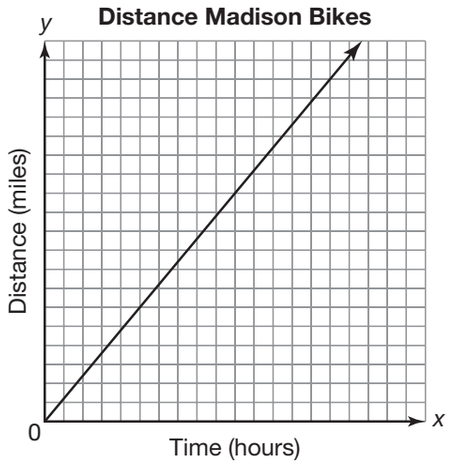
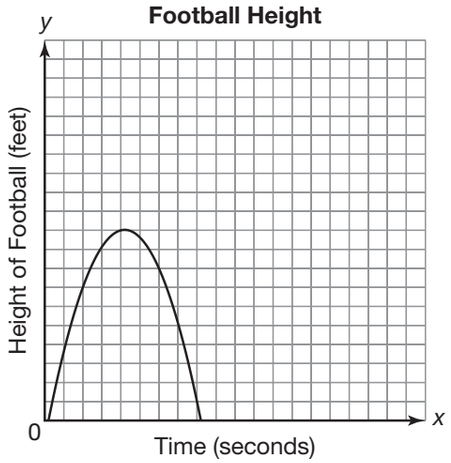
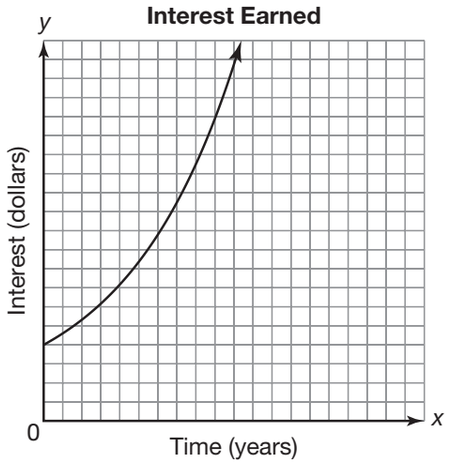
Odd-Numbered Answers

Chapter 1

LESSON 1.1

1. Independent quantity: time (hours) Dependent quantity: distance (miles)
3. Independent quantity: number of cups Dependent quantity: cost (dollars)
5. Independent quantity: time (hours) Dependent quantity: distance (miles)
7. Graph A
9. Graph B
11. Graph C
13. 

15. 

17. 

LESSON 1.2

1. Both graphs are always decreasing from left to right. Both graphs are functions. Both graphs are made up of straight lines.
3. Both graphs have an increasing and a decreasing interval. Both graphs have a minimum value. Both graphs are functions.
5. Both graphs are increasing from left to right. Both graphs are functions.
7. The graph is discrete.
9. The graph is continuous.
11. The graph is discrete.
13. Yes. The graph is a function.
15. No. The graph is not a function.
17. No. The graph is not a function.

LESSON 1.3

1. $f(x) = 3x - 8$
3. $P(x) = 3^x + 8$
5. $A(m) = -\frac{1}{2}m + 5$
7. Graph A
9. Graph B
11. Graph A

Answers

13. The graph represents an increasing function.

15. The graph represents a function with a combination of an increasing interval and a decreasing interval.

17. The graph represents a constant function.

19. The graph represents a function with an absolute minimum.

21. The graph represents a function with an absolute maximum.

23. The graph represents a function with an absolute maximum.

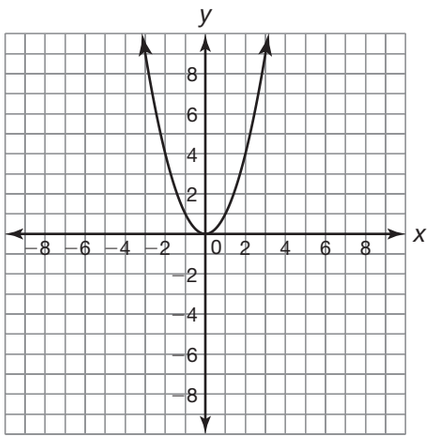
25. The graph represents an exponential function.

