NAME _____ DATE _____ PERIOD _____

11-4 Practice

Multiplying and Dividing Rational Expressions

Find each product or quotient.

1. $\frac{18x^2}{10y^2} \cdot \frac{15y^3}{24x}$

2. $\frac{24rt^2}{8r^4t^3} \cdot \frac{12r^3t^2}{36r^2t}$

3. $\frac{(x+2)(x+2)}{8} \cdot \frac{72}{(x+2)(x-2)}$

4. $\frac{m+7}{(m-6)(m+2)} \cdot \frac{(m-6)(m+4)}{(m+7)}$

5. $\frac{a-4}{a^2-a-12} \cdot \frac{a+3}{a-6}$

6. $\frac{4x+8}{x^2} \cdot \frac{x}{x^2-5x-14}$

7. $\frac{n^2+10n+16}{5n-10} \cdot \frac{n-2}{n^2+9n+8}$

8. $\frac{3y-9}{y^2-9y+20} \cdot \frac{y^2-8y+16}{y-3}$

9. $\frac{b^2+5b+4}{b^2-36} \cdot \frac{b^2+5b-6}{b^2+2b-8}$

10. $\frac{t^2+6t+9}{t^2-10t+25} \cdot \frac{t^2-t-20}{t^2+7t+12}$

11. $\frac{28a^2}{7b^2} \div \frac{21a^3}{35b}$

12. $\frac{mn^2p^3}{x^4y^2} \div \frac{mnp^2}{x^3y}$

13. $\frac{2a}{a-1} \div (a+1)$

14. $\frac{z^2-16}{3z} \div (z-4)$

15. $\frac{4y+20}{y-3} \div \frac{y+5}{2y-6}$

16. $\frac{4x+12}{6x-24} \div \frac{2x+6}{x+3}$

17. $\frac{b^2+2b-8}{b^2-11b+18} \div \frac{2b-8}{2b-18}$

18. $\frac{3x-3}{x^2-6x+9} \div \frac{6x-6}{x^2-5x+6}$

19. $\frac{a^2+8a+12}{a^2-7a+10} \div \frac{a^2-4a-12}{a^2+3a-10}$

20. $\frac{y^2+6y-7}{y^2+8y-9} \div \frac{y^2+9y+14}{y^2+7y-18}$

21. **BIOLOGY** The heart of an average person pumps about 9000 liters of blood per day. How many quarts of blood does the heart pump per hour? (*Hint:* One quart is equal to 0.946 liter.) Round to the nearest whole number.

22. **TRAFFIC** On Saturday, it took Ms. Torres 24 minutes to drive 20 miles from her home to her office. During Friday's rush hour, it took 75 minutes to drive the same distance.

   a. What was Ms. Torres's average speed in miles per hour on Saturday?

   b. What was her average speed in miles per hour on Friday?

NAME _____ DATE _____ PERIOD _____

11-5 Practice

Dividing Polynomials

Find each quotient.

1. $(6q^2 - 18q - 9) \div 9q$

2. $(y^2 + 6y + 2) \div 3y$

3. $\dfrac{12a^2b - 3ab^2 + 42ab}{6a^2b}$

4. $\dfrac{2m^3p^2 + 56mp - 4m^2p^3}{8m^3p}$

5. $(x^2 - 3x - 40) \div (x + 5)$

6. $(3m^2 - 20m + 12) \div (m - 6)$

7. $(a^2 + 5a + 20) \div (a - 3)$

8. $(x^2 - 3x - 2) \div (x + 7)$

9. $(t^2 + 9t + 28) \div (t + 3)$

10. $(n^2 - 9n + 25) \div (n - 4)$

11. $\dfrac{6r^2 - 5r - 56}{3r + 8}$

12. $\dfrac{20w^2 + 39w + 18}{5w + 6}$

13. $(x^3 + 2x^2 - 16) \div (x - 2)$

14. $(t^3 - 11t - 6) \div (t + 3)$

15. $\dfrac{x^3 + 6x^2 + 3x + 1}{x - 2}$

16. $\dfrac{6d^3 + d^2 - 2d + 17}{2d + 3}$

17. $\dfrac{2k^3 + k^2 - 12k + 11}{2k - 3}$

18. $\dfrac{9y^3 - y - 1}{3y + 2}$

19. **LANDSCAPING** Jocelyn is designing a bed for cactus specimens at a botanical garden. The total area can be modeled by the expression $2x^2 + 7x + 3$, where x is in feet.

