North Penn School District

Elementary Math Parent Letter

Grade 5

Unit 3 – Chapter 7: Multiply Fractions

Examples for each lesson:

Lesson 7.1

Find Part of a Group

Lauren bought 12 stamps for postcards. She gave Brianna $\frac{1}{6}$ of them. How many stamps did Lauren give to Brianna?

Find $\frac{1}{6}$ of 12.

Step 1 What is the denominator in the fraction of the stamps Lauren gave to Brianna? 6
So, divide the 12 stamps into 6 equal groups. Circle the groups.

Step 2 Each group represents $\frac{1}{6}$ of the stamps.

How many stamps are in 1 group? 2

So, $\frac{1}{6}$ of 12 is __2__, or $\frac{1}{6} \times 12$ is __2__.

So, Lauren gave Brianna __2__ stamps.

Lesson 7.2

Multiply Fractions and Whole Numbers

Find the product. $\frac{3}{8} \times 4$

Step 1 Draw 4 rectangles to represent the factor 4.

Step 2 The denominator of the factor $\frac{3}{8}$ is 8. So, divide the 4 rectangles into 8 equal parts.

Step 3 The numerator of the factor $\frac{3}{8}$ is 3. So, shade 3 of the parts.

Step 4 The 4 rectangles have 3 shaded parts. Each rectangle is divided into 2 equal parts. So, $\frac{3}{2}$ of the rectangles are shaded.

So, $\frac{3}{8} \times 4$ is $\frac{3}{2}$, or $1\frac{1}{2}$.

More information on this strategy is available on Animated Math Model #27.

Lesson 7.3

Fraction and Whole Number Multiplication

Find the product. $3 \times \frac{5}{6}$

$3 \times \frac{5}{6} = \frac{3}{\boxed{1}} \times \frac{5}{6}$ Write the whole-number factor, 3, as $\frac{3}{1}$.

$= \frac{3 \times \boxed{5}}{1 \times 6}$ Multiply the numerators. Then multiply the denominators.

$= \frac{\boxed{15}}{6}$

$= \boxed{2}\frac{3}{6}$, or $2\frac{\boxed{1}}{\boxed{2}}$ Write the product as a mixed number in simplest form.

So, $3 \times \frac{5}{6}$ is $\underline{2\frac{1}{2}}$.

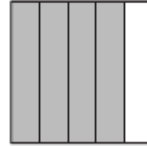More information on this strategy is available on Animated Math Model #27.

Multiply Fractions

You can use a model to help you multiply two fractions.

Multiply. $\frac{1}{3} \times \frac{4}{5}$

Step 1 Draw a rectangle. Divide it into 5 equal columns. To represent the factor $\frac{4}{5}$, shade 4 of the 5 columns.

Step 2 Now divide the rectangle into 3 equal rows. Shade $\frac{1}{3}$ of the $\frac{4}{5}$ you already shaded.

The rectangle is divided into 15 smaller rectangles. This is the denominator of the product.

There are 4 smaller rectangles that contain both types of shading. So, 4 is the numerator of the product.
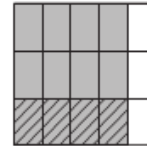
So $\frac{4}{15}$ of the rectangles contain both types of shading.

Think: What is $\frac{1}{3}$ of $\frac{4}{5}$?

$$\frac{1}{3} \times \frac{4}{5} = \frac{4}{15}.$$

More information on this strategy is available on Animated Math Model #28.

Lesson 7.5

Compare Fraction Factors and Products

You can use a model to determine how the size of the product compares to the size of one factor when multiplying fractions.

The factor is 1: $\frac{2}{3} \times 1$

• Draw a model to represent the factor 1.
  Divide it into 3 equal sections.

• Shade 2 of the 3 sections to represent the factor $\frac{2}{3}$.

$\frac{2}{3}$ of the rectangle is shaded. So, $\frac{2}{3} \times 1$ is ___equal to___ $\frac{2}{3}$.
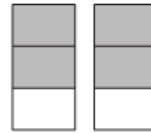
The factor is greater than 1: $\frac{2}{3} \times 2$

• Draw two rectangles to represent the factor 2.
  Divide each rectangle into 3 equal sections.

• Shade 2 of 3 sections in each to represent the factor $\frac{2}{3}$.