27. The graph represents a linear piecewise function.

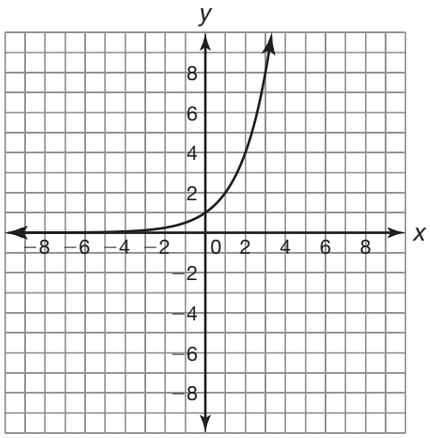
29. The graph represents a constant function.

LESSON 1.4

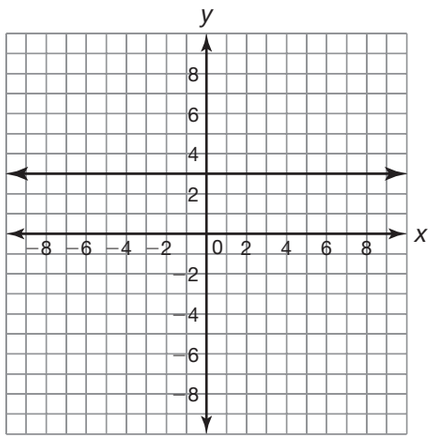
11. $f(x) = x^2$



13. $f(x) = x^2$



15. $f(x) = 3$



17. The graph represents a quadratic function.

19. The graph represents a linear absolute value function.

21. The graph represents a linear piecewise function.

Chapter 2

LESSON 2.1

1. The distance Nathan travels depends on the time. Distance, D, is the dependent quantity and time, t, is the independent quantity.

$D(t) = 6t$

3. The total number of envelopes Mario stuffs depends on the time. The total number of envelopes, E, is the dependent quantity and time, t, is the independent quantity.

$E(t) = 5t$

5. The amount of money the booster club earns depends on the number of cups sold. The amount of money, M, is the dependent quantity and the number of cups sold, c, is the independent quantity.

$M(c) = 2c$

Answers

7.

	Independent Quantity	Dependent Quantity
Quantity	Time	Distance
Units	hours	miles
Expression	t	$7t$
	0	0
	0.5	3.5
	1	7
	1.5	10.5
	2	14

(0.5, 3.5) and (1, 7)

$$\frac{7 - 3.5}{1 - 0.5} = \frac{3.5}{0.5}$$
$$= \frac{7}{1}$$

The unit rate of change is 7.

9. Noah is stuffing envelopes with invitations to the school's Harvest Festival. He stuffs 4 envelopes each minute.

	Independent Quantity	Dependent Quantity
Quantity	Time	Number of Envelopes
Units	minutes	envelopes
Expression	t	$4t$
	5	20
	10	40
	15	60
	20	80
	25	100

(5, 20) and (10, 40)

$$\frac{40 - 20}{10 - 5} = \frac{20}{5}$$
$$= \frac{4}{1}$$

The unit rate of change is 4.

Answers

11. The volleyball boosters sell bags of popcorn during the varsity matches to raise money for new uniforms. Each bag of popcorn costs $3.

	Independent Quantity	Dependent Quantity
Quantity	Number of bags of popcorn sold	Amount of money raised
Units	bags	dollars
Expression	b	$3b$
	5	15
	10	30
	15	45
	20	60
	25	75

(5, 15) and (10, 30)

$$\frac{30 - 15}{10 - 5} = \frac{15}{5}$$

$$= \frac{3}{1}$$

The unit rate of change is 3.

Answers

13. The input value is t.
The output value is $4t$.
The rate of change is 4.

15. The input value is e.
The output value is $15e$.
The rate of change is 15.

17. The input value is b.
The output value is $35b$.
The rate of change is 35.

19. Carmen earns $21 when she babysits for 3 hours.

21. Carmen earns $35 when she babysits for 5 hours.

23. Carmen earns $24.50 when she babysits for 3.5 hours.

25. $t = 3$

27. $t = 6$

29. $t = 2$

LESSON 2.2

1.

