

# Unit 7: Multiply and Divide Fractions

<b>Unit #:</b>	APSDO-00016997	<b>Duration:</b>	24.0 Day(s)	<b>Date(s)</b>	03-06-2017
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**Grade(s)**  
 5

**Subject(s)**  
 Mathematics

## Unit Focus

In this unit, students will explore fraction and whole number multiplication by making models that represent these computations. By constructing these models, students can see the fractional parts and add the parts to arrive at an answer. As the students make this realization, they increase their mathematical proficiency and show they can look for and express regularity in repeated reasoning. Once they have mastered this skill, students can use the conventional algorithm to compute products and quotients. All students will use a variety of algorithms to multiply fractions, compare fraction factors and products, multiply mixed numbers, divide a whole number by a fraction and divide a fraction by a whole number. Primary instructional materials for this unit include On Core and Everyday Mathematics.

## Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer
<p><b>Common Core</b>  <i>Mathematics: 5</i></p> <ul style="list-style-type: none"> <li>• Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.  <i>CCSS.MATH.CONTENT.5.NF.B.5A</i></li> <li>• Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for <math>(1/3) \div 4</math>, and use a visual fraction model to show the</li> </ul>	<p><b>T1</b> (T12) Compose and decompose numbers to establish relationships and perform operations.</p> <p><b>T2</b> (T13) Move from one representation to another without changing the quantity.</p> <p><b>T3</b> (T21) Perform operations in a conventional order within the real and complex number system.</p> <p><b>T4</b> (T50) Based on an understanding of any problem, initiate a plan, execute it and evaluate the reasonableness of the solution.</p> <p><b>T5</b> (T53) Articulate how mathematical concepts relate to one another in the context of a problem or in the theoretical sense.</p> <p><b>T6</b> (T51) Examine alternate methods to accurately and efficiently solve problems.</p> <p><b>T7</b> (T52) Use appropriate tools strategically to deepen understanding of mathematical concepts.</p>

<p>quotient. Use the relationship between multiplication and division to explain that <math>(1/3) \div 4 = 1/12</math> because <math>(1/12) \times 4 = 1/3</math>. <i>CCSS.MATH.CONTENT.5.NF.B.7A</i></p> <ul style="list-style-type: none"> <li>• Interpret the product <math>(a/b) \times q</math> as a parts of a partition of <math>q</math> into <math>b</math> equal parts; equivalently, as the result of a sequence of operations <math>a \times q \div b</math>. For example, use a visual fraction model to show <math>(2/3) \times 4 = 8/3</math>, and create a story context for this equation. Do the same with <math>(2/3) \times (4/5) = 8/15</math>. (In general, <math>(a/b) \times (c/d) = ac/bd</math>.) <i>CCSS.MATH.CONTENT.5.NF.B.4A</i></li> <li>• Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence <math>a/b = (n \times a)/(n \times b)</math> to the effect of multiplying <math>a/b</math> by 1. <i>CCSS.MATH.CONTENT.5.NF.B.5B</i></li> <li>• 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. <i>CCSS.MATH.CONTENT.5.NF.B.4B</i></li> <li>• Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for <math>4 \div (1/5)</math>, and use a visual fraction model to show the quotient. Use the relationship between multiplication</li> </ul>	Meaning	
	Understanding(s)	Essential Question(s)
	<p><b>U1</b> (U101) When objects/numbers are combined, mathematical rules guarantee the resulting quantity.</p> <p><b>U2</b> (U103) The same value can be represented in multiple ways.</p> <p><b>U3</b> (U502) Effective problem solvers identify and apply an appropriate model, tool, or strategy.</p> <p><b>U4</b> (U511) Placing a problem in a category gives you a familiar approach to solving it.</p> <p><b>U5</b> (U530) Every problem belongs to a category of problems that has a similar structure and set of characteristics; which means it can be solved using a similar model.</p> <p><b>U6</b> (U561) Recognition of patterns and structures fosters efficiency in solving problems.</p>	<p><b>Q1</b> (Q101) How do I classify/compare objects or sets of objects?</p> <p><b>Q2</b> (Q102) What rule do I know OR what pattern can I recognize to help me make a prediction/solve this problem?</p> <p><b>Q3</b> (Q103) What is the value of this number/relationship and how can I represent it in different ways?</p> <p><b>Q4</b> (Q104) How do I use my number sense to perform operations?</p> <p><b>Q5</b> (Q503) What strategies/approaches are best for this problem?</p> <p><b>Q6</b> (Q510) What type(s) of problem is this?</p> <p><b>Q7</b> (Q563) How does being fluent with basic facts and rules help me solve a complex problem?</p> <p><b>Q8</b> (Q532) Which model best represents this problem?</p> <p><b>Q9</b> (Q570) How can the repeated application of a process/structure help me solve problems more efficiently?</p>
	Acquisition of Knowledge and Skill	
Knowledge	Skill(s)	
	<p><b>S1</b></p> <p>Recognize that a fraction is equal to a division problem, where the numerator is divided by the denominator</p> <p><b>S2</b></p> <p>Multiply/divide a fraction by a whole number</p> <p><b>S3</b></p> <p>Create/solve a word problem that represents</p>	

and division to explain that  $4 \div (1/5) = 20$  because  $20 \times (1/5) = 4$ .

*CCSS.MATH.CONTENT.5.NF.B.7B*

- 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. For example, interpret  $3/4$  as the result of dividing 3 by 4, noting that  $3/4$  multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size  $3/4$ . If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?

*CCSS.MATH.CONTENT.5.NF.B.3*

- Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share  $1/2$  lb of chocolate equally? How many  $1/3$ -cup servings are in 2 cups of raisins?

*CCSS.MATH.CONTENT.5.NF.B.7C*

- Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *CCSS.MATH.CONTENT.5.NF.B.6*

a fraction multiplied by a whole number (*i.e.*, *Five friends each eat  $1/6$  of a pizza. How much did they eat in all?  $5 \times 1/6$* )

#### **S4**

Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions

#### **S5**

Create/solve a word problem that represents a fraction multiplied by a fraction (*i.e.*, *The baker used  $1/2$  of the flour. If he started with  $2/3$  of a bag of flour, how much of the flour did he use?*)

#### **S6**

Find the product of mixed numbers

#### **S7**

Identify and represent multiplication and division of a fraction in a picture model

#### **S8**

Understand that the product of a fraction times a fraction will be less than both factors

#### **S9**

Understand that the product of a fraction and a whole number is greater than or equal to the fraction

#### **S10**

Understand that when dividing a whole number by a fraction, the quotient will be greater than both; and when dividing a fraction by a whole number the quotient is a

		less than or equal to the original fraction
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