   a. Suppose in one design the length of the cactus bed is $4x$, and in another, the length is $2x + 1$. What are the widths of the two designs?

   b. If $x = 3$ feet, what will be the dimensions of the cactus bed in each of the designs?

20. **FURNITURE** Teri is upholstering the seats of four chairs and a bench. She needs $\frac{1}{4}$ square yard of fabric for each chair, and $\frac{1}{2}$ square yard for the bench. If the fabric at the store is 45 inches wide, how many yards of fabric will Teri need to cover the chairs and the bench if there is no waste?

NAME _____ DATE _____ PERIOD _____

11-4 Practice

Multiplying and Dividing Rational Expressions

Find each product or quotient.

1. $\frac{18x^2}{10y^2} \cdot \frac{15y^3}{24x}$ $\frac{9xy}{8}$

2. $\frac{24rt^2}{8r^4t^3} \cdot \frac{12r^3t^3}{36r^2t}$ $\frac{1}{r^2}$

3. $\frac{(x+2)(x+2)}{8} \cdot \frac{72}{(x+2)(x-2)}$ $\frac{9(x+2)}{x-2}$

4. $\frac{m+7}{(m-6)(m+2)} \cdot \frac{(m-6)(m+4)}{(m+7)}$ $\frac{m+4}{m+2}$

5. $\frac{a-4}{a^2-a-12} \cdot \frac{a+3}{a-6}$ $\frac{1}{a-6}$

6. $\frac{4x+8}{x^2} \cdot \frac{x}{x^2-5x-14}$ $\frac{4}{x(x-7)}$

7. $\frac{n^2+10n+16}{5n-10} \cdot \frac{n-2}{n^2+9n+8}$ $\frac{n+2}{5(n+1)}$

8. $\frac{3y-9}{y^2-9y+20} \cdot \frac{y^2-8y+16}{y-3}$ $\frac{3(y-4)}{y-5}$

9. $\frac{b^2+5b+4}{b^2-36} \cdot \frac{b^2+5b-6}{b^2+2b-8}$ $\frac{(b+1)(b-1)}{(b-6)(b-2)}$

10. $\frac{t^2+6t+9}{t^2-10t+25} \cdot \frac{t^2-t-20}{t^2+7t+12}$ $\frac{t+3}{t-5}$

11. $\frac{28a^2}{7b^2} \div \frac{21a^3}{35b}$ $\frac{20}{3ab}$

12. $\frac{mn^2p^3}{x^4y^2} \div \frac{mnp^2}{x^3y}$ $\frac{np}{xy}$

13. $\frac{2a}{a-1} \div (a+1)$ $\frac{2a}{(a+1)(a-1)}$

14. $\frac{z^2-16}{3z} \div (z-4)$ $\frac{z+4}{3z}$

15. $\frac{4y+20}{y-3} \div \frac{y+5}{2y-6}$ 8

16. $\frac{4x+12}{6x-24} \div \frac{2x+6}{x+3}$ $\frac{x+3}{3(x-4)}$

17. $\frac{b^2+2b-8}{b^2-11b+18} \div \frac{2b-8}{2b-18}$ $\frac{b+4}{b-4}$

18. $\frac{3x-3}{x^2-6x+9} \div \frac{6x-6}{x^2-5x+6}$ $\frac{x-2}{2(x-3)}$

19. $\frac{a^2+8a+12}{a^2-7a+10} \div \frac{a^2-4a-12}{a^2+3a-10}$ $\frac{(a+6)(a+5)}{(a-6)(a-5)}$

