Missouri Assessment and Teaching Tool

Grade 4: NF.B.8

Number Sense and Operations in Fractions

Essential Vocabulary
Fractions: Fractions represent the parts of a whole or collection of objects.
Numerator: A numerator represents the number of parts out of the whole, which is the denominator.
Denominator: The number below the line in a common fraction; a divisor.
Product: The answer to a multiplication problem.
Multiple: Multiples are a sequence of products using the same base number multiplied by different numbers.
Mathematical Fluency: Demonstrated when students do mathematics using an appropriate strategy in a reasonable amount of time, know multiple processes, and can apply or adapt strategies to find a correct solution.

Prioritized Standard
4.NF.B.8 Solve problems involving multiplication of a fraction by a whole number.
Expanded Expectation
The expectation of the student is to solve word problems with or without context involving the multiplication of a fraction by a whole number and to justify the solution.

Scale	Assessment Question
Scale 4.0: ***The student will:*** ● Identify the correct equation of a given area model showing a fraction by a fraction. ● Identify the correct equation of a given area model showing a whole number by a fraction. ● Identify the model that represents multiplying a fraction by a fraction. ● Identify the model that represents multiplying a whole number by a fraction.	● Which of these pictures (rectangles shaded in by the L x W) represent the equation? ● The home builder needs to cover a small storage room floor with carpet. The storage room is 4 meters long and half a meter wide. How much carpet does the builder need to cover the floor of the storage room? Use a grid to show your work and explain your answer. MAP Session 2, #21: https://bit.ly/3XY52Oq Scoring Guide: https://bit.ly/3XVtoIT

• Describe how multiplying fractions relates to finding the areas of rectangles with fractional side lengths.	MO Leap - Represent It: https://bit.ly/3YRt9j6 MO Leap - Scoring Guide: https://bit.ly/3IrH6gV

21. The model shown represents a multiplication equation.

Which multiplication equation does the model represent?

A. $\frac{2}{7} \times \frac{5}{3} = \frac{10}{21}$

B. $\frac{2}{7} \times \frac{5}{3} = \frac{19}{21}$

C. $\frac{5}{7} \times \frac{2}{3} = \frac{10}{21}$

D. $\frac{5}{7} \times \frac{2}{3} = \frac{19}{21}$

Scale 3.0:

The student will:

- Solve problems involving the multiplication of a fraction by a whole number.
- Use and explain multiple strategies to solve problems with or without context.

For example:

- Solve word problems involving the multiplication of a fraction by a whole number.
- Find the product of a fraction and a whole number.
- Use visual models to multiply a fraction by a whole number.
- Understand a multiple of a/b as a multiple of 1/b.

Item Types: Selected-Response, Constructed-Response, and Technology-Enhanced

Note:
Instructional focus should include students recognizing various equivalent forms that may, in certain situations, be better answers (e.g., 18/8 and 2 2/8 are acceptable and equivalent forms of 2 ¼). Understanding the relationship and equivalence is more important than using a particular form.

Explanation of Item Specification:
Classroom discussions should provide opportunities for students to see alternative representations supporting conclusions. This would allow time to consider different strategies for future situations.

- Tomas and Hector are running at P.E. Tomas runs 3/4 of a mile. Hector runs 3 times as far as Tomas. How far did Hector run?
- Michelle was making bracelets from ribbon. She wanted to make 4 bracelets, and each bracelet needed 2/3 yards of ribbon. How much ribbon does Michelle need?

	• Linda feeds each of her three rescue dogs three scoops of dog food per day. Each scoop is 2/3 cup. How much dog food does each dog receive? Support your solution by using a concrete, pictorial, or symbolic representation. ***Content Limits/Boundaries for State Assessment—Classroom Work Should Extend Beyond These Limits*** • *Limit to multiplying a whole number by a fraction less than 1.* • *Limit denominators to 2, 3, 4, 5, 6, 8, 10, 12, 100.* • *Limit whole numbers to numbers 10 or less.* MAP Session 1, #11: https://bit.ly/3Jifext Scoring Guide: https://bit.ly/3WGOpGx MO Leap - Tie-Dye Task: https://bit.ly/3wQNsB7 MO Leap - Scoring Guide: https://bit.ly/3RddWG3

MAP Session 1, #11:

11. Marcy exercised for 5 hours a week. She swam for ¾ of the time she exercised last week. How many hours did Marcy swim last week?

