Name _____ Date _____

Tell whether *x* and *y* show *direct variation, inverse variation,* or *neither.*

1. $x + y = \dfrac{1}{x}$

2. $\dfrac{1}{x} = y$

Write an equation relating *x, y,* and *z* given that *z* varies jointly with *x* and *y*. Then find *z* when *x* = 2 and *y* = 3.
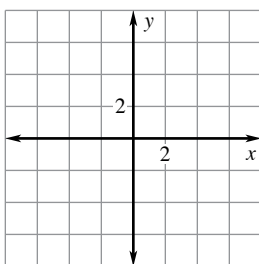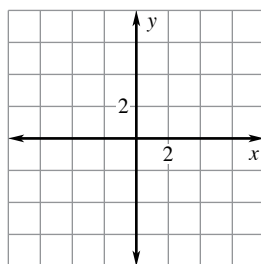
3. $x = 3, y = -3, z = 18$
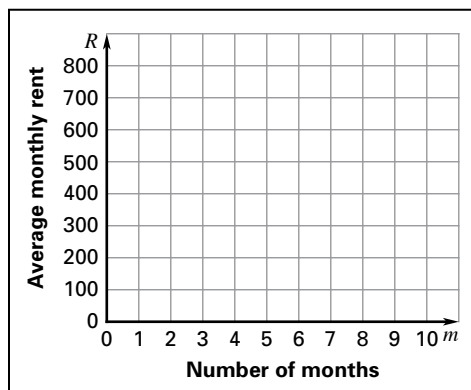
4. $x = -2, y = 5, z = 30$

Graph the function. State the domain and range.

5. $y = \dfrac{4}{x}$

6. $y = \dfrac{2}{x - 1} + 1$

7. An apartment renter must pay an initial \$250 security deposit, and a monthly rent of \$500. Write and graph an equation that gives the renter's average rent per month as a function of the number of months rented. After how many months will the average rent be \$550?

8. The value *M* (in dollars) of a laptop computer *t* years after it was purchased new can be estimated using the function

$M(t) = \dfrac{800}{t} + 100$ where $t \geq 1$. Estimate the laptop's value 4 years after purchase. What does the value of the laptop approach as time passes?

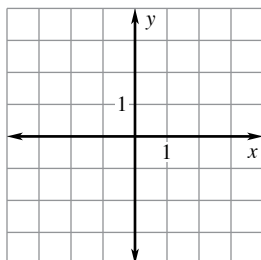**Answers**

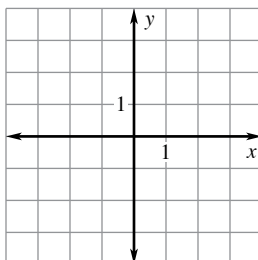1. _____

2. _____

3. _____

_____

4. _____

_____

5. _____

_____

_____

6. _____

_____

_____

_____

7. _____

_____

_____

8. _____

_____

Name _____   Date _____

Graph the function.

9. $y = \dfrac{4x}{2x^2}$

10. $y = \dfrac{2x - 1}{6x + 3}$

Answers

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

Simplify the rational expression, if possible.

11. $\dfrac{x^2 - x - 12}{x^2 + 5x + 6}$

12. $\dfrac{x^2 - 9}{x^2 + x - 12}$

15. _____

16. _____

Perform the indicated operation and simplify.

13. $\dfrac{3x^2y^2}{7xy^4} \cdot \dfrac{28xy}{6x}$

14. $\dfrac{x^2 + 7x + 10}{2(x^2 - 4)} \cdot \dfrac{4}{(x + 5)^2}$

17. _____

18. _____

Find the least common multiple of the polynomials.

19. _____

15. $5x$ and $4x^2 - 4$

16. $x^2 - 5x$ and $x^3 + 3x^2 - 10x$

20. _____

Perform the indicated operation and simplify.

21. _____

17. $\dfrac{2}{3x^2} + \dfrac{7}{4x}$

22. _____

18. $\dfrac{x}{x^2 - 4} + \dfrac{3x - 5}{x^2 + 4x + 4}$

23. _____

Solve the equation by cross multiplying.

