**October 31, 2014 Period 3 Lesson 2.2**

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?

Lesson 2.2

October 31, 2014

# Lesson Objective:

Students will be able to:

use a visual model and a formal rule to divide by a fraction.

# 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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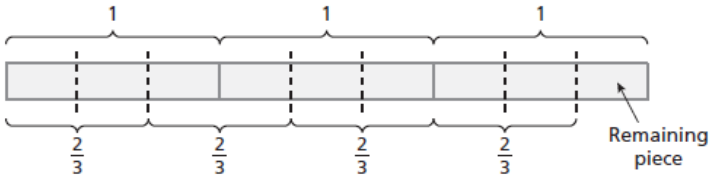
## 1 ACTIVITY: Dividing by a Fraction

**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 _____.



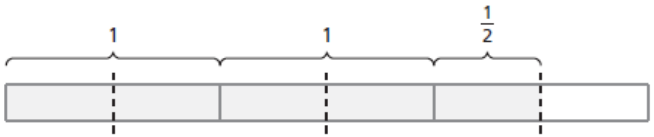

How many groups of $\frac{2}{3}$ are in 3? _____

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**

| | |
|---|---|
| $8 \div 16$ | $\frac{1}{2}$ |
| $8 \div 8$ | $1$ |
| $8 \div 4$ | $2$ |
| $8 \div 2$ | $4$ |
| $8 \div 1$ | $8$ |
| $8 \div \frac{1}{2}$ | |
| $8 \div \frac{1}{4}$ | |
| $8 \div \frac{1}{8}$ | |

**Multiplication Table**

| | |
|---|---|
| $8 \times \frac{1}{16}$ | $\frac{1}{2}$ |
| $8 \times \frac{1}{8}$ | $1$ |
| $8 \times \frac{1}{4}$ | $2$ |
| $8 \times \frac{1}{2}$ | $4$ |
| $8 \times 1$ | $8$ |
| $8 \times 2$ | |
| $8 \times 4$ | |
| $8 \times 8$ | |

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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.** | $\frac{3}{5}$ | $\frac{3}{5}$ | $\frac{5}{3}$ | $\frac{3}{5} \times \frac{5}{3} = 1$ |
| **b.** | $\frac{9}{5}$ | $\frac{9}{5}$ | $\frac{5}{9}$ | $\frac{9}{5} \times \frac{5}{9} = 1$ |
| **c.** | $2$ | $\frac{2}{1}$ | $\frac{1}{2}$ | $\frac{2}{1} \times \frac{1}{2} = 1$ |

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# On Your Own

**Write the reciprocal of the number.**

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

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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** $\frac{1}{5} \div \frac{3}{4} = \frac{1}{5} \times \frac{4}{3} = \frac{1 \times 4}{5 \times 3}$

**Algebra** $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{a \cdot d}{b \cdot c}$, 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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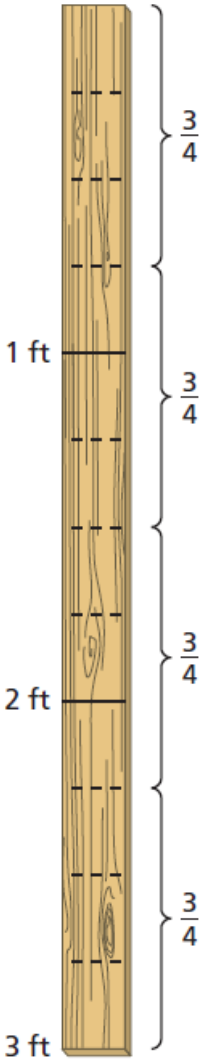
## EXAMPLE 3 Dividing a Whole Number by a Fraction




**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 $\frac{4}{3}$.

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

$= 4$ Simplify.

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

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

# On Your Own

**Divide. Write the answer in simplest form.**

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

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

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$$5\frac{1}{2} \div \frac{13}{10}$$

$$\frac{-5\frac{1}{2}}{3\frac{1}{10}}$$

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

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

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

$2 \times 8 = 16$

$-1 + 1$

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

$2 \times 2 = 4$

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

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

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

$$4$$

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## 4 Dividing a Fraction by a Whole Number

**Find $\frac{4}{5} \div 2$.**

$$\frac{4}{5} \div 2 = \frac{4}{5} \div \frac{2}{1}$$ 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