	Independent Quantity	Dependent Quantity
Quantity	Time	Height
Units	minutes	feet
	0	1000
	2	1400
	4	1800
	6	2200
	8	2600
Expression	t	$200t + 1000$

3.

	Independent Quantity	Dependent Quantity
Quantity	Time	Height
Units	minutes	feet
	0	4125
	1	3575
	2	3025
	3	2475
	4	1925
Expression	t	$-550t + 4125$

Answers

5.

	Independent Quantity	Dependent Quantity
Quantity	Time	Depth
Units	minutes	feet
	0	−300
	2	−244
	4	−188
	6	−132
	8	−76
Expression	t	$28t - 300$

7. The input value is t, time in minutes. The output value is $f(t)$, height in feet.

The y-intercept is 130. The rate of change is 160.5.

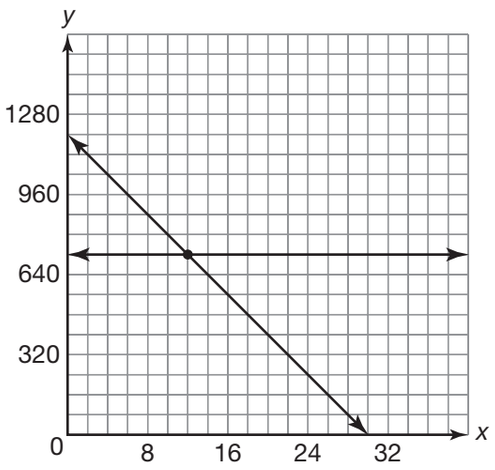
9. The input value is t, time in minutes. The output value is $f(t)$, depth in feet.

The y-intercept is 0. The rate of change is −17.

11. The input value is t, time in minutes. The output value is $f(t)$, volume in gallons.

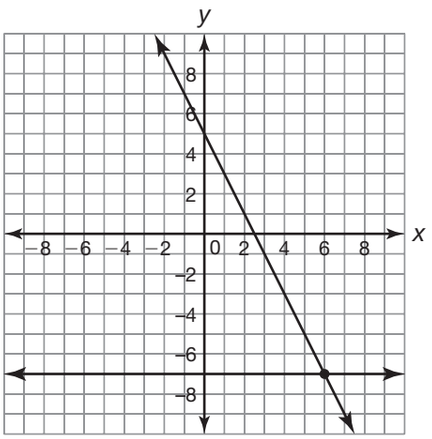
The y-intercept is 5. The rate of change is 4.25.

13.



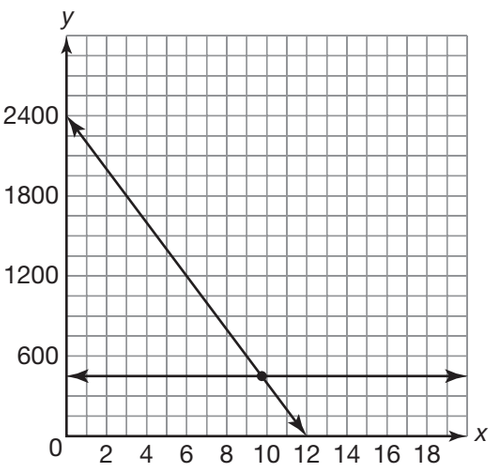
$f(x) = 720$ at $x = 12$

15.



$f(x) = -7$ at $x = 6$

17.



$f(x) = 450$ at $x \approx 10$

Answers

19. $12 = x$

21. $6 = x$

23. $9.75 = x$

LESSON 2.3

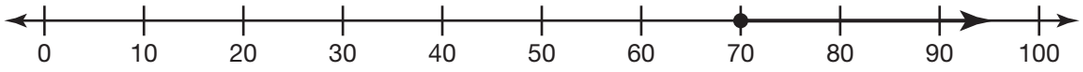
1. $x \geq 8$

3. $x < 3$

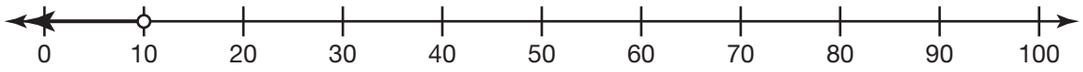
5. $x > 10$

7. Elena must sell at least 50 tickets. $x \geq 50$

9. Elena must sell at least 70 tickets. $x \geq 70$



11. Elena must sell fewer than 10 tickets. $x < 10$



13. $5 \leq x$

Leon must play in 5 or more games to score at least 117 points.