19. $\dfrac{x}{2x - 2} = \dfrac{3}{x - 1}$

20. $\dfrac{x + 3}{6} = \dfrac{x + 1}{x - 4}$

Solve the equation by using the LCD.

21. $\dfrac{x}{2(x - 2)} + \dfrac{x - 6}{x - 2} = \dfrac{x}{8}$

22. $\dfrac{x}{2(x - 3)} - \dfrac{2x}{x + 4} = \dfrac{x}{4(x - 3)}$

23. Find the average rate of change of $f(x) = 2^{x+1} - 4$ over the interval [3, 6].

Name _____   Date _____

The variables *x* and *y* vary inversely. Use the given values to write an equation relating *x* and *y*. Then find *y* when *x* = 2.
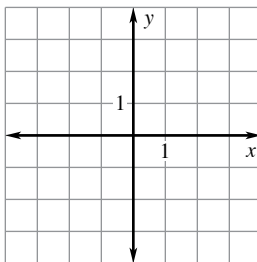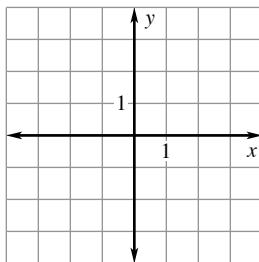
1. $x = 3, y = 4$

2. $x = 4, y = -2$

Write an equation relating *x*, *y*, and *z* given that *z* varies jointly with *x* and *y*. Then find *z* when *x* = 2 and *y* = 3.

3. $x = 5, y = -3, z = 15$

4. $x = -2, y = -2, z = -16$

Graph the function. State the domain and range.

5. $y = \dfrac{-2}{x}$

6. $y = \dfrac{2}{x+1} - 1$

Answers

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

_____

_____

_____

7. A used car can be purchased by paying $1000 down at the time of purchase, and then paying $200 per month for 25 months. Write and graph an equation that gives the average cost per month as a function of the number of months of ownership. After how many months will the average cost be $325?

6. _____

_____

_____

_____

_____

_____

7. _____

_____

_____
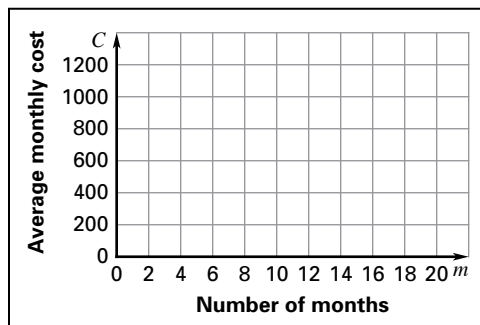
8. The value *M* (in dollars) of a watercraft *t* years after it was purchased new can be estimated using the function $M(t) = \dfrac{5000}{t} + 600$ where $t \geq 1$. Estimate the watercraft's value 4 years after purchase. What does the value of the watercraft approach as time passes?

8. _____

_____

Name _____ Date _____

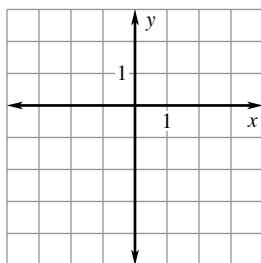**Graph the function.**

9. $y = \dfrac{3x^2}{2x + 1}$

10. $y = \dfrac{4x + 1}{8x - 3}$

Answers

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. _____

20. _____

21. _____

22. _____

23. _____
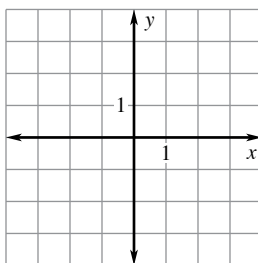
Simplify the rational expression, if possible.

11. $\dfrac{x^2 + 7x + 12}{x^2 - 7x + 12}$

12. $\dfrac{x^2 + 5x}{x^2 + 6x + 5}$

Perform the indicated operation and simplify.

