MA.5.AR.1.3

Overarching Standard: *MA.5.AR.1 Solve problems involving the four operations with whole numbers and fractions.*

Benchmark of Focus

MA.5.AR.1.3: Solve real-world problems involving division of a unit fraction by a whole number and a whole number by a unit fraction.

Examples: Shanice had a sleepover and her mom is making French toast in the morning. If her mom had $2\frac{1}{4}$ loaves of bread and used $1\frac{1}{2}$ loaves for the French toast, how much bread does she have left?

Benchmark Clarifications

Clarification 1: Instruction includes the use of visual models and equations to represent the problem.

Related Benchmark/Horizontal Alignment
- MA.5.NSO.2.2
- MA.5.FR.2.4

Vertical Alignment

| Previous Benchmarks	Next Benchmarks
MA.4.AR.1.3	MA.6.NSO.2.3

Terms from the K-12 Glossary
- (delete if none)
-

Purpose and Instructional Strategies

The purpose of this benchmark is to connect division of fraction concepts to real-world scenarios (K12.MTR.7.1). This work builds on the multiplication of fractions by whole numbers in Grade 4 (MA.4.AR.1.3), and prepares them for Grade 6 (MA.6.NSO.2.3) where they will solve real- world fraction problems using all four operations with fractions (MTR.7.1).
- During instruction, it is important for students to have opportunities to extend their understanding of the meaning of fractions, how many unit fractions are in a whole, and their understanding of division of fractions as involving equal groups or shares and the number of objects in each.
- Students should use visual fraction models and reasoning to solve word problems involving division of fractions. For example, to assist students with solving the problem, "The elephant eats 4 lbs. of peanuts a day. His trainer gives him $\frac{1}{5}$ of a pound at a time. How many times a day does the elephant eat peanuts?" use the following diagram to show how $4 \div \frac{1}{5}$ can be visualized to assist students with solving.

1 lb. of peanuts

$\frac{1}{5}$ lb.
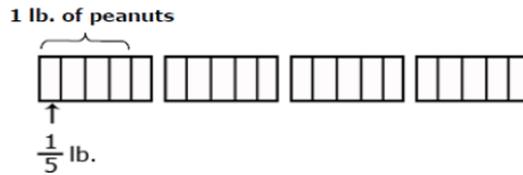
- The expectation of this benchmark is not for students to use an algorithm (e.g., multiplicative inverse) to divide fractions.

- Instruction includes students using equivalent fractions to simplify answers; however,putting answers in simplest form is not a priority.

Common Misconceptions or Errors
- Students may believe that division always results in a smaller number, which is true when dividing a fraction by a whole number, but not when dividing a whole number by a fraction. Using models will help students develop the understanding needed for computation with fractions.


Strategies to Support Tiered Instruction
- Instruction includes opportunities to engage in teacher-directed practice using visual representations to solve real-world problems involving division of a unit fraction by a whole number or a whole number by a unit fraction. The teacher directs students on how to use models or equations based on real-world situations. Through questioning, the teacher guides students to explain what each fractional portion represents in the problems used during instruction and practice.
    - For example, the teacher displays and reads aloud the following problem: "Julio has 6 packages of cookies. He is making gift bags for people at school. Each bag will contain $\frac{1}{3}$ of a package of cookies. How many gift bags can he make?" Using models, the teacher solves the problem with guided questioning having students explain how to use models to solve this question. The teacher guides students to create an equation to represent the problem. This is repeated with multiple real-world examples that involve division of a unit fraction by a whole number or a whole number by a unit fraction.

1 package of cookies

1 gift bag
($\frac{1}{3}$ package per bag)

$6 \div \frac{1}{3} = 18$
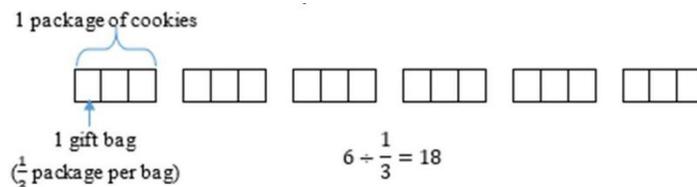
- Teacher provides opportunities to use hands-on models and manipulatives to solve real- world problems involving division of a unit fraction by a whole number or a whole number by a unit fraction. Students explain how each model represents the real-world situation. The teacher directs students how to use models or equations based on real- world examples and through questioning guide students to explain what each fractional portion represents in the problems used during instruction and practice.
    - For example, the teacher displays and reads aloud the following problem: "Shelton made some lemonade. The pitcher of lemonade holds 8 cups. If each of the glasses that he uses can hold $\frac{1}{2}$ cup, how many servings of lemonade can he share?" Using fraction bars or

fraction strips, the teacher models solving the problem with explicit instruction and guided questioning. Students explain how to use fraction bars or fraction strips as a model to solve this question and use an equation to represent the problem. This is repeated with multiple real-world problems that involve multiplication of a whole number by a fraction or a fraction by a whole number.

