

## MA.5.FR.2.3

**Overarching Standard:** MA.5.FR.2 *Perform operations with fractions.*

### **Benchmark of Focus:**

MA.5.FR.2.3: When multiplying a given number by a fraction less than 1 or a fraction greater than 1, predict and explain the relative size of the product to the given number without calculating.

### **Benchmark Clarifications:**

*Clarification 1:* Instruction focuses on the connection to decimals, estimation and assessing the reasonableness of an answer.

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### **Related Benchmark/Horizontal Alignment**

- MA.5.NSO.2.4
  - MA.5.NSO.2.5
  - MA.5.GR.2.1
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### **Vertical Alignment**

<b>Previous Benchmarks</b>	<b>Next Benchmarks</b>
MA.4.FR.2.4	MA.6.NSO.2.2 MA.6.NSO.2.3

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### **Purpose and Instructional Strategies**

The purpose of this benchmark is for students to examine how numbers change when multiplying by fractions (MTR.2.1). Students already had experience with this idea when they multiplied a fraction by a whole number in Grade 4 (MA.4.FR.2.4). Work from this benchmark will help prepare students to multiply and divide fractions and decimals with procedural fluency in Grade 6 (MA.6.NSO.2.2).

- It is important for students to have experiences examining:
  - when multiplying by a fraction greater than 1, the number increases;
  - when multiplying by a fraction equal to 1, the number stays the same; and
  - when multiplying by a fraction less than 1, the number decreases.
- Throughout instruction, encourage students to use models or drawings to assist them with a visual of the relative size. Models to consider when multiplying fractions to assist with finding relative size without calculating include, but are not limited to, area models (rectangles), linear models (fraction strips/bars and number lines) and set models (counters). Include examples with equivalent fractions and decimals (K.12.MTR.2.1).

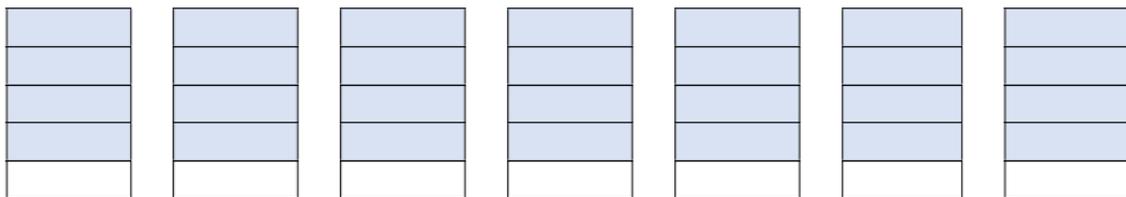
- Have students explain how they used the model or drawing to arrive at the solution and justify reasonableness of their answers (K12.MTR.4.1).

### Common Misconceptions or Errors

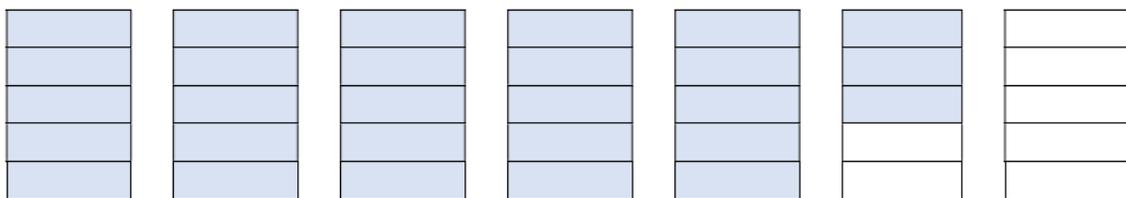
- Students may believe that multiplication always results in a larger number. This is why it is imperative to include models during instruction when multiplying fractions so students can see and experience the results and begin to make generalizations that are based on their understanding. Ultimately, allowing students to begin to understand that multiplying by a fraction less than one will result in a lesser product, but when multiplying by a fraction greater than one will result in a greater product.

### Strategies to Support Tiered Instruction

- Instruction includes opportunities to predict and explain the relative size of the product of a given number by a fraction less than one or a fraction greater than one. Students use models to check their prediction and solve. The teacher guides students to connect that multiplying a given number by a fraction less than one will result in a smaller number and that multiplying a given number by a fraction greater than one will result in a larger number.