13. $\dfrac{5x^2 y}{4y^3} \cdot \dfrac{12x^2 y^2}{30x^3}$

14. $\dfrac{2x^3}{7xy^2} \div \dfrac{6xy^2}{14y^3}$

Find the least common multiple of the polynomials.

15. $x^2 + 4x + 3$ and $x^2 - 9$

16. $x^2 - 4x$ and $x^3 - 8x^2 + 16x$

Perform the indicated operation and simplify.

17. $\dfrac{7}{5x} - \dfrac{4}{3x}$

18. $\dfrac{2x}{x^2 - 1} + \dfrac{2x - 3}{x^2 + 5x + 4}$

Solve the equation by cross multiplying.

19. $\dfrac{x + 4}{3x + 5} = \dfrac{2x - 1}{3x + 1}$

20. $\dfrac{x^2 + 1}{3 - 3x} = \dfrac{x + 2}{3}$

Solve the equation by using the LCD.

21. $\dfrac{3 + x}{2} + 2x = \dfrac{6x + 1}{4 - x}$

22. $\dfrac{x + 5}{2x + 3} + \dfrac{x + 1}{-2x} = -1$

23. Determine whether the function $g(x) = x^5 - x^3 + 2x$ is even, odd, or neither.

Name _____ Date _____

Write an equation for the given relationship.

1. z varies directly with x and inversely with y.

2. r varies jointly with q, s, and t.

3. w varies directly with x and inversely with y and z.

**Graph the function. State the domain and range.**

4. $y = \dfrac{-3}{x}$
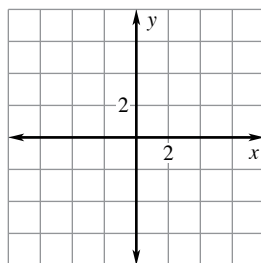
5. $y = \dfrac{2x + 3}{x - 2}$
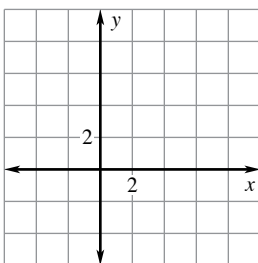
6. A company hires a computer programmer with an initial signing bonus of $1000. Additionally, the programmer is paid $2500 per month in salary. Write and graph an equation that gives the company's average cost per month for the employee as a function of the employee's number of months of employment. After how many months will the average cost per month be $2750?
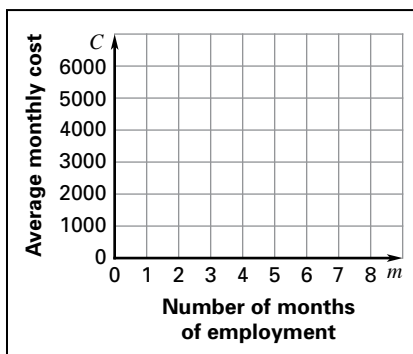
7. A hockey goalie blocks 15 of the first 17 shots against him. The table shows how the goalie's block percentage changes if he blocks x consecutive shots after the first 17 shots. Write a rational function for the block percentage in terms of x. How many consecutive blocks must the goalie make to reach a block percentage of 95%?

x	Total blocked	Total # of shots	Block percentage
0	15	17	0.88
4	19	21	0.90
8	23	25	0.92
x	$x + 15$	$x + 17$	?

Answers

1. _____

2. _____

3. _____

4. _____

_____

_____

5. _____

_____

_____

6. _____

_____

_____

7. _____

_____

CHAPTER 5	**Chapter Test C** *continued*
	For use after the chapter "Rational Functions"

Graph the function.

Answers

8. $y = \dfrac{2x - 1}{-x + 3}$

9. $y = \dfrac{x}{2x^2}$

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____
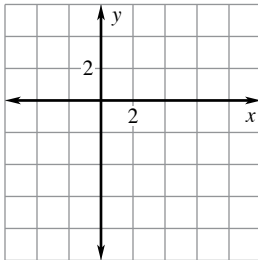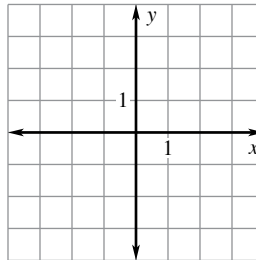
Simplify the rational expression, if possible.

