MA.5.FR.2.4

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

Benchmark of Focus

MA.5.FR.2.4: Extend previous understanding of division to explore the division of a unit fraction by a whole number and a whole number by a unit fraction.

Benchmark Clarifications

Clarification 1: Instruction includes the use of manipulatives, drawings or the properties of operations.

Clarification 2: Refer to Situations Involving Operations with Numbers (Appendix A).

Related Benchmark/Horizontal Alignment
- MA.5.NSO.2.2
- MA.5.AR.1.3

Vertical Alignment

Previous Benchmarks
MA.4.FR.2.4

Next Benchmarks
MA.6.NSO.2.2
MA.6.NSO.2.3

Purpose and Instructional Strategies

The purpose of this benchmark is for students to experience division with whole number divisors and unit fraction dividends (fractions with a numerator of 1) and with unit fraction divisors and whole number dividends. This work prepares for division of fractions in Grade 6 (MA.6.NSO.2.2) in the same way that in Grade 4 (MA.4.FR.2.4) students were prepared for multiplication of fractions.

- Instruction should include the use of manipulatives, area models, number lines, and emphasizing the properties of operations (e.g., through fact families) for students to see the relationship between multiplication and division (K12.MTR.2.1).
- Throughout instruction, students should have practice with both types of division: a unit fraction that is divided by a non-zero whole number and a whole number that is divided by a unit fraction.
- Students should be exposed to all situation types for division (refer to: Situations Involving Operations with Numbers (Appendix A)).
- The expectation of this benchmark is not for students to use an algorithm (e.g., multiplicative inverse) to divide by a fraction.
- 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.

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 situations. 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 can you check your work to explain why $\frac{1}{2}$ divided by 3 equals $\frac{1}{6}$?
- 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.

- Create a story for the problem $4 \div \frac{1}{2}$.
- Sample answer that indicates understanding: I swam 4 laps in a pool. Every $\frac{1}{2}$ lap, I paused to take a big breath. How many times did I pause to take a big breath? I need to find how many groups of $\frac{1}{2}$ are in 4 so I can divide 4 by $\frac{1}{2}$ to get 8.
- Sample answer that indicates an incomplete understanding or a misconception: I have 4 quarts of juice and divide them in half to share it with my friend.

- What connections do you see between $3 \div \frac{1}{4} = $ _____ and $\frac{1}{4} \times$ ____ $= 3$?
- Sample answer that indicates understanding: Since multiplication and division are inverse operations, then the quotient of $3 \div \frac{1}{4}$ will be the factor to multiply by $\frac{1}{4}$ to equal 3.
- Sample answer that indicates an incomplete understanding or a misconception: They both have a 3 and a ¼ in them and a missing part

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Instructional Tasks
Instructional Task 1

Part A. Emily has 2 feet of ribbon to make friendship bracelets. Use models and equations to answer the questions below.

   a. How many friendship bracelets can she make if each bracelet uses 2 feet of ribbon?
   b. How many friendship bracelets can she make if each bracelet uses 1 foot of ribbon?

c. How many friendship bracelets can she make if each bracelet uses 1 half foot of ribbon?
d. How many friendship bracelets can she make if each bracelet uses 1 third foot of ribbon?
e. How many friendship bracelets can she make if each bracelet uses 1 fifth foot of ribbon?

Part B. Do you see any patterns in the models and equations you have written? Explain.

Instructional Items

Instructional Item 1

What is the quotient of $\frac{1}{3} \div 5$?

a. $\frac{1}{15}$
b. 15
c. $\frac{5}{3}$
d. $\frac{3}{5}$

Instructional Item 2

How many fourths are in 8 wholes?

a. 4
b. 8
c. 16
d. 32

Achievement Level Descriptors:

Benchmark	Context	Assessment Limits
MA.5.FR.2.4 Extend previous understanding of division to explore the division of a unit fraction by a whole number and a whole number by a unit fraction. Clarification 1: Instruction includes the use of manipulatives, drawings or the properties of operations. Clarification 2: Refer to Situations Involving Operations with Numbers (Appendix A)	Both	Items may not use the terms "simplify" or "lowest terms." Numerical expressions or equations must be given without models.

ALD 2	ALD 3	ALD 4	ALD 5
Extends previous understanding of division to explore the division of a whole	Extends previous understanding of division to explore the division of a unit	Extends previous understanding of division to explore the division of a unit	Divides a unit fraction by a whole number and a whole number by a unit fraction.

	number by a unit fraction using drawings and models.	fraction by a whole number and a whole number by a unit fraction using drawings and models.	fraction by a whole number and a whole number by a unit fraction.	

Additional Resources:

CPALMS Resources

KHAN Academy: Dividing Fractions by Whole Numbers

Resources/Tasks to Support Your Child at Home:

Learn Zillion: Use visual models for division of whole numbers by unit fractions.

Example Problems and Solutions:

- A baker has 6 bags of flour. Each bag weighs 1 pound. She divides each bag into thirds. How many $\frac{1}{3}$ pound bags of flour does the baker have?
    Equation: $6 \div \frac{1}{3}$ = 18 bags of flour

- Create a story context for $4 \div \frac{1}{6}$ and use a visual model to show the quotient.
    Examples include: There are 4 pies for dessert. If each pie is cut into sixths, how many $\frac{1}{6}$ sized pieces are there?

- Abigail has $\frac{1}{2}$ 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.

    Equation: $\frac{1}{2} \div 6 = \frac{1}{12}$