

12-3 Multiplying Rational Expressions

(Pages 655–659)

To multiply rational expressions, you can divide by the common factors either *before* or *after* you multiply the expressions. From this point on, you may assume that no denominator has a value of 0.

Example

Multiply $\frac{2x^2(3x - 2)}{3x^2 + x - 2} \cdot \frac{1}{4x}$.

$$\frac{2x^2(3x - 2)}{3x^2 + x - 2} \cdot \frac{1}{4x} = \frac{2x^2(3x - 2)}{(3x - 2)(x + 1)} \cdot \frac{1}{4x} \quad \text{Factor the denominator.}$$

$$= \frac{\overset{1}{\cancel{2}}x^{\overset{1}{\cancel{2}}}(3x - \overset{1}{\cancel{2}})}{\underset{1}{\cancel{(3x - 2)}}(x + 1)} \cdot \frac{1}{\underset{2}{\cancel{4}}x} \quad \text{Divide by the GCF of } 2x(3x - 2) \text{ before multiplying.}$$

$$= \frac{x}{2(x + 1)} \text{ or } \frac{x}{2x + 2} \quad \text{Multiply. Then, simplify the denominator.}$$

Try These Together

1. Multiply $\frac{ab^2}{12} \cdot \frac{6}{b}$.

HINT: Divide both numerator and denominator by the same quantity—their greatest common factor.

2. Multiply $(x - 8) \cdot \frac{4}{x^2 - 64}$.

HINT: Write $x - 8$ as $\frac{x - 8}{1}$.

Practice

Find each product. Assume that no denominator has a value of 0.

3. $\frac{15a}{b^3} \cdot \frac{2b^4}{3}$

4. $\frac{3x^4yz^2}{24y^2} \cdot \frac{4}{x}$

5. $16abc \cdot \frac{ab}{bc^2}$

6. $\frac{25mn^2}{4n} \cdot \frac{10n^3}{5m}$

7. $(2x + 8) \cdot \frac{7}{x + 4}$

8. $\frac{12(a - 1)}{3a} \cdot \frac{a^2}{a - 1}$

9. $\frac{x + 2}{5} \cdot \frac{2}{x^2 + 2x}$

10. $\frac{x^2 - 9}{x - 3} \cdot \frac{9x - 6}{3}$

11. $\frac{2x - 10}{3x} \cdot \frac{6x^2}{x^2 - 25}$

12. $\frac{x^2 + 16}{x} \cdot \frac{x}{x + 4}$

13. $\frac{4x + 2}{2x + 6} \cdot \frac{6}{2x^2 + 7x + 3}$

14. $\frac{x^2 + 2x - 15}{x^2 + 4x} \cdot \frac{x^2}{x + 5}$

15. $\frac{y^2 - 36}{y + 3} \cdot \frac{y - 4}{y^2 + 2y - 24}$

16. $\frac{3x + 12}{x^2 - x - 2} \cdot \frac{2x - 2}{6x + 24}$

17. $\frac{3x^2 - 6x - 9}{x^2 - x - 2} \cdot \frac{x^2 - 4}{6x + 12}$

18. **Standardized Test Practice** Multiply $\frac{x^2 + 14x + 49}{x^2 - 49} \cdot \frac{x - 7}{x + 7}$.

A $x + 7$

B $\frac{1}{x + 7}$

C 1

D $x - 2$

Answers: 1.	$\frac{ab}{2}$	2.	$\frac{x + 8}{4}$	3.	$10ab$	4.	$\frac{x^3z^2}{2y}$	5.	$\frac{16a^2b}{c}$	6.	$\frac{25n^4}{2}$	7.	14	8.	$4a$	9.	$\frac{5x}{2}$	10.	$3x^2 + 7x - 6$	11.	$\frac{x + 5}{4x}$	
12.	$\frac{x^2 + 16}{x + 4}$	13.	$\frac{x^2 + 6x + 9}{6}$	14.	$\frac{x + 4}{x^2 - 3x}$	15.	$\frac{y + 3}{y - 6}$	16.	$\frac{x^2 - x - 2}{x - 1}$	17.	$\frac{x - 3}{x - 2}$	18.	$\frac{2}{3}$									