

Section 10.R.1 Multiplication and Division with Fractions and Mixed Numbers

Go to Section 10.R.1 Learn mode in Hawkes to follow along!

Introduction to Fractions

Fraction

A **fraction** is a number that can be written in the form _____

$$\begin{array}{l} \frac{a}{b} \leftarrow \frac{\text{numerator}}{\text{denominator}} \end{array}$$

Proper Fractions and Improper Fractions

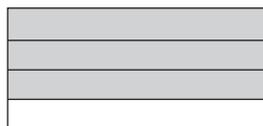
A **proper fraction** is a fraction in which _____. (Proper fractions have values _____.)

An **improper fraction** is a fraction in which _____. (Improper fractions have values _____.)

Example 1 Understanding Fractions

Write a fraction indicating

- the shaded part of the rectangle and
- the unshaded part of the rectangle.



Solution

Name:

Date:

2

Exercises

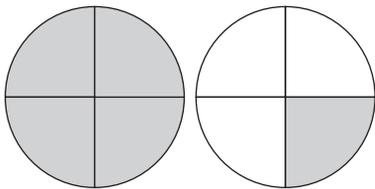
Draw a figure to represent each fraction.

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

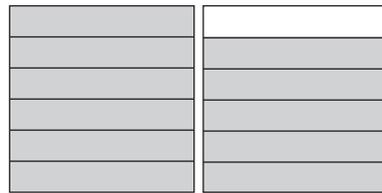
2. $\frac{4}{5}$

Write a fraction that indicates the shaded parts of each figure.

3.



4.



Multiplying with Fractions

To Multiply Fractions

1. _____.

2. _____.

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{\quad}{\quad} \text{ where } b, d \neq 0$$

Example 4 Multiplying Fractions

Multiply.

a. $\frac{4}{13} \cdot 3$

b. $\frac{9}{8} \cdot 0$

c. $\frac{4}{3} \cdot \frac{5}{3} \cdot \frac{2}{7}$

Solution

Exercises

Multiply.

5. $\frac{1}{7} \cdot \frac{1}{7}$

9. Find $\frac{2}{3}$ of $\frac{2}{15}$.

6. $\frac{2}{3} \cdot \frac{5}{11}$

10. Find $\frac{4}{7}$ of $\frac{3}{5}$.

7. $\frac{1}{2} \cdot \frac{3}{7} \cdot \frac{9}{2}$

11. Find $\frac{1}{3}$ of $\frac{2}{3}$.

8. $\frac{7}{3} \cdot \frac{2}{5} \cdot \frac{1}{9}$

12. Find $\frac{1}{4}$ of $\frac{3}{4}$.

Finding Equivalent Fractions

The number 1 is called the _____ for whole numbers; that is, _____ for any whole number a . The number 1 is also the multiplicative identity for fractions since

_____.

If two fractions are equal, they are called _____.

▮ Example 5 Finding Equivalent Fractions

Find the missing numerator that will make the fractions equivalent.

$$\frac{3}{4} = \frac{?}{36}$$

Solution

Exercises

Find the missing numerator that will make the fractions equivalent.

$$13. \frac{3}{4} = \frac{3}{4} \cdot \frac{?}{?} = \frac{?}{12}$$

$$15. \frac{1}{17} = \frac{1}{17} \cdot \frac{?}{?} = \frac{?}{51}$$

$$14. \frac{3}{16} = \frac{3}{16} \cdot \frac{?}{?} = \frac{?}{80}$$

$$16. \frac{1}{5} = \frac{1}{5} \cdot \frac{?}{?} = \frac{?}{75}$$

Reducing Fractions to Lowest Terms

A fraction is reduced to lowest terms _____
_____.

▣ Example 7 Reducing Fractions to Lowest Terms

Reduce $\frac{16}{28}$ to lowest terms.

Solution

Exercises

Reduce each fraction to lowest terms. If it is already in lowest terms, simply rewrite the fraction.

17. $\frac{3}{9}$

19. $\frac{7}{13}$

18. $\frac{2}{8}$

20. $\frac{140}{112}$

Multiplying and Reducing Fractions to Lowest Terms

We can multiply fractions and reduce all in one step by using _____
_____.

Note that if all the factors in the numerator or denominator divide out, then _____ must be used as a factor.

▮ Example 10 Multiplying and Reducing Fractions

Multiply and reduce to lowest terms: $\frac{17}{50} \cdot \frac{25}{34} \cdot 8$

Solution

Exercises

Multiply and reduce to lowest terms. (**Hint:** Factor before multiplying.)

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

23. $9 \cdot \frac{7}{24}$

22. $\frac{8}{10} \cdot \frac{5}{4}$

24. $\frac{32}{20} \cdot \frac{13}{9} \cdot \frac{7}{26}$

Dividing with Fractions

Reciprocal

The **reciprocal** of $\frac{a}{b}$ is _____ (where $a \neq 0$ and $b \neq 0$) and _____.

Division

To divide by any nonzero number, _____.

In general,

_____.

Example 12 Dividing Fractions

Divide:

a. $\frac{2}{3} \div \frac{5}{8}$

b. $\frac{3}{4} \div 4$

Solution

Exercises

Divide and reduce to lowest terms.

25. $\frac{5}{8} \div \frac{3}{5}$

27. $\frac{25}{40} \div 10$

26. $\frac{5}{8} \div \frac{5}{8}$

28. $\frac{15}{24} \div \frac{25}{18}$