20. $\frac{y^2+6y-7}{y^2+8y-9} \div \frac{y^2+9y+14}{y^2+7y-18}$ $\frac{y-2}{y+2}$

21. **BIOLOGY** The heart of an average person pumps about 9000 liters of blood per day. How many quarts of blood does the heart pump per hour? (*Hint:* One quart is equal to 0.946 liter.) Round to the nearest whole number. **396 qt/h**

22. **TRAFFIC** On Saturday, it took Ms. Torres 24 minutes to drive 20 miles from her home to her office. During Friday's rush hour, it took 75 minutes to drive the same distance.

a. What was Ms. Torres's average speed in miles per hour on Saturday? **50 mph**

b. What was her average speed in miles per hour on Friday? **16 mph**

NAME _____ DATE _____ PERIOD _____

11-5 Practice

Dividing Polynomials

Find each quotient.

1. $(6q^2 - 18q - 9) \div 9q$ $\frac{2q}{3} - 2 - \frac{1}{q}$

2. $(y^2 + 6y + 2) \div 3y$ $\frac{y}{3} + 2 + \frac{2}{3y}$

3. $\frac{12a^2b - 3ab^3 + 42ab}{6a^2b}$ $2 - \frac{b}{2a} + \frac{7}{a}$

4. $\frac{2m^3p^2 + 56mp - 4m^2p^3}{8m^3p}$ $\frac{p}{4} + \frac{7}{m^2} - \frac{p^2}{2m}$

5. $(x^2 - 3x - 40) \div (x + 5)$ $x - 8$

6. $(3m^2 - 20m + 12) \div (m - 6)$ $3m - 2$

7. $(a^2 + 5a + 20) \div (a - 3)$ $a + 8 + \frac{44}{a-3}$

8. $(x^2 - 3x - 2) \div (x + 7)$ $x - 10 + \frac{68}{x+7}$

9. $(t^2 + 9t + 28) \div (t + 3)$ $t + 6 + \frac{10}{t+3}$

10. $(n^2 - 9n + 25) \div (n - 4)$ $n - 5 + \frac{5}{n-4}$

11. $\frac{6r^2 - 5r - 56}{3r + 8}$ $2r - 7$

12. $\frac{20w^2 + 39w + 18}{5w + 6}$ $4w + 3$

13. $(x^3 + 2x^2 - 16) \div (x - 2)$ $x^2 + 4x + 8$

14. $(t^3 - 11t - 6) \div (t + 3)$ $t^2 - 3t - 2$

15. $\frac{x^3 + 6x^2 + 3x + 1}{x - 2}$ $x^2 + 8x + 19 + \frac{39}{x-2}$

16. $\frac{6d^3 + d^2 - 2d + 17}{2d + 3}$ $3d^2 - 4d + 5 + \frac{2}{2d+3}$

17. $\frac{2k^3 + k^2 - 12k + 11}{2k - 3}$ $k^2 + 2k - 3 + \frac{2}{2k+3}$

18. $\frac{9y^3 - y - 1}{3y + 2}$ $3y^2 - 2y + 1 - \frac{3}{3y+2}$

19. **LANDSCAPING** Jocelyn is designing a bed for cactus specimens at a botanical garden. The total area can be modeled by the expression $2x^2 + 7x + 3$, where x is in feet.

a. Suppose in one design the length of the cactus bed is $4x$, and in another, the length is $2x + 1$. What are the widths of the two designs? $\frac{x}{2} + \frac{7}{4} + \frac{3}{4x}$; $x + 3$

b. If $x = 3$ feet, what will be the dimensions of the cactus bed in each of the designs? **12 ft by 3.5 ft; 7 ft by 6 ft**

20. **FURNITURE** Teri is upholstering the seats of four chairs and a bench. She needs $\frac{1}{4}$ square yard of fabric for each chair, and $\frac{1}{2}$ square yard for the bench. If the fabric at the store is 45 inches wide, how many yards of fabric will Teri need to cover the chairs and the bench if there is no waste? $1\frac{1}{5}$ yd