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

# Warm Up

$$
\begin{array}{r}
705 \\
\times\,156 \\
\hline
\end{array}
\qquad
\begin{array}{r}
183 \\
\times\,515 \\
\hline
\end{array}
\qquad
\begin{array}{r}
625 \\
\times\,208 \\
\hline
\end{array}
\qquad
\begin{array}{r}
276 \\
\times\,150 \\
\hline
\end{array}
$$

$$
\begin{array}{r}
957 \\
\times\,393 \\
\hline
\end{array}
\qquad
\begin{array}{r}
547 \\
\times\,404 \\
\hline
\end{array}
\qquad
\begin{array}{r}
719 \\
\times\,628 \\
\hline
\end{array}
\qquad
\begin{array}{r}
919 \\
\times\,800 \\
\hline
\end{array}
$$

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

# Warm Up Answers

| 705 | 183 | 625 | 276 |
|---:|---:|---:|---:|
| × 156 | × 515 | × 208 | × 150 |
| 4,230 | 915 | 5,000 | 0 |
| 35,250 | 1,830 | 0 | 13,800 |
| 70,500 | 91,500 | 125,000 | 27,600 |
| 109,980 | 94,245 | 130,000 | 41,400 |

| 957 | 547 | 719 | 919 |
|---:|---:|---:|---:|
| × 393 | × 404 | × 628 | × 800 |
| 2,871 | 2,188 | 5,752 | 0 |
| 86,130 | 0 | 14,380 | 0 |
| 287,100 | 218,800 | 431,400 | 735,200 |
| 376,101 | 220,988 | 451,532 | 735,200 |

Lesson 2.2

October 2, 2014

# Essential Question:

## How can you divide by a fraction?

Lesson 2.2                                                    October 2, 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. |
| 2 | I recognize, but still need help to use a visual model and a formal rule to divide by a fraction. |
| 1 | I do not know how to use a visual model and a formal rule to divide by a fraction. |

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

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

$2\frac{1}{3}$

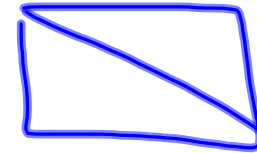3. $\frac{8}{9} \times \frac{3}{5}$

$\frac{8}{15}$

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.$^2$

$A = \frac{1}{2}bh$

$5\frac{2}{3} \cdot 3$

$17 \cdot \frac{3}{3}$

$\frac{17}{3}$

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

# Activity 1 & 2

With a partner, work on Activity 1 & 2 on pages 35 & 36 of your Big Ideas Record and Practice Journal.
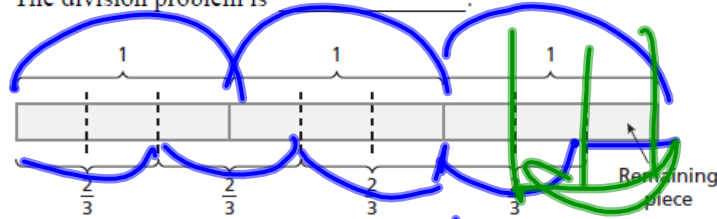
# October 6, 2014 Period 4 Lesson 2.2

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 _____.

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

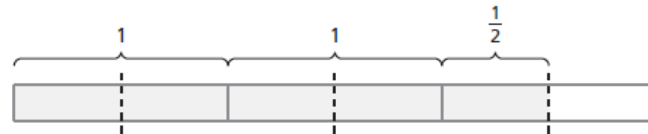How many groups of $\frac{2}{3}$ are in 3? __4__

The remaining piece represents __$\frac{1}{2}$__ of $\frac{2}{3}$.

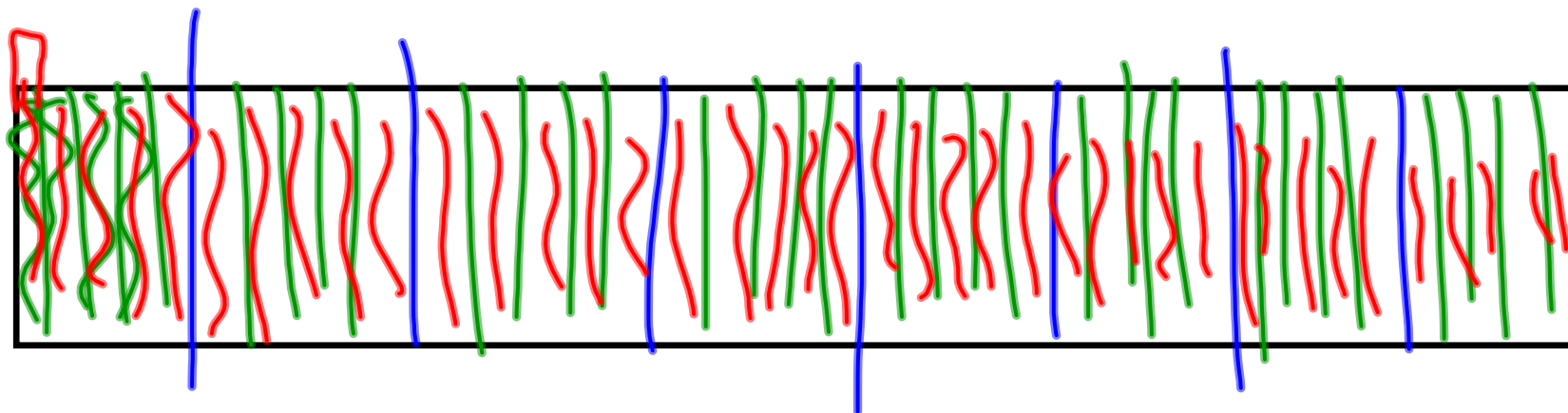So, there are __$4\frac{1}{2}$__ groups of $\frac{2}{3}$ in 3.

