Learning Objective: Students will be able to use a visual model and a formal rule to divide by a fraction.

Lesson 2.2

October 31, 2014

Essential Question:

How can you divide by a fraction?

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Lesson Objective:

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Self-Evaluation Scale

Score	Description
4	I can teach other students how to use a visual model and a formal rule to divide by a fraction.
3	I can use a visual model and a formal rule to divide by a fraction.
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Homework Answers

2.1 Record and Practice Journal

Multiply. Write the answer in simplest form.

1. $\frac{1}{6} \times \frac{5}{8}$

$\frac{5}{48}$

2. $\frac{7}{9} \times 3$

$2\frac{1}{3}$

3. $\frac{8}{9} \times \frac{3}{5}$

$\frac{8}{15}$

4. $\frac{7}{8} \times 2\frac{1}{3}$

$2\frac{1}{24}$

5. $7 \times 3\frac{9}{14}$

$25\frac{1}{2}$

6. $5\frac{5}{9} \times 2\frac{7}{10}$

15

7. You reserve $\frac{2}{5}$ of the seats on a tour bus. You are able to fill $\frac{5}{8}$ of the seats you reserve. What fraction of the seats on the bus are you able to fill?

$\frac{1}{4}$

8. A triangle has a base of $5\frac{2}{3}$ inches and a height of 3 inches. What is the area of the triangle?

$8\frac{1}{2}$ in.^{2}

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Activity 1 & 2

With a partner, work on Activity 1 & 2 on pages 35 & 36 of your Big Ideas Record and Practice Journal.

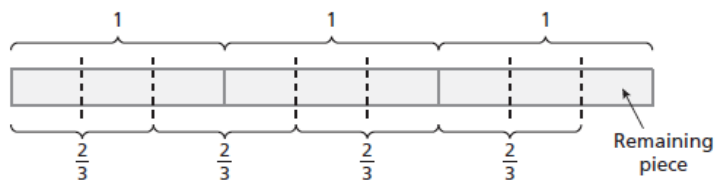Learning Objective: Students will be able to use a visual model and a formal rule to divide by a fraction.

> **1 ACTIVITY:** Dividing by a Fraction

Work with a partner. Write the division problem and solve it using a model.

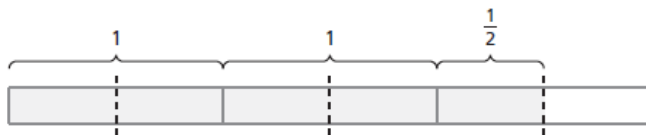**a.** How many two-thirds are in three?

The division problem is _____.

How many groups of $\frac{2}{3}$ are in 3? _____

The remaining piece represents _____ of $\frac{2}{3}$.

So, there are _____ groups of $\frac{2}{3}$ in 3.

So, _____ ÷ _____ = _____.

b. How many halves are in five halves?

c. How many four-fifths are in eight?

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Work with a partner.

a. Complete each table.

Division Table

$8 \div 16$	$\dfrac{1}{2}$
$8 \div 8$	1
$8 \div 4$	2
$8 \div 2$	4
$8 \div 1$	8
$8 \div \dfrac{1}{2}$	
$8 \div \dfrac{1}{4}$	
$8 \div \dfrac{1}{8}$	

Multiplication Table

$8 \times \dfrac{1}{16}$	$\dfrac{1}{2}$
$8 \times \dfrac{1}{8}$	1
$8 \times \dfrac{1}{4}$	2
$8 \times \dfrac{1}{2}$	4
8×1	8
8×2	
8×4	
8×8	

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Two numbers whose product is 1 are **reciprocals**. To write the reciprocal of a number, write the number as a fraction. Then invert the fraction.

So, the reciprocal of a fraction $\frac{a}{b}$ is $\frac{b}{a}$, where a and $b \neq 0$.

The Meaning of a Word ● Invert

When you **invert** a glass, you turn it over.

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1 **Writing Reciprocals**

	Original Number	Fraction	Reciprocal	Check
a.	$\dfrac{3}{5}$	$\dfrac{3}{5}$	$\dfrac{5}{3}$	$\dfrac{3}{5} \times \dfrac{5}{3} = 1$
b.	$\dfrac{9}{5}$	$\dfrac{9}{5}$	$\dfrac{5}{9}$	$\dfrac{9}{5} \times \dfrac{5}{9} = 1$
c.	2	$\dfrac{2}{1}$	$\dfrac{1}{2}$	$\dfrac{2}{1} \times \dfrac{1}{2} = 1$

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On Your Own

Write the reciprocal of the number.

1. $\dfrac{3}{4}$ 2. 5 3. $\dfrac{7}{2}$ 4. $\dfrac{4}{9}$

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Key Idea

Dividing Fractions

Words To divide a number by a fraction, multiply the number by the reciprocal of the fraction.