10. $\dfrac{x^3 - 27}{x - 3}$

11. $\dfrac{x^3 - 3x^2 - 25x - 21}{x^2 - 6x - 7}$

14. _____

15. _____

Perform the indicated operation and simplify.

16. _____

12. $\dfrac{4x^2y}{3y^2} \div \dfrac{16x^4}{9x^3y^2}$

17. _____

13. $\dfrac{x^2 - 2x - 3}{2x - 4} \cdot \dfrac{x^2 + 3x - 10}{x^2 + 6x + 5}$

18. _____

19. _____

14. $\dfrac{4}{3x} - \dfrac{1}{2x^2}$

20. _____

15. $\dfrac{4x}{x^2 - 9} + \dfrac{3x - 1}{x^2 + 5x + 6}$

21. _____

16. Simplify the complex fraction $\dfrac{\frac{2}{x} - 1}{3 + \frac{x}{2}}$.

_____

_____

_____

Solve the equation by cross multiplying.

17. $\dfrac{4}{3x - 1} = \dfrac{5}{2x + 4}$

18. $\dfrac{x + 3}{x^2 - 5} = \dfrac{4}{x - 2}$

Solve the equation by using the LCD.

19. $\dfrac{x + 1}{5} = \dfrac{3}{2x} + \dfrac{2x + 2}{16}$

20. $\dfrac{x + 4}{3} - \dfrac{2}{x} = x - 1$

20. Compare the properties of the two functions and the key characteristics of their graphs. Include domain, range, asymptotes, end behavior and general appearance of the graph.

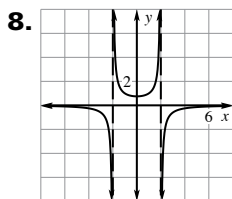Function 1: $y = x^2$

Function 2: $y = -(x - 2)^2 + 1$

Answers for Rational Functions

Quiz 1

1. $y = \dfrac{14}{x}; -7$ **2.** $y = -\dfrac{24}{x}; 12$ **3.** $y = -\dfrac{6}{x}; 3$

4. $y = \dfrac{9}{x}; -4.5$

5.

6.

7.

8.

9.
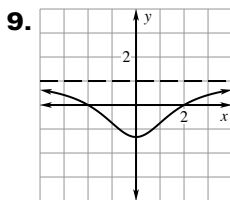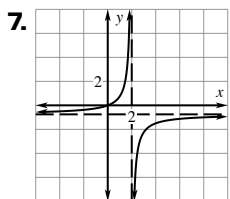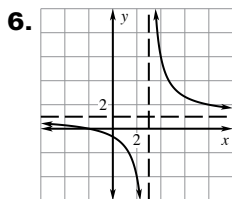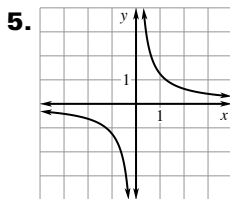
10. $z = 4xy; 192$

Quiz 2

1. $\dfrac{2(x-5)}{x(x+4)}$ **2.** $\dfrac{x-3}{x+2}$ **3.** $\dfrac{(x+2)(x+3)}{(x-5)(x+4)}$

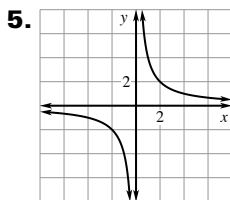**4.** $\dfrac{2x}{x^2-9}$ **5.** $\dfrac{x+20}{x^2-2x-8}$ **6.** $\dfrac{8x+28}{x^2-64}$

7. $0, 6$ **8.** 2 **9.** -2 **10.** $\dfrac{4}{3x}$ **11.** $x < 0$
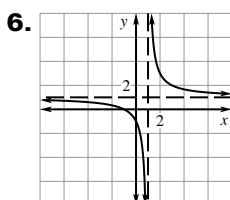**12.** even

Chapter Test A

1. neither **2.** inverse variation

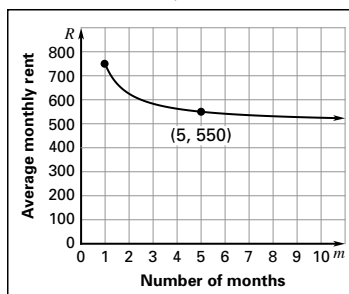**3.** $z = -2xy; -12$ **4.** $z = -3xy; -18$

5.