In all, 4 sections are shaded, which is greater than the number of sections in one rectangle. So, $\frac{2}{3} \times 2$ is ___greater than___ $\frac{2}{3}$.

The factor is less than 1: $\frac{2}{3} \times \frac{1}{6}$

• Draw a rectangle. Divide it into 6 equal columns.
  Shade 1 of the 6 columns to represent the factor $\frac{1}{6}$.

• Now divide the rectangle into 3 equal rows. Shade 2 of the 3 rows of the section already shaded to represent the factor $\frac{2}{3}$.

The rectangle is divided into 18 sections. 2 of the sections are shaded twice. 2 sections is less than the 3 sections that represent $\frac{1}{6}$.

So, $\frac{2}{3} \times \frac{1}{6}$ is ___less than___ $\frac{1}{6}$.

Lesson 7.6

Fraction Multiplication

To multiply fractions, you can multiply the numerators, then multiply the denominators. Write the product in simplest form.

Multiply. $\frac{3}{10} \times \frac{4}{5}$

Step 1 Multiply the numerators. Multiply the denominators.

$$\frac{3}{10} \times \frac{4}{5} = \frac{3 \times 4}{10 \times 5}$$
$$= \frac{12}{50}$$

Step 2 Write the product in simplest form.

$$\frac{12}{50} = \frac{12 \div 2}{50 \div 2}$$
$$= \frac{6}{25}$$

So, $\frac{3}{10} \times \frac{4}{5}$ is $\frac{6}{25}$.

More information on this strategy is available on Animated Math Models #27, 28.
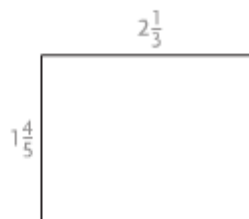
Area and Mixed Numbers

You can use an area model to help you multiply mixed numbers.
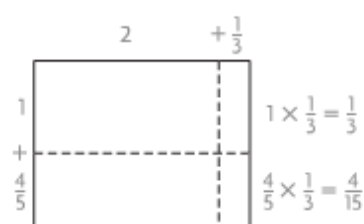
Find the area. $1\frac{4}{5} \times 2\frac{1}{3}$

Step 1 Rewrite each mixed-number factor as the sum of a whole number and a fraction.

$1\frac{4}{5} = 1 + \frac{4}{5}$ and $2\frac{1}{3} = 2 + \frac{1}{3}$

Step 2 Draw an area model to show the original multiplication problem.

Step 3 Draw dashed lines, and label each section to show how you broke apart the mixed numbers in Step 1.

Step 4 Find the area of each section.

$1 \times 2 = \underline{\quad 2 \quad}$

$1 \times \frac{1}{3} = \underline{\quad \frac{1}{3} \quad}$

$\frac{4}{5} \times 2 = \underline{\quad \frac{8}{5} \quad}$

$\frac{4}{5} \times \frac{1}{3} = \underline{\quad \frac{4}{15} \quad}$

Step 5 Add the areas of each of the sections to find the total area of the rectangle.

$$2 + \frac{1}{3} + \frac{8}{5} + \frac{4}{15} = \frac{\boxed{30}}{15} + \frac{\boxed{5}}{15} + \frac{\boxed{24}}{15} + \frac{4}{15}$$

$$= \frac{\boxed{63}}{15}, \text{ or } 4\frac{1}{5}$$

So, $1\frac{4}{5} \times 2\frac{1}{3}$ is $\underline{4\frac{1}{5}}$.

Lesson 7.8

Compare Mixed Number Factors and Products

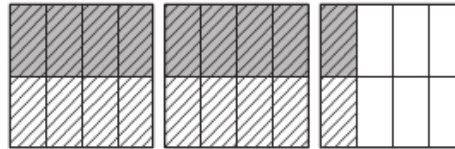Complete each statement with *equal to*, *greater than*, or *less than*.

$1 \times 1\frac{3}{4}$ is ____?____ $1\frac{3}{4}$.

The Identity Property of Multiplication states that the product of

1 and any number is that number. So, $1 \times 1\frac{3}{4}$ is __equal to__ $1\frac{3}{4}$.

$\frac{1}{2} \times 2\frac{1}{4}$ is ____?____ $2\frac{1}{4}$.