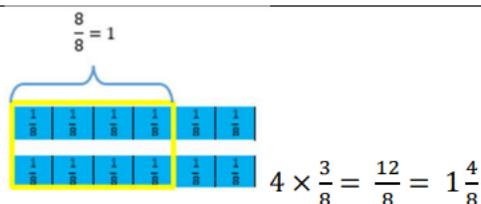
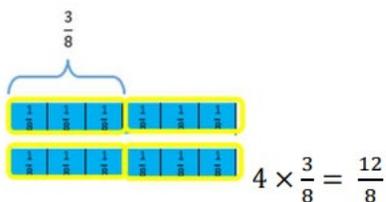


$$7 \times \frac{4}{5} = \frac{28}{5} = 5\frac{3}{5}$$



- For example, the teacher displays the problem  $7 \times \frac{4}{5}$  and asks students to predict if the product will be greater than, equal to, or less than 7 (it will be less than 7). Students use a visual model to represent the problem to determine  $7 \times \frac{4}{5} = \frac{28}{5}$ . This is repeated additional examples using fractions both greater than, equal to, and less than one.
- Instruction includes providing hands-on opportunities to predict and explain the relative size of the product of a given number by a fraction less than one or a fraction greater than one. Students use fraction strips/bars or counters to check their prediction and solve, connecting that multiplying a given number by a fraction less than one will result in a smaller number and that multiplying a given number by a fraction greater than one will result in a larger number.
  - For example, the teacher displays the problem  $4 \times \frac{3}{8} = \underline{\quad}$ . Then, the teacher asks students to predict if the product will be greater than, equal to, or less than 4 (it will be less than 4).

- Using fraction bars or fraction strips, the teacher models solving this problem with explicit instruction and guided questioning. Students explain how to use fraction bars or fraction strips as a model to solve this problem. This is repeated with additional examples using fractions both greater than, equal to, and less than one.



### Questions to ask students:

- Will the product of  $\frac{3}{4} \times 6,350$  be less than 6,350 or greater than 6,350? Explain.*
  - Sample answer that indicated understanding: Since  $\frac{3}{4}$  is less than 1 whole, and any number multiplied by 1 is equal to that number, the product will be less than 6,350.
  - Sample answer that indicates an incomplete understanding or misconception: Student says that whenever you multiply, you always get a bigger number, so the product will be greater than 6,350.
- Will the product of  $\frac{5}{4} \times 43,193$  be less than 43,193 or greater than 43,193? Explain.*
  - Sample answer that indicates understanding: Since  $\frac{5}{4}$  is greater than one whole, and any number multiplied by 1 is equal to that number, the product will be greater than 43,193.
  - Sample answer that indicates an incomplete understanding or misconception: Student says that when you multiply by a fraction, you always get a smaller number, so the product will be greater than 43,193.

## Instructional Tasks

### Instructional Task 1

Derrick is playing a computer game where he must multiply a number by a factor that increases the number's size each time. Select all of the factors that he could multiply by to continue to increase the size of his number? Explain your thinking.

- a.  $\frac{3}{4}$
- b.  $\frac{4}{3}$
- c.  $1\frac{1}{9}$
- d. 1.01
- e.  $\frac{5}{2}$
- f.  $\frac{8}{9}$
- g.  $\frac{99}{100}$
- h.  $\frac{2}{2}$

## Instructional Items

### Instructional Item 1

Which of the following expressions will have a product greater than 4?

- a.  $4 \times \frac{8}{8}$
- b.  $\frac{3}{4} \times 4$
- c.  $4 \times \frac{99}{100}$
- d.  $\frac{101}{100} \times 4$

### Instructional Item 2

Fill in the blank. The product of the expression  $\frac{63}{65} \times 20$  will be \_\_\_\_\_ 20.

- a. less than
- b. equal to
- c. greater than
- d. half of

## Achievement Level Descriptors

Benchmark		Context	Assessment Limits
MA.5.FR.2.3 When multiplying a given number by a fraction less than 1 or a fraction greater than 1, predict and explain the relative size of the product to the given number without calculating. Clarification 1: Instruction focuses on the connection to decimals, estimation and assessing the reasonableness of an answer.		Both	N/A
ALD 2	ALD 3	ALD 4	ALD 5
Recognizes that multiplying a whole number by a fraction less	Recognizes that multiplying a whole number by a fraction less than one will produce a	When multiplying a given number by a fraction less than one or a fraction greater than one, predicts	When multiplying a given number by a fraction less than one or a fraction greater than one, predicts

than one will produce a smaller product.	smaller product and by a fraction greater than one will produce a larger product.	and explains the relative size of the product to the given number without calculating	and explains the relative size of the product to the given number without calculating and identifies errors
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**Additional Resources:**

[CPALMS Resources](#)

[Multiplication of Fractions Progression \(Part 1\)](#)

[Scaling with multiplication](#)

[Predict the product of multiplying a fraction less than one by a whole number](#)

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**Resources/Tasks to Support Your Child at Home:**

[Scaling Up to Escape](#)