



## Unit Plan

## 5.2 Fractions as Quotients and Fr. Multiplication

Chester / Littleville Elementary / Grade 5 / Mathematics

[↗](#) Week 4 - Week 7 | 4 Curriculum Developers | Last Updated: Mar 20, 2024 by LeBlanc, Deanna[Style Guide](#)

## What is the purpose of the unit? What are the major take-aways?

## Standards

## MA: Mathematics (2017)

## MA: Grade 5

## Operations &amp; Algebraic Thinking

## 5.OA Write and interpret numerical expressions.

- 1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols, e.g.,  $(6 \times 30) + (6 \times 1/2)$ .
- 2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. [Show Details](#)

## Number &amp; Operations—Fractions

## 5.NF Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

- 4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
- 3. Interpret a fraction as division of the numerator by the denominator ( $a/b = a \div b$ ). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. [Show Details](#)
- 4a. Interpret the product  $(a/b) \times q$  as a parts of a partition of  $q$  into  $b$  equal parts; equivalently, as the result of a sequence of operations  $a \times q \div b$ . [Show Details](#)
- 4b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

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## Enduring Understandings

1. Fractions as Division: Students will understand that a fraction is another way of expressing division, where the numerator represents the number of parts and the denominator represents the total number of equal parts into which something is divided. This conceptual understanding enables them to see fractions as quotients and to solve problems involving the division of whole numbers that result in fractional or mixed number answers.
2. Multiplication of Fractions: Students will understand that multiplying a fraction by a whole number or another fraction is an extension of the multiplication concept they have already mastered with whole numbers. They will recognize that when they multiply by

## Essential Questions

1. How can we use parentheses, brackets, and braces to change or clarify the order of operations in numerical expressions?
2. How can we express mathematical problems using numerical expressions without actually solving them?
3. How do fractions represent division, and how can we use this understanding to solve real-world problems?
4. How does multiplying a whole number by a fraction differ from multiplying two whole numbers? How can we use fractions to describe parts of a whole in different contexts?

a fraction, they are finding a part of the whole or a part of another fraction, leading to a deeper comprehension of scaling and resizing quantities.

3. Numerical Expressions and Order of Operations: Students will comprehend the importance of following the correct order of operations, including the use of parentheses, brackets, and braces in numerical expressions. They will interpret and evaluate expressions involving these symbols and apply this knowledge when working with fractions and mixed numbers to reinforce their computational fluency.

4. Representation of Calculations: Students will be proficient in writing simple expressions to represent calculations with numbers, and in interpreting these expressions to describe mathematical situations without actually performing the calculations. This skill will aid them in understanding the structure of mathematics and in communicating mathematical ideas clearly.

5. Fraction Multiplication as Repeated Addition: Students will understand that multiplying a fraction by a whole number can be seen as repeated addition of that fraction, as well as the inverse being that division can be seen as determining how many times one number is contained within another.

6. Visual Models in Problem Solving: Students will recognize the value of using visual models, such as fraction bars, area models, and number lines, in interpreting and solving problems involving fractions. These models help learners to conceptualize and solve problems that involve fraction multiplication and division, enhancing their ability to think and reason mathematically.

5. When we multiply a fraction by a whole number, how does this process relate to division and partitioning?

6. How can we interpret the product of a fraction and a whole number in terms of partitioning or dividing something into equal parts?

7. How can we visualize multiplication of fractions using models like area diagrams or number lines?

8. What are some strategies we can use to solve word problems that involve fraction multiplication or division?

9. Why is it important to understand the concept of a fraction as division, and how does this aid in the multiplication of fractions?

10. How do operations with fractions extend our previous understandings of multiplication and division?

## Content

In this unit, students learn to interpret a fraction as a quotient and extend their understanding of multiplication of a whole number and a fraction.

In grade 3, students made sense of multiplication and division of whole numbers in terms of equal-size groups. In grade 4, they used multiplication to represent equal-size groups with a fractional amount in each group and to express comparison.

Students also interpret the product of a whole number and a fraction in terms of the side lengths of a rectangle.

The commutative and associative properties become evident as students connect different expressions to the same diagram. The distributive property comes into play as students multiply a whole number and a fraction written as a mixed number.

Throughout the unit

The warm-up activities support the development of concepts in the unit. The Number Talks enable students to revisit the distributive property with whole numbers, in preparation for multiplying of a whole number and a mixed number. The True or False warm-ups allow students to recognize equivalent expressions and explore the relationship between multiplication and division.

## Skills

### Section A Goals

- Represent and explain the relationship between division and fractions.
- Solve problems involving division of whole numbers leading to answers that are fractions.

### Section B Goals

- Connect division to multiplication of a whole number by a non-unit fraction.
- Connect division to multiplication of a whole number by a unit fraction.
- Explore the relationship between multiplication and division.


### Section C Goals

- Find the area of a rectangle when one side length is a whole number and the other side length is a fraction or mixed number.
- Represent and solve problems involving the multiplication of a whole number by a fraction or mixed number.
- Write, interpret and evaluate numerical expressions that represent multiplication of a whole number by a fraction or mixed number.

## How will you gauge student learning?

### Assessments

#### 5.2 End-of-Unit Assessment | Summative | Written Test

 [Grade5-2-End-of-Unit-Assessment-assessment.pdf](#)

[6 State Standards Assessed](#)

## How will students learn?

### Learning Activities

#### Section A:

In this section, students learn to see a fraction as a quotient, a result of dividing the numerator by the denominator. They solve a sequence of problems about situations that involve sharing a whole number of objects. Through repeated reasoning, they notice regularity in the result of division (MP8) and generalize that  $a/b = a \div b$ .

#### Section B:

In grade 4, students saw that a non-unit fraction can be expressed as a product of a whole number and a unit fraction, or a whole number and a non-unit fraction with the same denominator.

This section allows students to connect these two interpretations of  $8/3$  and relate  $8 \times 1/3$  and  $8 \div 3$ .

Students use diagrams and contexts to make sense of division situations that result in a fractional quotient. As they interpret and write expressions that represent the quantities, students observe the commutative property of multiplication.

#### Section C:

In this section, students learn that they can reason about the area of a rectangle with a fractional side length the same way they had with rectangles with whole-number side lengths: using diagrams and multiplication.

To find the area of such rectangles, students work through a progression of fractional side lengths: a unit fraction ( $1/3$ ), a non-unit fraction ( $2/3$ ), a fraction greater than 1 ( $5/3$ ), and a mixed number ( $1 \frac{2}{3}$ ). They write and interpret multiplication expressions that represent the area of such rectangles. Students use shaded diagrams and their understanding of fractions to reason about the value of the expressions.

Along the way, the associative property of multiplication becomes evident.

The distributive property is illustrated as students reason about the area of a rectangle where the side lengths are a whole number and a mixed number.

### Differentiated Instruction

### Technology Integration

### 21st Century Skills

### Positive Behavior

### CASEL

Collaborative for Academic, Social, and Emotional Learning

### Resources

### Teacher Notes and Reflections