; domain: all real numbers except 0, range: all real numbers except 0

6.
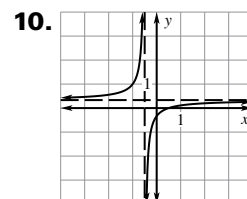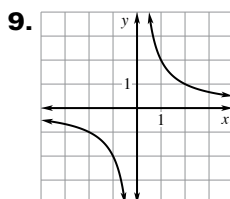
; domain: all real numbers except 1, range: all real numbers except 1

7. $R(m) = \dfrac{250}{m} + 500, m \geq 1;$

; 5 months

8. \$300; \$100

9.

10.

11. $\dfrac{x-4}{x+2}$ **12.** $\dfrac{x+3}{x+4}$ **13.** $\dfrac{2x}{y}$

14. $\dfrac{2}{(x-2)(x+5)}$ **15.** $20x(x-1)(x+1)$

16. $x(x-5)(x+5)(x-2)$ **17.** $\dfrac{21x+8}{12x^2}$

18. $\dfrac{4x^2 - 9x + 10}{(x-2)(x+2)^2}$ **19.** 6 **20.** $-2, 9$ **21.** $6, 8$

22. $0, 4$ **23.** $\dfrac{122}{3}$

Chapter Test B

1. $y = \dfrac{12}{x}; 6$ **2.** $y = -\dfrac{8}{x}; -4$ **3.** $z = -xy; -6$
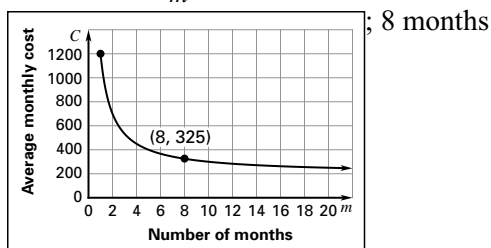
4. $z = -4xy; -24$
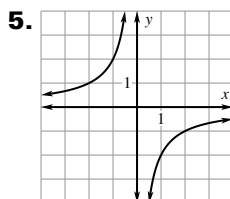
5.

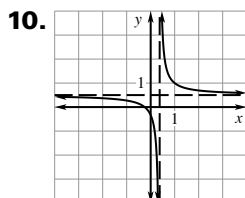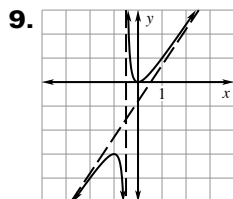; domain: all real numbers except 0, range: all real numbers except 0

6.
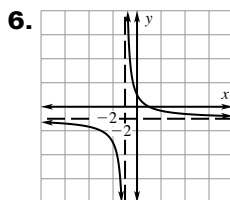
; domain: all real numbers except -1, range: all real numbers except -1

continued

7. $C(m) = \dfrac{1000}{m} + 200$, $1 \le m \le 25$;

; 8 months

8. 1850; $600

9.

10.

11. not possible **12.** $\dfrac{x}{x+1}$ **13.** $\dfrac{x}{2}$ **14.** $\dfrac{2x}{3y}$

15. $(x+1)(x+3)(x-3)$ **16.** $x(x-4)^2$

17. $\dfrac{1}{15x}$ **18.** $\dfrac{4x^2 + 3x + 3}{(x^2 - 1)(x+4)}$ **19.** $-1, 3$

20. $-1, \dfrac{1}{2}$ **21.** $-1, 2$ **22.** $-3, \dfrac{1}{4}$ **23.** odd

Chapter Test C

1. $z = \dfrac{ax}{y}$ **2.** $r = aqst$ **3.** $w = \dfrac{ax}{yz}$

4.

; domain: all real numbers except 0, range: all real numbers except 0

5.

