars) are all already positioned correctly with one edge aligned at the zero mark.