

Dividing Fractions

Goal: Divide fractions and mixed numbers.

Vocabulary

Reciprocals:

Dividing Fractions

Words To divide by a fraction, multiply by its reciprocal.

Numbers $\frac{3}{8} \div \frac{4}{5} = \frac{3}{8} \cdot \frac{\quad}{\quad} = \frac{\quad}{\quad}$

Algebra $\frac{\quad}{\quad} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{\quad}{\quad} \quad (b, c, d \neq 0)$

EXAMPLE 1 Dividing a Fraction by a Fraction

a. $\frac{9}{10} \div \frac{3}{20} = \frac{9}{10} \cdot \frac{\quad}{\quad}$
 $= \frac{\quad}{\quad}$
 $= \frac{\quad}{\quad}$

Remember that the reciprocal of a negative number is also a negative number.

b. $\frac{11}{12} \div \frac{-1}{6} = \frac{\quad}{\quad} \cdot \frac{\quad}{\quad}$
 $= \frac{\quad}{\quad}$
 $= \frac{\quad}{\quad}, \text{ or } \frac{\quad}{\quad}$

Guided Practice Find the quotient. Simplify if possible.

1. $\frac{4}{9} \div \left(-\frac{5}{6}\right)$	2. $\frac{9}{16} \div \frac{3}{10}$	3. $-\frac{5}{7} \div \frac{-11}{14}$	4. $\frac{3}{8} \div \frac{6}{7}$

EXAMPLE 2 Dividing a Fraction by an Integer

Party Favors You are making 10 small bags of mints to use as party favors. You have $\frac{5}{8}$ pound of mints to divide equally. How much should you put in each bag?

Remember that
 $10 = \frac{10}{1}$.

Solution

$$\frac{5}{8} \div 10 = \frac{5}{8} \cdot \square$$

$$10 \cdot \square = 1, \text{ so the reciprocal of } 10 \text{ is } \square.$$

$$= \square$$

Use rule for multiplying fractions.

$$= \square$$

Divide out common factor.

$$= \square$$

Multiply.

Answer: You should put \square pound of mints in each bag.

EXAMPLE 3 Dividing Mixed Numbers

$$4\frac{1}{2} \div \left(-3\frac{3}{4}\right) = \square \div \left(\square\right)$$

Write $4\frac{1}{2}$ and $-3\frac{3}{4}$ as improper fractions.

$$= \square \cdot \left(\square\right)$$

Multiply by the reciprocal of \square .

$$= \square$$

Multiply. Divide out common factors.

$$= \square, \text{ or } \square$$

Multiply.

✓ **Check** Use estimation to check your answer. Because $4 \div (-4)$ is equal to \square , you know that \square is a reasonable answer.

Guided Practice Find the quotient. Simplify if possible.

5. $8\frac{2}{3} \div 2$	6. $-10\frac{4}{5} \div 18$	7. $8\frac{1}{4} \div 1\frac{5}{6}$	8. $7\frac{5}{7} \div \left(-1\frac{13}{14}\right)$
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EXAMPLE 4 Simplify an Expression with Fractions

$$\frac{\left(\frac{3}{5}\right)\left(\frac{3}{4}\right)^2}{\left(\frac{15}{8}\right)} = \frac{\left(\frac{3}{5}\right)\left(\frac{\quad}{\quad}\right)}{\left(\frac{15}{8}\right)}$$

Evaluate power.

$$= \frac{\left(\frac{\quad}{\quad}\right)}{\left(\frac{15}{8}\right)}$$

Multiply the fractions in the numerator.

$$= \frac{\left(\frac{\quad}{\quad}\right)}{\left(\frac{\quad}{\quad}\right)}$$

Rewrite as a product. Divide out common factors.

$$= \frac{\quad}{\quad}$$

Multiply.

Guided Practice Simplify the expression.

Homework

9. $\frac{\left(\frac{4}{15}\right)}{\left(\frac{1}{2}\right)\left(\frac{4}{5}\right)}$

10. $\frac{\left(\frac{1}{5}\right)^2\left(\frac{3}{4}\right)}{\left(\frac{16}{75}\right)}$