

Lesson 11-2

Multiplying Rational Expressions

In the previous lesson, you learned to simplify rational expressions. In this lesson, you will learn to multiply rational expressions and simplify the resulting product.

Example 1:

$$\begin{aligned} \frac{3x^2y}{2rs} \cdot \frac{24r^2s}{15xy^2} &= \\ &= \frac{3 \cdot 3 \cdot 2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot y \cdot r \cdot r \cdot s}{2 \cdot 3 \cdot 5 \cdot r \cdot s \cdot x \cdot y \cdot y} \\ &= \frac{3 \cdot \cancel{3} \cdot \cancel{2} \cdot 2 \cdot 2 \cdot \cancel{x} \cdot x \cdot \cancel{y} \cdot r \cdot r \cdot \cancel{s}}{\cancel{2} \cdot \cancel{3} \cdot 5 \cdot \cancel{r} \cdot \cancel{s} \cdot \cancel{x} \cdot y \cdot y} \\ &= \frac{12rx}{5y} \end{aligned}$$

Example 2:

$$\begin{aligned} \frac{m+3}{5m} \cdot \frac{20m^2}{m^2+8m+15} &= \\ &= \frac{(m+3) \cdot 2 \cdot 2 \cdot 5 \cdot m \cdot m}{(m+3)(m+5) \cdot 5 \cdot m} \quad (\text{factored form}) \\ &= \frac{\cancel{(m+3)} \cdot 2 \cdot 2 \cdot \cancel{5} \cdot m \cdot \cancel{m}}{\cancel{(m+3)}(m+5) \cdot \cancel{5} \cdot \cancel{m}} \\ &= \frac{4m}{m+5} \end{aligned}$$

Find each product. Simplify the resulting rational expression completely.

1. $\frac{7a^2}{5} \cdot \frac{15}{14a} =$

2. $\frac{3m^2}{2m} \cdot \frac{18m^2}{9m} =$

3. $\frac{10r^3}{6x^3} \cdot \frac{42x^2}{35r^3} =$

4. $\frac{7ab^3}{11r^2} \cdot \frac{44r^3}{21a^2b} =$

5. $\frac{64y^2}{5y} \cdot \frac{5y}{8y} =$

6. $\frac{2a^2}{b} \cdot \frac{5bc}{6a} =$

$$7. \quad \frac{m+4}{3m} \cdot \frac{4m^2}{m^2+9m+20} =$$

$$8. \quad \frac{5a+10}{10b^2} \cdot \frac{4b^3}{a^2+11a+18} =$$

$$9. \quad 2(x+1) \cdot \frac{x+4}{x^2+5x+4} =$$

$$10. \quad \frac{x^2-y^2}{12} \cdot \frac{36}{x+y} =$$

$$11. \quad \frac{9}{3+2z} \cdot (12+8z) =$$

$$12. \quad \frac{4x}{9x^2-25} \cdot (3x+5) =$$

$$13. \quad \frac{4y+8}{y^2-25} \cdot \frac{y-5}{5y+10} =$$

$$14. \quad \frac{c^2-c-6}{c^2-9} \cdot \frac{c^2+7c+12}{c^2+4c+4} =$$