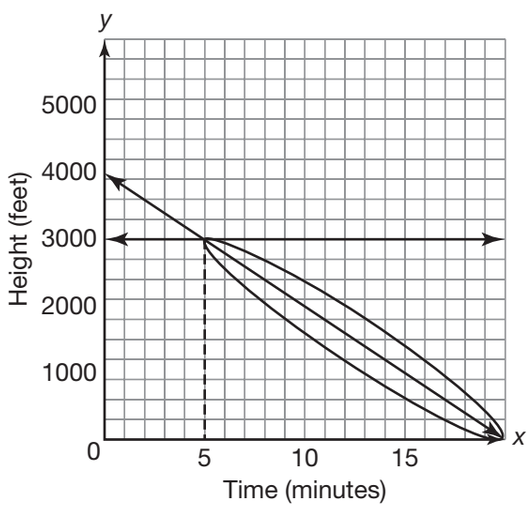
15. $7 < x$

Leon must play in more than 7 games to score more than 143 points.

17. $2.54 > x$

Leon must play in 2 or fewer games to score fewer than 85 points.

19.

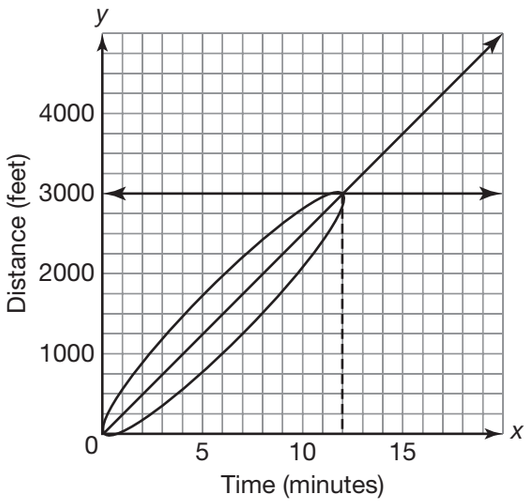


More than 5 minutes have passed if the balloon is below 3000 feet.

$x > 5$

Answers

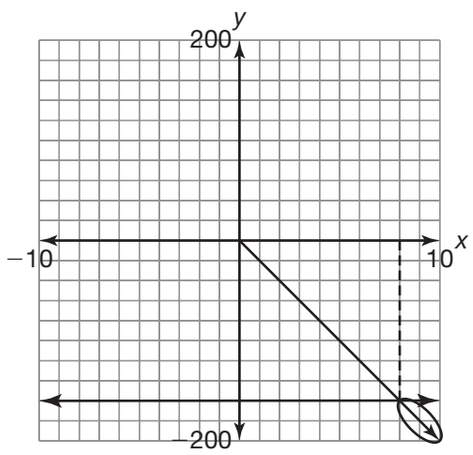
21.



Less than 12 minutes have passed if Lea still has more than 2000 feet to walk.

$x < 12$

23.



At least 8 minutes have passed if the submarine is at least 160 feet below the surface.

$x \geq 8$

Answers

LESSON 2.4

1. $22 \geq x > -4$

3. $0 \leq x \leq 6$

5. $87 \geq x \geq 83$

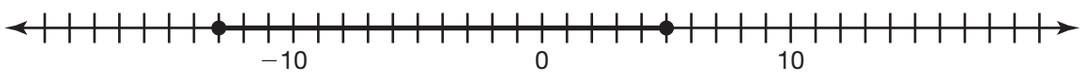
7. $-8 < x \leq 11$

9. $7 < x < 25$

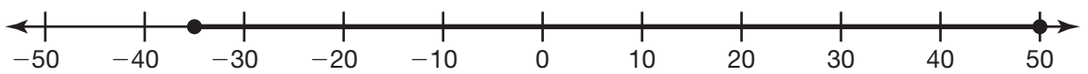
11. $-14 \leq x \leq 5$

13.

15.



