

2.2 Dividing Fractions

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ESSENTIAL QUESTION

How do you divide fractions?

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COMMON CORE STATE STANDARDS

6.NS.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions.

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

Two numbers whose product is 1 are **RECIPROCAL**s.

To write the reciprocal of a number write the number as a fraction. Then invert the fraction.

Write the reciprocal of 4.

It is $\frac{1}{4}$ because

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

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EXAMPLE 1 Writing Reciprocals

Write the reciprocal of the number.

a. $\frac{3}{5}$ $\frac{5}{3}$

b. $\frac{9}{5}$ $\frac{5}{9}$

c. 2 $\frac{1}{2}$

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On Your Own

Write the reciprocal of the number.

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

2. 5 $\frac{1}{5}$

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

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- KEEP** the first fraction
- CHANGE** division to multiplication
- FLIP** the second fraction

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EXAMPLE 2 Dividing a Fraction by a Fraction

Divide. Write answer in simplest form.

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

$\frac{1 \cdot 3}{6 \cdot 2} = \frac{3}{12}$

$\frac{1}{4}$

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● On Your Own

Divide. Write answer in simplest form.

$$\frac{2}{7} \div \frac{1}{3}$$

$$\frac{2}{7} \div \frac{1}{3}$$

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

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● On Your Own

Divide. Write answer in simplest form.

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

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

$$\frac{1}{2} \cdot \frac{8}{1} = 4$$

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● On Your Own

Divide. Write answer in simplest form.

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

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

$$\frac{3}{8} \cdot \frac{4}{1} = \frac{3}{2}$$

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● On Your Own

Divide. Write answer in simplest form.

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

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

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

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EXAMPLE  Dividing a Fraction by a Whole Number

Divide. Write answer in simplest form

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

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

$$\frac{4}{5} \cdot \frac{1}{2} = \frac{4 \cdot 1}{5 \cdot 2} = \frac{4}{10}$$

$$\frac{4}{10} = \frac{2}{5}$$

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 **On Your Own**

Divide. Write answer in simplest form.

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

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

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

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 **On Your Own**

Divide. Write answer in simplest form.

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

$$\frac{2}{3} \div 10 = \frac{2}{3} \cdot \frac{1}{10}$$

$$\frac{2}{3} \cdot \frac{1}{10} = \frac{2 \cdot 1}{3 \cdot 10} = \frac{2}{30}$$

$$\frac{2}{30} = \frac{1}{15}$$

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 **On Your Own**

Divide. Write answer in simplest form.

$$\frac{5}{8} \div 4$$

$$\frac{5}{8} \div 4 = \frac{5}{8} \cdot \frac{1}{4}$$

$$\frac{5}{8} \cdot \frac{1}{4} = \frac{5 \cdot 1}{8 \cdot 4} = \frac{5}{32}$$

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On Your Own

Divide. Write answer in simplest form.

$$\frac{6}{7} \div 4$$

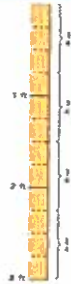
$$\frac{6}{7} \div 4 = \frac{6}{7} \cdot \frac{1}{4} = \frac{6}{28} = \frac{3}{14}$$

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EXAMPLE 13 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?

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



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You can cut $4 \frac{3}{4}$ foot pieces from the piece of wood

EXAMPLE 5 Using Order of Operations

Evaluate $\frac{3}{8} + \frac{5}{6} \div 5$.

$$\frac{3}{8} + \frac{5}{6} \div 5 = \frac{3}{8} + \frac{5}{6} \cdot \frac{1}{5} = \frac{3}{8} + \frac{1}{6}$$

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$$\frac{3}{8} + \frac{1}{6} = \frac{9}{24} + \frac{4}{24} = \frac{13}{24}$$

On Your Own

Evaluate the expression. Write the answer in simplest form.

$$\frac{4}{5} + \frac{2}{5} \div 4$$

$$\frac{4}{5} + \frac{2}{5} \div 4 = \frac{4}{5} + \frac{2}{5} \cdot \frac{1}{4} = \frac{4}{5} + \frac{1}{10}$$

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$$\frac{4}{5} + \frac{1}{10} = \frac{8}{10} + \frac{1}{10} = \frac{9}{10}$$

On Your Own

Evaluate the expression. Write the answer in simplest form.

$$\frac{3}{8} \div \frac{3}{4} - \frac{1}{6}$$

$$\frac{3}{8} \div \frac{3}{4} - \frac{1}{6}$$

$$\frac{3}{8} \cdot \frac{4}{3} - \frac{1}{6}$$

$$\frac{12}{24} - \frac{1}{6}$$

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$$\frac{1 \cdot 3}{2 \cdot 3} - \frac{1}{6}$$

$$\frac{3}{6} - \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$$

On Your Own

Evaluate the expression. Write the answer in simplest form.

$$\frac{8}{9} \div 2 \div 8$$

$$\frac{8}{9} \div 2 \div 8$$

$$\frac{8}{9} \cdot \frac{1}{2} \div 8$$

$$\frac{8}{18} \div 8$$

$$\frac{8}{18} \cdot \frac{1}{8} = \frac{1}{18}$$

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$$\frac{8}{9} \cdot \frac{1}{2} = \frac{8}{18}$$

$$\frac{8}{18} \cdot \frac{1}{8} = \frac{1}{18}$$

- KEEP** the first fraction
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