



Unit Plan

5.3 Multiplying and Dividing Fractions

Chester / Littleville Elementary / Grade 5 / Mathematics

[Week 8 - Week 11](#) | 4 Curriculum Developers | Last Updated: Mar 21, 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

Number & 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.
- 7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
- 6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
- 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 represent parts of a whole, and understanding how to multiply and divide them is essential in representing and solving real-world problems.
2. Multiplication of fractions extends from the concept of repeated addition. When we multiply a fraction by a whole number, we are essentially adding the fraction to itself multiple times.
3. Multiplication of a fraction by a fraction can be understood as taking a part of a part, which involves partitioning a quantity into equal parts and considering a certain number of these parts.
4. The product of a fraction and a whole number can be interpreted as the number of parts of a whole when the whole is divided into equal fractional parts.
5. Dividing a unit fraction by a whole number and a whole number by a unit fraction requires an understanding of the reciprocal

Essential Questions

1. How can we apply what we know about multiplication of whole numbers to the multiplication of fractions?
2. How does understanding partitioning of a whole help us multiply fractions and find the products?
3. In what ways can we visualize the multiplication of fractions to better understand the concept?
4. Why does multiplying fractions sometimes result in a smaller number, whereas multiplying whole numbers makes them larger?
5. How can dividing by a unit fraction or dividing a unit fraction by a whole number be thought of as an operation related to multiplication?
6. What are the similarities and differences when dividing whole numbers as opposed to dividing fractions?
7. Why is it useful to understand how to multiply and divide fractions when solving real-world problems?
8. How can the action of finding the area of a rectangle with fractional side lengths enhance our understanding of multiplying fractions?

relationship between division and multiplication.

6. Dividing fractions is connected to finding how many times a divisor can fit into the dividend, where one or both of these may be fractions.

7. Real-world problems often involve multiplying and dividing fractions and mixed numbers, and these operations can be visualized using models, such as the area model, number lines, and visual fraction models, to aid comprehension and validation of the results.

8. Area models, particularly rectangles with fractional side lengths, provide a concrete representation of multiplying fractional side lengths, reinforcing the concept that the area found by traditional multiplication is consistent with the concept of finding the area through combining unit squares of fractional lengths.

9. When we calculate the area of shapes with fractional dimensions, how do the operations of multiplication and division apply?

10. How can the concept of area help us to visualize and understand the products of fractions?

Content

In this unit, students find the product of two fractions, divide a whole number by a unit fraction, and divide a unit fraction by a whole number.

Previously, students made sense of multiplication of a whole number and a fraction in terms of the side lengths and area of a rectangle. Here, they make sense of multiplication of two fractions the same way. Students interpret area diagrams with two unit fractions for their side lengths, then a unit fraction and a non-unit fraction, and then two non-unit fractions.

Through repeated reasoning, students notice regularity in the value of the product (MP8). They generalize that it can be found by multiplying the numerators and multiplying the denominators of the factors.

Next, students make sense of division situations and expressions that involve a whole number and a unit fraction. They recall that division can be understood in terms of finding the number of equal-size groups or finding the size of each group.

Students consider how changing the dividend or the divisor changes the value of the quotients and look for patterns (MP8). They use tape diagrams to represent and reason about division situations and expressions.

Later in the unit, students apply what they learned to solve problems. The relationship between multiplication and division is reinforced when they notice that both operations can be used to solve the same problem.

Throughout the unit

Throughout the unit, the Number Talk routines help students to make sense of the developing concepts in each section. After noticing patterns and making generalizations about multiplying fractions, students multiply fractions using mental math. As the content transitions to division in the second section, students revisit whole-number division and fractions as quotients before dividing with unit fractions. As students apply their knowledge of

Skills

Section A Goals

- Recognize that $a/b \times c/d = (a \times c)/(b \times d)$ and use this generalization to multiply fractions numerically.
- Represent and describe multiplication of a fraction by a fraction using area concepts.

Section B Goals

- Divide a unit fraction by a whole number using whole-number division concepts.
- Divide a whole number by a unit fraction using whole-number division concepts.

Section C Goals


- Solve problems involving fraction multiplication and division.

fraction multiplication and division to solve problems in the final section, the Number Talk routines help to build computation fluency.

How will you gauge student learning?

Assessments

5.3 End-of-Unit Assessment | Summative | Written Test

 Grade5-3-End-of-Unit-Assessment-assessment.pdf

[8 State Standards Assessed](#)

How will students learn?

Learning Activities

Section A:

In this section, students reason about multiplication of two fractions. They begin by considering situations that involve finding a fraction of a fraction. They represent the situations by drawing diagrams that make sense to them.

Students connect the product of two fractions to the area of a rectangle with fractional side lengths. When multiplying unit fractions, students see the denominator as the number of equal parts in the unit square, structured as an array. So partitioning one side of a rectangle into fourths and the other into thirds create a 4-by-3 array. Each part in the array is $\frac{1}{12}$ of 1 whole.

They extend this insight to find the product of non-unit fractions, including fractions greater than 1.

Section B:

In grade 3, students learned that division can be understood in terms of equal-size groups and can be interpreted in two ways. For example, $8 \div 4 = 2$ can mean finding the size of each group if 8 is put into 4 equal groups, or finding how many groups of 4 are in 8.

To build this understanding, students reason about situations, diagrams, and expressions that represent division. They look for patterns and assess the reasonableness of the quotients they find.

Section C:

In this section, students solve problems involving multiplication and division of fractions. As they reason about situations and interpret tape diagrams, they see that the same situation or diagram can be expressed with multiplication or division.

Differentiated Instruction

Technology Integration

21st Century Skills

Positive Behavior

CASEL

Collaborative for Academic, Social, and Emotional Learning

Resources

Teacher Notes and Reflections