17. $-35 \leq x \leq 50$

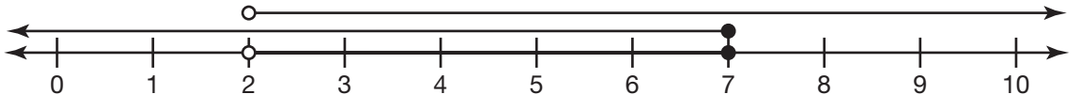


19. $x \geq 6$ or $x < 3$

21. $x > 31$ or $x \leq 26$

23. $x > 1000$ or $x < 10$

25.



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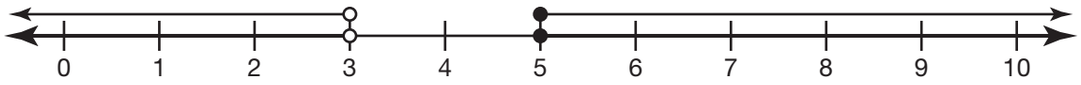

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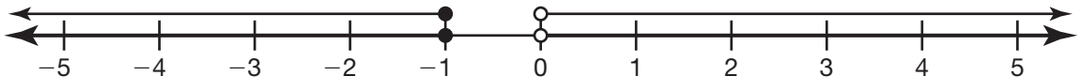
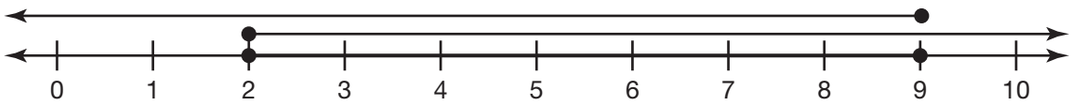
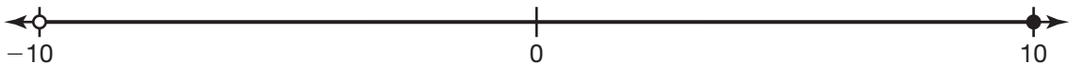


31.



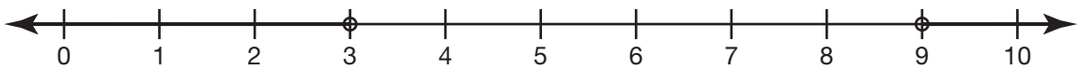
$2 \leq x \leq 9$

33.



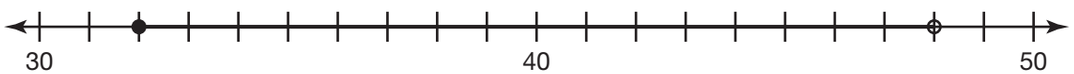
Solution: $-10 < x \leq 10$

35.



Solution: $x > 9$ or $x < 3$

37.



Solution: $32 \leq x < 48$

LESSON 2.5

1. $|3| = 3$

3. $\left|\frac{1}{4}\right| = \frac{1}{4}$

5. $|3.7| = 3.7$

7. There is only one solution.

$x = -9$

9. There are two solutions.

$x = 4$ or $x = -4$

11. There is only one solution.

$x = 0$

13. $x = -7$

15. $x = 17$

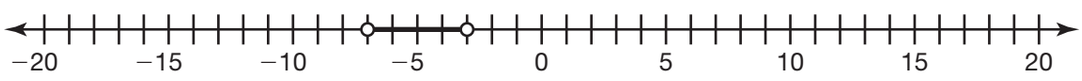
17. There are no solutions.

19. $x = 33$ $x = -33$

21. $x = 30$ $x = -18$

23. $x = 15$ $x = -15$

25.



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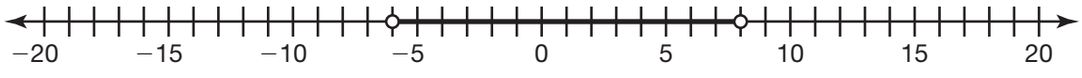
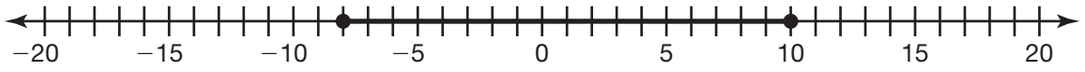
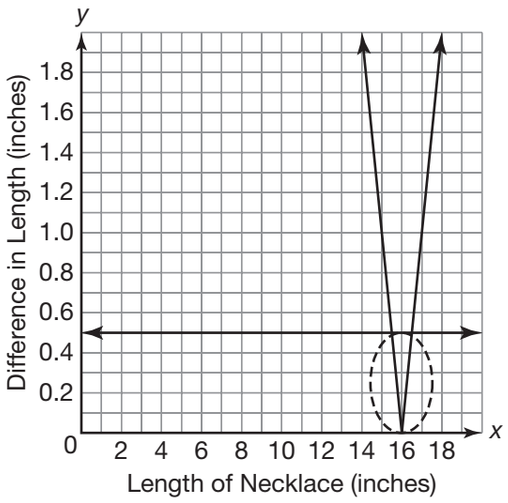


