LESSON 3.9

Exercise Set A

MM1A2e Add, subtract, multiply, and divide rational expressions.

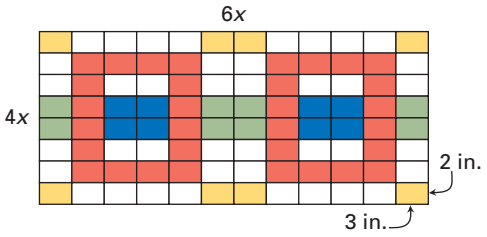
Find the product.

1. $\frac{4x^2}{15} \cdot \frac{5}{8x^5}$
2. $\frac{24}{7x^2} \cdot \frac{14x^6}{40}$
3. $\frac{21}{2x + 12} \cdot \frac{4x + 24}{15}$
4. $\frac{5x + 10}{2x - 6} \cdot \frac{x - 3}{10x + 20}$
5. $\frac{x - 3}{2x + 8} \cdot \frac{x + 4}{x^2 + 2x - 15}$
6. $\frac{x^2 + 4x - 12}{x^2 + 7x + 10} \cdot \frac{x + 5}{2x - 4}$
7. $\frac{6x}{4x^2 - 1} \cdot \frac{2x^2 + 7x + 3}{18}$
8. $\frac{x^4}{x^4 + 5x^3} \cdot (x + 5)$
9. $\frac{3x - 6}{x^2 - x - 2} \cdot (x^2 + 6x + 5)$

Find the quotient.

10. $\frac{24}{5x^3} \div \frac{6}{25x^2}$
11. $\frac{11x^4}{18} \div \frac{22}{9x^2}$
12. $\frac{7x + 21}{30} \div \frac{21x + 63}{20}$
13. $\frac{4x - 24}{3x + 15} \div \frac{12x - 72}{x + 5}$
14. $\frac{x + 2}{3x - 3} \div \frac{x^2 + 11x + 18}{x - 1}$
15. $\frac{x^2 + 4x}{4x} \div \frac{x^2 + x - 12}{x - 3}$
16. $\frac{2x + 10}{x^2 - 25} \div \frac{4x^2}{2x^2 - 10x}$
17. $\frac{2x - 14}{x^2 - 4x - 21} \div (x + 3)$

18. **Wall Art** You want to create a rectangular picture from 2-inch by 3-inch tiles. You want the picture's dimensions to be related as shown.



   a. Write and simplify an expression that you can use to determine the number of 2-inch by 3-inch tiles that will be needed for the picture.

   b. If $x = 5$, how many tiles will you need?

19. **Profit** The total profit P (in millions of dollars) earned by a company from 1995 to 2004 can be modeled by

$$P = \frac{3500 + 500t}{98 - t}$$

where t is the number of years since 1995. The number N (in hundreds of thousands) of units sold can be modeled by

$$N = \frac{(t + 7)(3000 - 20t)}{490 - 5t}$$

where t is the number of years since 1995. Write a model that gives the profit earned per unit per year. Then approximate the profit per unit in 2002.

UNIT 3

Exercise Set B

MM1A2e Add, subtract, multiply, and divide rational expressions.

Find the product.

1. $\frac{8x}{2x^2 + x - 3} \cdot \frac{4x^2 + 2x - 6}{16}$

2. $\frac{x^2 - x - 2}{18x^3} \cdot \frac{14x^2}{x^2 + x - 6}$

3. $\frac{-x - 3}{5x^2 + 10x} \cdot \frac{10x^2 + 20x}{4x + 12}$

4. $\frac{x^2 + 8x + 15}{x^2 + 7x + 10} \cdot \frac{x^2 - 2x - 8}{3x^2 + 9x}$

5. $\frac{x^6}{9x^3 + 63x} \cdot (x^2 + 7)$

6. $\frac{4x - 12}{x^2 + 5x - 24} \cdot (2x^2 + 11x - 40)$

Find the quotient.

7. $\frac{x^2 - 2x - 48}{4x^2 + 24} \div \frac{x - 8}{8x + 24}$

8. $\frac{x^2 - 5x - 36}{5x^2 + 16x} \div \frac{x^2 - 8x - 9}{x + 1}$

9. $\frac{2x^2 - 9x - 5}{5 - x} \div \frac{2x^2 + 7x + 3}{x + 3}$

10. $\frac{x^2 + 4x}{5x^3 + 20x^2} \div \frac{x^2 - 16}{10x - 40}$

11. $\frac{4x^4 - 20x^2}{x + 7} \div \frac{16x^2 - 112}{x^2 - 49}$

12. $\frac{3x^2 - 10x - 8}{5x^2 - 20x} \div \frac{6x^2 + x - 2}{30x^2 - 120x}$

13. $\frac{x^2 + 2x - 35}{x^2 - 3x - 10} \div \frac{3x^2 + 21x}{9x + 18}$

14. $\frac{x^3 - x^2 + 4x - 4}{10x^3} \div \frac{x^2 + 7x - 8}{5x^2 + 40x}$

Let *a* be a polynomial in the given equation. Find *a*.

15. $\frac{a}{x + 5} \cdot \frac{2x^2 + 11x + 5}{x + 6} = 2x^2 - 11x - 6$

16. $\frac{4x^2 + 7x - 15}{2x + 1} \div \frac{x + 3}{a} = 4x^2 - 33x + 35$

17. **Snow Tires** The average amount C (in dollars) of money spent per snow tire and the number N of snow tires bought by an auto body shop from 2000 to 2004, can be modeled by

$$C = \frac{t + 80}{1 - 0.05t} \quad \text{and} \quad N = \frac{500(t + 20)}{t + 80}$$

where t is the number of years since 2000. Write a model that gives the total amount A spent by the shop each year on snow tires. Then approximate the amount spent in 2003.

18. **Drive-in Movies** The average monthly revenue R (in dollars) from admissions at a drive-in theater and the average price p (in dollars) per car from 1988 to 2000 can be modeled by

$$R = \frac{13{,}124 + 3122t}{26 - t} \quad \text{and} \quad p = \frac{294 + 7t}{130 - 5t}$$

where t is the number of years since 1988.

a. Write a model that gives the average number x of cars admitted per month to the theater.

b. Graph the model on a graphing calculator and describe how the number of cars admitted changed over time.