; domain: all real numbers except 2, range: all real numbers except 2

6. $C(m) = \dfrac{1000}{m} + 2500$, $m \ge 1$;

; 4 months
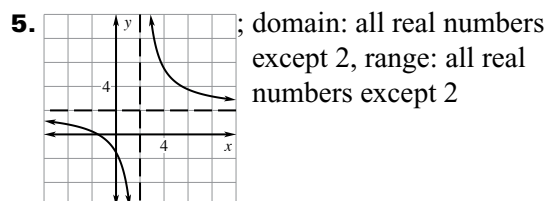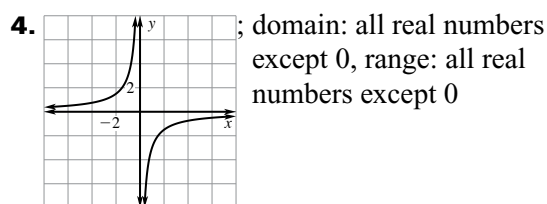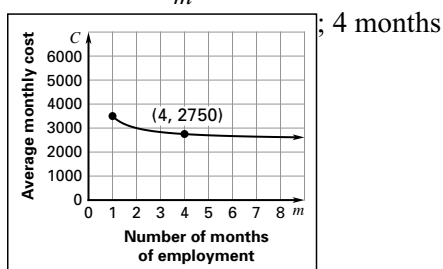
7. $f(x) = \dfrac{x+15}{x+17}$; 38 consecutive blocks

8.

9.
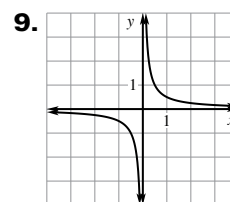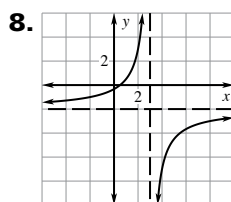
10. $x^2 + 3x + 9$ **11.** $x + 3$ **12.** $\dfrac{3xy}{4}$ **13.** $\dfrac{x-3}{2}$

14. $\dfrac{8x-3}{6x^2}$ **15.** $\dfrac{7x^2 - 2x + 3}{(x^2 - 9)(x+2)}$ **16.** $\dfrac{4 - 2x}{x^2 + 6x}$

17. 3 **18.** $-2, \dfrac{7}{3}$ **19.** $-5, 4$ **20.** $2, \dfrac{3}{2}$

21. The domains are the same, the ranges are $y \ge 0$ for Function 1 and $y \le 1$ for Function 2. Neither function has any asymptotes. End behavior: Function 1 rises on both sides, Function 2 falls on both sides. The graphs of both functions have the same shape, but the graph of Function 2 is the graph of Function 1 moved 2 units to the right, up 1 unit, and reflected over the x-axis.

Standardized Test

1. A **2.** C **3.** B **4.** C **5.** C **6.** A **7.** D **8.** B
9. A **10.** C **11.** D **12.** D **13.** 3

14. a. $y = 175 + 25x$ **b.** $y = \dfrac{175}{x} + 25$; month 12

15. a. surface area $= 2\pi r^2 + 2\pi rh$,
volume $= \pi r^2 h$ **b.** surface area $= 2\pi r^2 + \dfrac{710}{r}$
c. 3.8 cm **d.** about $.28/can

SAT/ACT Chapter Test

1. C **2.** D **3.** C **4.** B **5.** B **6.** A **7.** C
8. A **9.** C **10.** D **11.** A **12.** B **13.** B

14. $\dfrac{4}{9}$ **15.** $\dfrac{1}{4}$ **16.** 5

Alternative Assessment

1. Complete answers should include:
identification of the x-intercepts $\left(-\dfrac{1}{2} \text{ and } 5\right)$, the
vertical asymptotes ($x = -2$, $x = 0$, and $x = 1$), and the horizontal asymptote ($y = 0$); an explanation that the x-intercepts are the real zeros of the polynomial in the numerator; an explanation that the vertical asymptotes exist at the real zeros of the polynomial in the denominator; an