Answers

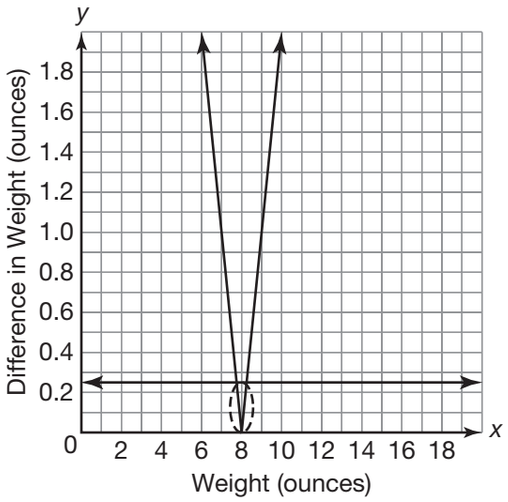
29.



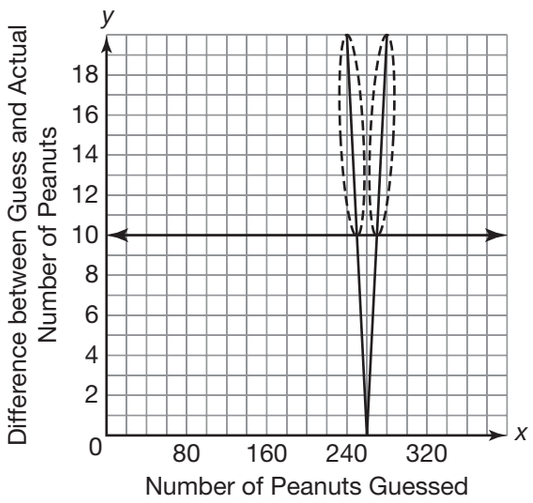
31. The necklaces can be between 15.5 and 16.5 inches long to meet the specifications.



33. Each bag of chips can weigh between 7.75 ounces and 8.25 ounces.



35. A guess that is more than 270 or less than 250 will not win a prize.



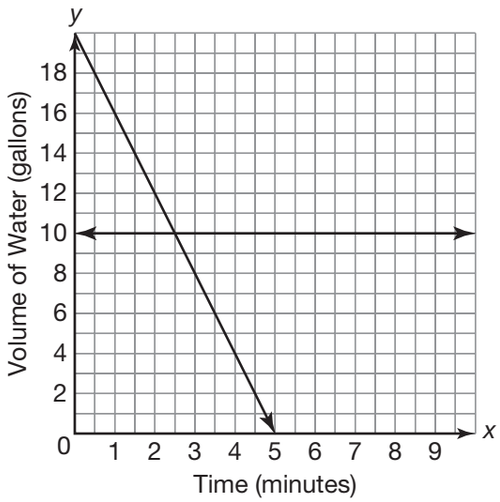
LESSON 2.6

1. B $f(x) = 3x$

3. C $f(x) = 25{,}000\left(\frac{5}{6}\right)^x$

5. B $f(x) = -32x2 + 25x$

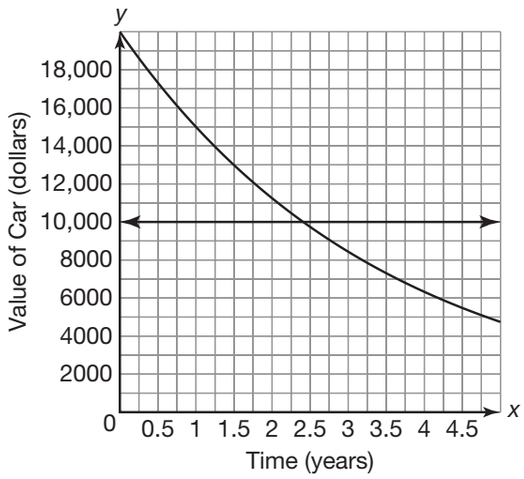
7.