Numbers $\dfrac{1}{5} \div \dfrac{3}{4} = \dfrac{1}{5} \times \dfrac{4}{3} = \dfrac{1 \times 4}{5 \times 3}$

Algebra $\dfrac{a}{b} \div \dfrac{c}{d} = \dfrac{a}{b} \cdot \dfrac{d}{c} = \dfrac{a \cdot d}{b \cdot c}$, where b, c, and $d \neq 0$

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$$\frac{1}{6} \div \frac{2}{3} = \frac{1}{6} \cdot \frac{3}{2}$$

2   Dividing a Fraction by a Fraction

Find $\frac{1}{6} \div \frac{2}{3}$.

$\frac{1}{6} \div \frac{2}{3} = \frac{1}{6} \times \frac{3}{2}$ Multiply by the reciprocal of $\frac{2}{3}$, which is $\frac{3}{2}$.

$= \frac{1 \times \cancel{3}^{1}}{\cancel{6}_{2} \times 2}$ Multiply fractions. Divide out the common factor 3.
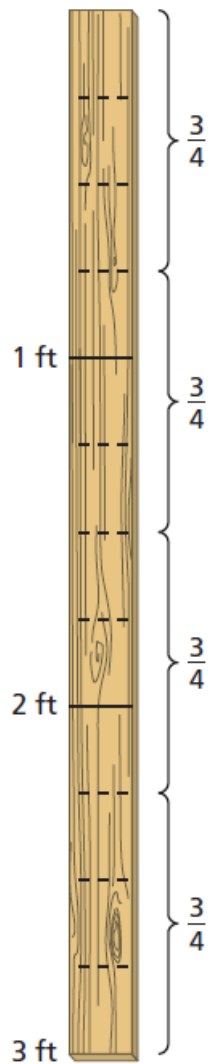
$= \frac{1}{4}$ Simplify.

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EXAMPLE 3 **Dividing a Whole Number by a Fraction**

A piece of wood is 3 feet long. How many $\frac{3}{4}$-foot pieces can you cut from the piece of wood?

Method 1: Draw a diagram. Mark each foot on the diagram. Then divide each foot into $\frac{1}{4}$-foot sections.

Count the number of $\frac{3}{4}$-foot pieces of wood. There are four.

∴ So, you can cut four $\frac{3}{4}$-foot pieces from the piece of wood.

Method 2: Divide 3 by $\frac{3}{4}$ to find the number of $\frac{3}{4}$-foot pieces.

$$3 \div \frac{3}{4} = 3 \times \frac{4}{3}$$ Multiply by the reciprocal of $\frac{3}{4}$, which is $\frac{4}{3}$.

$$= \frac{\overset{1}{3} \times 4}{\underset{1}{3}}$$ Multiply. Divide out the common factor 3.

$$= 4$$ Simplify.

∴ So, you can cut four $\frac{3}{4}$-foot pieces from the piece of wood.

1 ft
2 ft
3 ft

$\frac{3}{4}$ $\frac{3}{4}$ $\frac{3}{4}$ $\frac{3}{4}$

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$$\frac{2}{7} \div \frac{1}{3} = \frac{2}{7} \cdot \frac{3}{1} = \boxed{\frac{6}{7}}$$

On Your Own

Divide. Write the answer in simplest form.

5. $\dfrac{2}{7} \div \dfrac{1}{3}$ **6.** $\dfrac{1}{2} \div \dfrac{1}{8}$ **7.** $\dfrac{3}{8} \div \dfrac{1}{4}$ **8.** $\dfrac{2}{5} \div \dfrac{3}{10}$

9. How many $\dfrac{1}{2}$-foot pieces can you cut from a 7-foot piece of wood?

$$\frac{2}{5} \div \frac{3}{10}$$

$$\frac{2}{5} \cdot \frac{\overset{2}{\cancel{10}}}{3} = \frac{4}{3}$$

$$\boxed{1\frac{1}{3}}$$

$$\frac{3}{8} \div \frac{1}{4}$$

$$\frac{3}{8} \text{dot} 2 \cdot \frac{1}{4} \text{dot} 4$$

$$\left(1\frac{1}{2} \right) \quad \frac{3}{2}$$

$$\frac{1}{2} \div \frac{1}{8}$$

$$\frac{1}{2} \cdot \frac{8}{1}$$

$$\frac{4}{1}$$

$$4$$

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4 Dividing a Fraction by a Whole Number

Find $\dfrac{4}{5} \div 2$.

$$\frac{4}{5} \div 2 = \frac{4}{5} \div \frac{2}{1}$$ Write 2 as an improper fraction.

$$= \frac{4}{5} \times \frac{1}{2}$$ Multiply by the reciprocal of $\frac{2}{1}$, which is $\frac{1}{2}$.

$$= \frac{\overset{2}{\cancel{4}} \times 1}{5 \times \underset{1}{\cancel{2}}}$$ Multiply fractions. Divide out the common factor 2.

$$= \frac{2}{5}$$ Simplify.

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Assignment

Complete problems 8, 9, 11, 13, 19, 21, 43, 48, & 51 on pages 67 & 68 in your Big Ideas Text Book.

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Homework

In your Big Ideas Record and Practice Journal

page 38. + 2 candies each