A. $3\frac{3}{4}$
B. $3\frac{1}{4}$
C. $4\frac{3}{4}$
C. $5\frac{3}{4}$

Sample Stem - Example 1: Use numbers 1–9 no more than once each to make the biggest product.

$$\square \times \frac{\square}{\square} = \frac{\square}{\square}$$

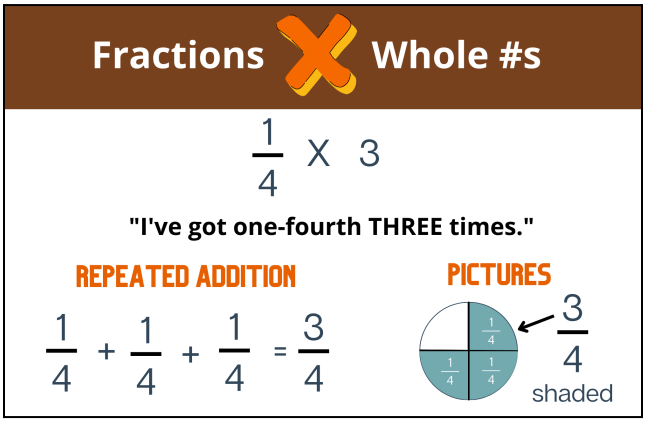
Scale 2.0: ***The student will:*** **Recognize or recall specific vocabulary, such as:** fraction, whole number, multiplication, numerator, denominator, product	• Jocelyn, Dany, and Cadence each had a bag of candy. All three girls ate some candy, leaving ⅔ of a bag for each girl. Choose the equations that could correctly solve how much candy the girls have left. a. 1/3 + 1/3 + 1/3

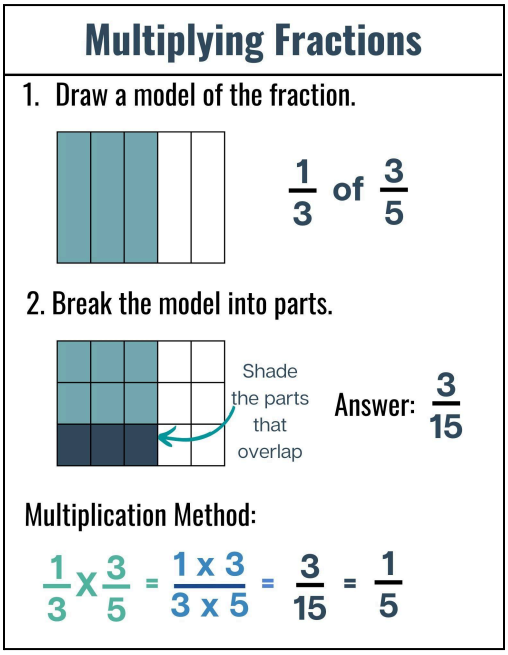
Perform basic processes, such as:

- Understand the concept of multiplying fractions by whole numbers and with number lines.
  Video: https://bit.ly/41kqW1h
  Video: https://bit.ly/3ErWCrW
- Understand a fraction as a whole number of groups of a unit fraction (e.g., 3/8 is 3 groups of 1/8). A unit fraction is a term that identifies the size of 1 fractional piece in a whole.
- Interpret a multiplication equation as a comparison (e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5).
- Solve problems involving basic multiplication of a whole number by a whole number.
- Demonstrate with words that fraction comparisons are valid only when the two fractions refer to the same-sized whole.
- Demonstrate with visual models that fraction comparisons are valid only when the two fractions refer to the same-sized whole.

b. 2/3 + 2/3 + 2/3
c. 3 x 2/3
d. 3 x 1/3
e. 3 + 2/3

- Claire, Tony, Noah, and Jayden each swim 3/4 of a mile. How many miles did they swim all together? Show two different ways to solve the problem using models and/or numbers.





Scale 1.0:
With help, the student can perform 2.0 and 3.0.