After 2.5 minutes, half of the water in the tank (10 gallons) will be drained.

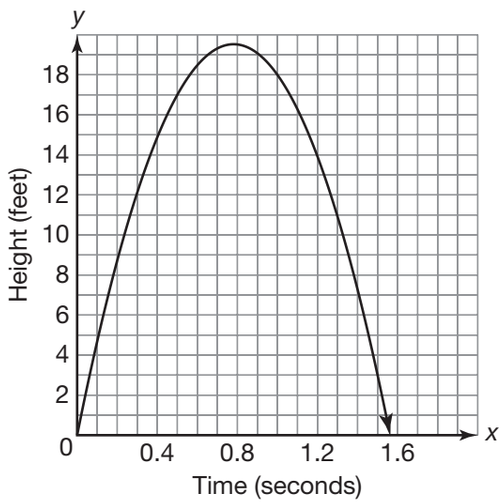
Answers

9.



Ronna can own the car for almost 2.5 years before reselling and will still make at least $10,000.

11.



The softball is in the air for about 1.5 seconds.

Chapter 3

LESSON 3.1

1. The attendance during Game 9 will be 2620 people.

3. The average price of gas in August will be $3.44.

5. In 2014, Kata will travel 5623 miles.

LESSON 3.2

1. a = pounds of apples

b = pounds of oranges

$0.75a + 0.89b$

3. m = matinee

n = evening

$7m + 10.5n$

5. d = daisies

r = roses

$8.99d + 15.99r$

7. c = carnations

f = lilies

$10.99c + 12.99f = 650$

9. q = pounds of oranges

r = pounds of peaches

$0.79q + 1.05r = 325$

11. d = DVDs

b = Blu-ray discs

$15.99d + 22.99b = 2000$

13. The booster club must sell 75 hot dogs to reach their goal.

15. The booster club must sell 360 hamburgers to reach their goal.

17. The booster club must sell 132 hot dogs to reach their goal.

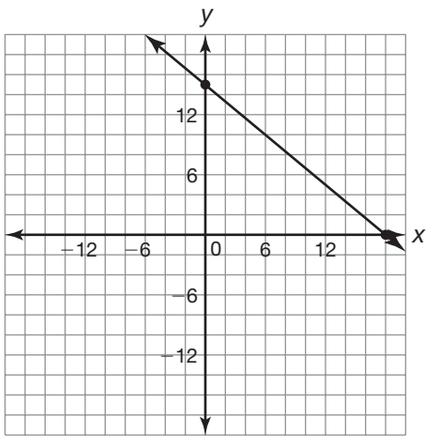
19. The x-intercept is (12, 0) and the y-intercept is (0, 30).

21. The x-intercept is $(-21, 0)$ and the y-intercept is (0, 168).

23. The x-intercept is approximately (24.43, 0) and the y-intercept is (0, 13.68).

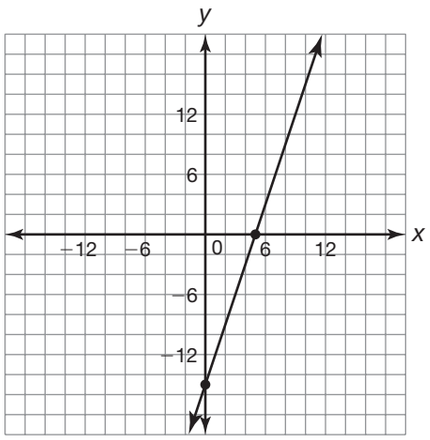
Answers

25.



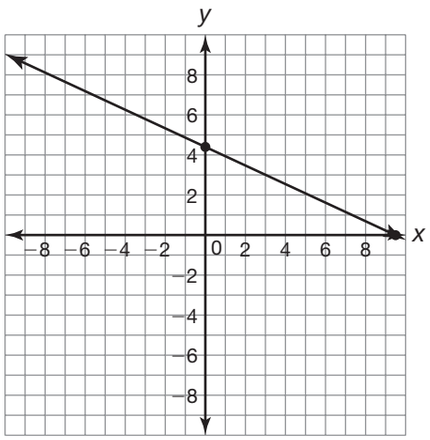
$x = 18$ $y = 15$

27.



