

3-3 Study Guide and Intervention**Multiplying Rational Numbers**

Multiply Fractions To multiply fractions, multiply the numerators and multiply the denominators: $\frac{a}{b} \cdot \frac{c}{d} = \frac{a \cdot c}{b \cdot d}$, where $b, d \neq 0$. Fractions may be simplified either before or after multiplying. When multiplying negative fractions, assign the negative sign to the numerator.

Example Find each product. Write in simplest form.

a. $-\frac{8}{15} \cdot \frac{5}{7} = \frac{-8}{15} \cdot \frac{5}{7}$

Rewrite with the negative sign in the numerator.

$$= \frac{-8}{\cancel{15}^1} \cdot \frac{\cancel{5}^1}{7}$$

Simplify before multiplying by dividing 5 and 15 by their GCF, 5.

$$= \frac{-8 \cdot 1}{3 \cdot 7}$$

Multiply.

$$= \frac{-8}{21} = -\frac{8}{21}$$

Simplify.

b. $7\frac{1}{2} \cdot 2\frac{2}{3} = \frac{15}{2} \cdot \frac{8}{3}$

Rename mixed numbers as improper fractions.

$$= \frac{\cancel{15}^5}{\cancel{2}^1} \cdot \frac{\cancel{8}^4}{\cancel{3}^1}$$

Divide 15 and 3 by 3, and 8 and 2 by 2.

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

Multiply.

$$= \frac{20}{1} \text{ or } 20$$

Simplify.

Exercises

Find each product. Write in simplest form.

1. $\frac{1}{2} \cdot \frac{3}{5}$

2. $-\frac{8}{9} \cdot \frac{5}{16}$

3. $\frac{4}{5} \cdot \frac{5}{8}$

4. $\frac{3}{10} \cdot \left(-\frac{1}{4}\right)$

5. $\frac{7}{9} \cdot \frac{11}{20}$

6. $\frac{2}{5} \cdot (-5)$

7. $-4\frac{4}{5} \cdot 1\frac{1}{6}$

8. $1\frac{5}{7} \cdot 10\frac{1}{2}$

9. $-2\frac{1}{8} \cdot \left(-4\frac{4}{7}\right)$

10. $2\frac{4}{9} \cdot \left(-3\frac{6}{11}\right)$

3-3 Study Guide and Intervention *(continued)***Multiplying Rational Numbers**

Evaluate Expressions With Fractions Algebraic expressions are expressions which contain one or more variables. Variables can represent fractions in algebraic expressions.

Example Evaluate $\frac{2}{3}ab$ if $a = 3\frac{3}{7}$ and $b = -\frac{5}{12}$. Write the product in simplest form.

$$\frac{2}{3}ab = \frac{2}{3}\left(3\frac{3}{7}\right)\left(-\frac{5}{12}\right)$$

Replace a with $3\frac{3}{7}$ and b with $-\frac{5}{12}$.

$$= \frac{2}{3}\left(\frac{24}{7}\right)\left(-\frac{5}{12}\right)$$

Rename $3\frac{3}{7}$ as $\frac{24}{7}$.

$$= \frac{2}{3}\left(\frac{\cancel{24}^2}{7}\right)\left(-\frac{5}{\cancel{12}_2}\right)$$

The GCF of 24 and 12 is 12.

$$= \frac{2 \cdot 2(-5)}{3 \cdot 7}$$

Multiply.

$$= \frac{-20}{21} = -\frac{20}{21}$$

Simplify.

Exercises

Evaluate each expression if $x = \frac{7}{10}$, $y = -4\frac{2}{5}$, and $z = -\frac{4}{7}$. Write the product in simplest form.

1. xy

2. yz

3. xyz

4. $5y$

5. $-5xy$

6. $\frac{1}{2}y$

7. $2\frac{3}{10}z$

8. $-\frac{2}{3}x$

9. $x \cdot x$

10. $28z$

11. $-y$

12. $y \cdot y$

13. $5\frac{5}{6}xz$

14. $\frac{2}{5}(-x)$

15. $\frac{9}{10}y$