Draw three rectangles. Divide each rectangle into 4 equal columns.

Shade completely the first two rectangles and one column of the last rectangle to represent $\frac{1}{4}$.

Divide the rectangles into 2 rows. Shade one row to represent the factor $\frac{1}{2}$.

18 small rectangles are shaded. 9 rectangles have both types of shading. 9 rectangles is less than the 18 rectangles that represent $2\frac{1}{4}$.

So, $\frac{1}{2} \times 2\frac{1}{4}$ is __less than__ $2\frac{1}{4}$.

When you multiply a mixed number by a fraction less than 1,

the product will be __less than__ the mixed number.

$1\frac{1}{4} \times 1\frac{3}{4}$ is ____?____ $1\frac{1}{4}$.

Use what you know about the product of two whole numbers greater than 1 to determine the size of the product of two mixed numbers.

So, $1\frac{1}{4} \times 1\frac{3}{4}$ is __greater than__ $1\frac{1}{4}$ and __greater than__ $1\frac{3}{4}$.

When you multiply two mixed numbers, their product is __greater than__ either factor.

Multiply Mixed Numbers

You can use a multiplication square to multiply mixed numbers.

Multiply. $1\frac{2}{7} \times 1\frac{3}{4}$ **Write the product in simplest form.**

Step 1 Write the mixed numbers outside the square.

$\times$	1	$\frac{2}{7}$
1		
$\frac{3}{4}$		

Step 2 Multiply the number in each column by the number in each row.

$\times$	1	$\frac{2}{7}$
1	1×1	$\frac{2}{7} \times 1$
$\frac{3}{4}$	$1 \times \frac{3}{4}$	$\frac{2}{7} \times \frac{3}{4}$

Step 3 Write each product inside the square.

$\times$	1	$\frac{2}{7}$
1	1	$\frac{2}{7}$
$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{14}$

Step 4 Add the products inside the multiplication square.

$$1 + \frac{2}{7} + \frac{3}{4} + \frac{3}{14}$$

Find the least common denominator.

$$\frac{28}{28} + \frac{8}{28} + \frac{21}{28} + \frac{6}{28} = \frac{63}{28}$$

Simplify.

$$\frac{63}{28} = 2\frac{7}{28}, \text{ or } 2\frac{1}{4}$$

So, $1\frac{2}{7} \times 1\frac{3}{4}$ is $\underline{2\frac{1}{4}}$.

Lesson 7.10

Problem Solving • Find Unknown Lengths

Zach built a rectangular deck in his backyard. The area of the deck is 300 square feet. The length of the deck is $1\frac{1}{3}$ times as long as the width. What are the dimensions of the deck?

Read the Problem		
What do I need to find? I need to find __the__ __dimensions of the deck__.	**What information do I need to use?** The deck has an area of __300__ square feet, and the length is __$1\frac{1}{3}$__ as long as the width.	**How will I use the information?** I will __guess__ the length and width of the deck. Then I will __check__ my guess and __revise__ it if it is not correct.

Solve the Problem

I can try different values for the length of the deck, each that is $1\frac{1}{3}$ times as long as the width. Then I can multiply the length and width and compare to the correct area.

Guess		Check	Revise
Width (in feet)	**Length (in feet)** ($1\frac{1}{3}$ times the width)	**Area of Deck (in square feet)**	
12	$1\frac{1}{3} \times 12 =$ __16__	$12 \times 16 =$ __192__ too low	Try a __longer__ width.
18	$1\frac{1}{3} \times 18 =$ __24__	$18 \times 24 =$ __432__ too high	Try a __shorter__ width.
15	$1\frac{1}{3} \times 15 =$ __20__	$15 \times 20 =$ __300__ correct	

So, the dimensions of the deck are __20__ feet by __15__ feet.

Vocabulary

Denominator – the number below the bar in a fraction that tells how many equal parts are in the whole or in the group

Equivalent fractions – two or more fractions that name the same amount

Mixed number – a number represented by a whole number and fraction

Numerator – the number above the bar in a fraction that tells how many equal parts of the whole are being considered

Product – the answer to a multiplication problem

Simplest form – a fraction in which 1 is the only number that can divide evenly into the numerator and the denominator