So, __3__ ÷ __$\frac{2}{3}$__ = __$4\frac{1}{2}$__.

b. How many halves are in five halves?

c. How many four-fifths are in eight?

$$8 + 2 = 10$$



1 2  3  4  5 6  7 8  9 10

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

**Work with a partner.**

a.  Complete each table.

| Division Table | | Multiplication Table | |
|---|---|---|---|
| $8 \div 16$ | $\dfrac{1}{2}$ | $8 \times \dfrac{1}{16}$ | $\dfrac{1}{2}$ |
| $8 \div 8$ | $1$ | $8 \times \dfrac{1}{8}$ | $1$ |
| $8 \div 4$ | $2$ | $8 \times \dfrac{1}{4}$ | $2$ |
| $8 \div 2$ | $4$ | $8 \times \dfrac{1}{2}$ | $4$ |
| $8 \div 1$ | $8$ | $8 \times 1$ | $8$ |
| $8 \div \dfrac{1}{2}$ | | $8 \times 2$ | |
| $8 \div \dfrac{1}{4}$ | | $8 \times 4$ | |
| $8 \div \dfrac{1}{8}$ | | $8 \times 8$ | |

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

$\dfrac{3}{8}$

$O \; O$

$\dfrac{2}{1} = 2 \neq \dfrac{1}{2}$

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 $\dfrac{a}{b}$ is $\dfrac{b}{a}$, where $a$ and $b \neq 0$.

## The Meaning of a Word ● Invert

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

**October 6, 2014 Period 4 Lesson 2.2**

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

$$\frac{16}{16} \qquad \frac{16}{16} = \qquad \frac{8}{5} * \frac{5}{8} = 1 \qquad\qquad \frac{8}{5} \times \frac{5}{8}$$

## 1 — Writing Reciprocals

| | Original Number | Fraction | Reciprocal | Check |
|---|---|---|---|---|
| a. | $\frac{3}{5}$ | $\frac{8}{5}$ → $\frac{5}{3}$ | | $\frac{3}{5} \times \frac{5}{3} = 1$ |
| b. | $\frac{9}{5}$ | $\frac{9}{5}$ → $\frac{5}{9}$ | | $\frac{9}{5} \times \frac{5}{9} = 1$ |
| c. | $\frac{2}{1}$ | $\frac{2}{1}$ → $\frac{1}{2}$ | | $\frac{2}{1} \times \frac{1}{2} = 1$ |

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

# On Your Own

## Write the reciprocal of the number.

1. $\dfrac{3}{4}$

2. $5$

3. $\dfrac{7}{2}$

4. $\dfrac{4}{9}$

$$\text{Div} = \text{Mult of the reciprocal}$$

$$4 \div 2 = 2$$

$$\overset{2}{\cancel{4}} \cdot \frac{1}{\cancel{2}_{1}} = \frac{2}{1} = 2$$

$$10 \div 2$$

$$\frac{\overset{5}{\cancel{10}}}{1} \cdot \frac{1}{\underset{1}{2}} = \frac{5}{1} = 5$$

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

## 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 $d \neq 0$

Dividend
Divisor

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

$$1 \cdot \frac{4}{3} = \frac{4}{3}$$

$$4 \div \frac{3}{4} = 4 \cdot \frac{4}{3} = \frac{16}{3} = 5\frac{1}{3}$$

**October 6, 2014 Period 4 Lesson 2.2**

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

$$6\overline{)12}$$

$$12 \div 6$$

$$12 \cdot \frac{1}{6}$$

$$\frac{12}{6}$$

## 2   Dividing a Fraction by a Fraction

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

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

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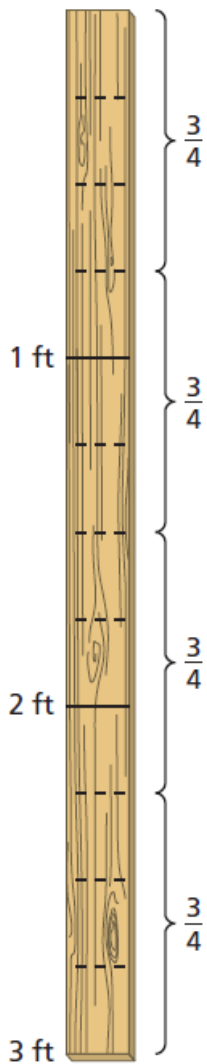
$$= \frac{1}{4}$$     Simplify.

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

**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.

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

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

$$= 4 \qquad \text{Simplify.}$$

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

1 ft · · · $\frac{3}{4}$ · $\frac{3}{4}$

2 ft · · · $\frac{3}{4}$ · $\frac{3}{4}$

3 ft · · · $\frac{3}{4}$ · $\frac{3}{4}$

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

# 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?

**October 6, 2014 Period 4 Lesson 2.2**

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

### 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.

$$3\frac{1}{3} \div 2\frac{1}{2}$$

$$\frac{10}{3} \div \frac{5}{2} = \frac{\overset{2}{\cancel{10}}}{3} \cdot \frac{2}{\underset{1}{\cancel{5}}} = \frac{4}{3} = 1\frac{1}{3}$$

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

# Assignment

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

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

Lesson 2.2                                                                 October 6, 2014

# Essential Question:

How can you divide by a fraction?

Lesson 2.2                                                    October 6, 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 |
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**October 6, 2014 Period 4 Lesson 2.2**

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

# Homework

In your Big Ideas Record and Practice Journal page 38.