$$8 \div \frac{1}{2} = 16$$
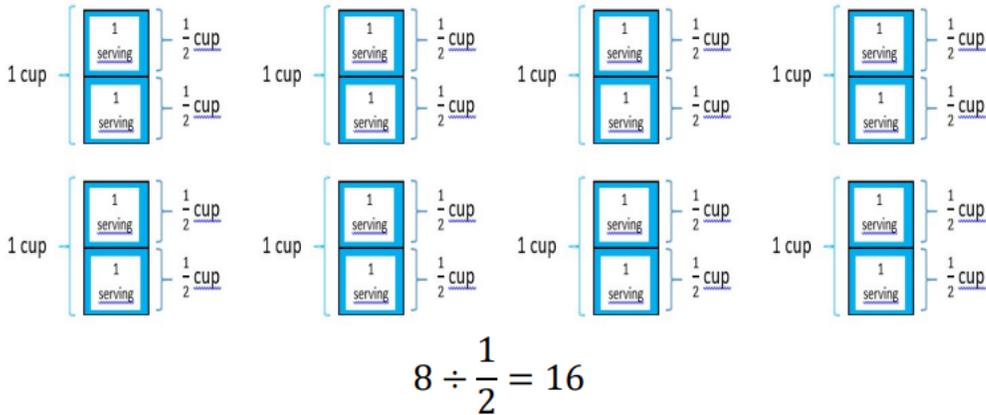
Questions to ask students:

- **Is it always, sometimes, or never true that you divide a bigger number by a smaller number? Explain.**
  - Sample answer that indicates understanding: This is sometimes true because when dividing a fraction by a whole number, like dividing $\frac{1}{2}$ by 3, results in a quotient of $\frac{1}{6}$ so it depends on the situation. If the situation is about dividing 12 muffins among 3 people, each person will get 4 muffins. In that case, we divided the greater number by a smaller number.
  - Sample answer that indicates an incomplete understanding or a misconception: It is always true that you divide a bigger number by a smaller number because that's what I learned about division before.

- **How do you know that the equation you wrote matches this word problem?**
  - Sample answer that indicates understanding: The student is able to explain how the model or picture made matches the problem and understands the division of a unit fraction by a whole number.
  - Sample answer that indicates an incomplete understanding or a misconception: The student is unable to adequately explain how the model or picture matches the division problem.

- **How can you check your work to explain why $\frac{1}{2}$ divided by 3 equals $\frac{1}{6}$?**
  - Sample answer that indicates understanding: Sample answer that indicates understanding: I know that $\frac{1}{2} \div 3 = \frac{1}{6}$ because $3 \times \frac{1}{6} = \frac{1}{2}$. Multiplication is the inverse of division.

Instructional Tasks

Instructional Task 1

Sonya has $\frac{1}{2}$ gallon of chocolate chip ice cream. She wants to share her ice cream with 6 friends. How much ice cream will each friend get?

Instructional Items

Instructional Item 1

Betty has 12 sheets of tissue paper to add to her holiday gift bags. Each gift bag needs $\frac{1}{3}$ sheet of tissue paper. How many holiday gift bags can Betty fill?

Achievement Level Descriptors:

Benchmark	Context	Assessment Limits
MA.5.AR.1.3 Solve real-world problems involving division of a unit fraction by a whole number and a whole number by a unit fraction. Example: A property has a total of $\frac{1}{2}$, acre and needs to be divided equally among 3 sisters. Each sister will receive $\frac{1}{6}$, of an acre. Example: Kiki has 10 candy bars and plans to give $\frac{1}{4}$, of a candy bar to her classmates at school. How many classmates will receive a piece of a candy bar? Clarification 1: Instruction includes the use of visual models and equations to represent the problem.	Real-world	Unit fractions will have denominators limited to 1–10, 12, 16, 20, 50, and 100.

| ALD 2	ALD 3	ALD 4	ALD 5
Solves real-world problems involving division of a whole number by a unit fraction using models.	Solves real-world problems involving division of a unit fraction by a whole number and a whole number by a unit fraction using models.	Solves real-world problems involving division of a unit fraction by a whole number and a whole number by a unit fraction.	Identifies an error and solves real-world problems involving division of a unit fraction by a whole number and a whole number by a unit fraction with an equation.

Additional Resources:

CPALMS Resources

Learn Zillion: Divide a unit fraction by a whole number

Resources/Tasks to Support Your Child at Home:

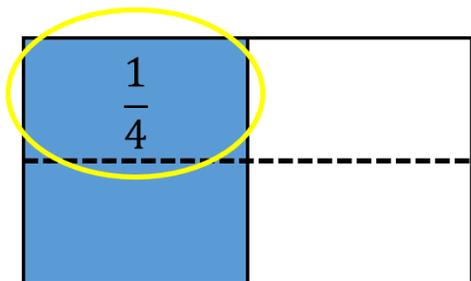Learn Zillion: Draw pictures for division of unit fractions

- Abigail has 1/2 gallon of orange juice. She pours the same amount of the juice into each of 6 glasses. Write an equation to represent the fraction of a gallon of orange juice in each glass.

$$\frac{1}{2} \div 6 = \frac{1}{12}$$
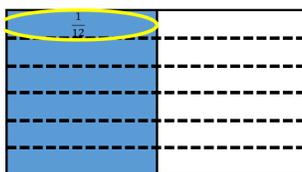
- Divide $\frac{1}{2}$ of a sandwich among 2 people or share $\frac{1}{3}$ quart of milk with 4 friends. Ask how much each person will get. Draw models to support thinking.

$\frac{1}{2} \div 2 = \frac{1}{4}$ sandwich

$\frac{1}{3} \div 4 = \frac{1}{12}$ quart of milk