$5 = x$ $y = -15$

29.



$x = 9.5$ $y \approx 4.4$

LESSON 3.3

1. $72°F \approx 22.22°C$
3. $102.6°F \approx 39.22°C$
5. $42°C = 107.6°F$
7. $y = -\frac{2}{3}x + 8$
9. $y = \frac{4}{9}x + 5$
11. $y = -\frac{1}{8}x - 12$
13. $-5x + y = 8$
15. $-2x + 3y = -18$
17. $5x + y = -13$
19. $\frac{2A}{b} = h$
21. $\sqrt{\frac{A}{\pi}} = r$
23. $\frac{3V}{lh} = w$

LESSON 3.4

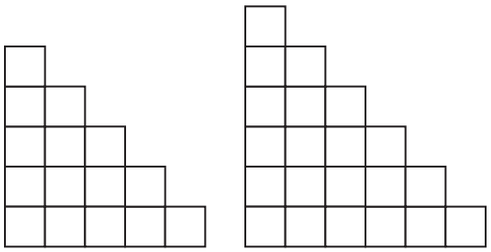
1. $f(x) = 35x - 105$
3. $f(x) = 1.99x - 3.98$
5. $f(x) = 20x - 20$
7. The linear function $c(x) = \frac{5}{2}x - 24$ represents the total number of boxes that Line A and Line B can produce combined.
9. The linear function $f(x) = 2.16x - 12.44$ represents the total amount that Carlos and Hector can earn combined.
11. The linear function $c(x) = 47.75x - 279$ represents the total amount that Line A and Line B can make combined.

Answers

Chapter 4

LESSON 4.1

1. The second figure has 2 more squares than the first, the third figure has 3 more squares than the second, and the fourth figure has 4 more squares than the third.



3. Each figure has 2 more circles than the previous figure.

5. Each figure has twice as many triangles as the previous figure.

7. 1000, 995, 990, 985, 980, 975, 970

9. \$40, \$80, \$120, \$160, \$200, \$240

11. 1, 3, 7, 15, 31, 63, 127

13. 200, 225, 250, 275, 300, 325, 350

15. 50, 47, 44, 41, 38, 35, 32, 29

LESSON 4.2

1. $d = 5 - 1$

$d = 4$

3. $d = 13 - 10.5$

$d = 2.5$

5. $d = 91.5 - 95$

$d = -3.5$

7. $d = 1190 - 1250$

$d = -60$

9. $d = 9 - 8\frac{1}{2}$

$d = \frac{1}{2}$

11. $r = 10 \div 5$

$r = 2$

13. $r = -6 \div 3$

$r = -2$

15. $r = -30 \div 10$

$r = -3$

17. $r = 40 \div 5$

$r = 8$

19. $r = -1 \div 0.2$

$r = -5$

21. 8, 14, 20, 26, 32, 38, 44, . . .

23. −24, −14, −4, 6, 16, 26, 36, . . .

25. 20, 11, 2, −7, −16, −25, −34, . . .

27. −101, −112, −123, −134, −145, −156, −167, . . .

29. −500, −125, 250, 625, 1000, 1375, 1750, . . .

31. 3, 9, 27, 81, 243, 729, 2187, . . .

33. 5, −10, 20, −40, 80, −160, 320, . . .

35. 2, −2, 2, −2, 2, −2, 2, . . .

37. −8000, 4000, −2000, 1000, −500, 250, −125, . . .

Answers

39. 156.25, 31.25, 6.25, 1.25, 0.25, 0.05, 0.01, . . .

41. The sequence is arithmetic. The next 3 terms are 20, 24, and 28.

43. The sequence is geometric. The next 3 terms are 768, 3072, and 12,288.

45. The sequence is neither arithmetic nor geometric.

47. The sequence is arithmetic. The next 3 terms are 23.9, 28.0, and 32.1.

49. The sequence is geometric. The next 3 terms are 1280, −5120, and 20,480.

LESSON 4.3

1. $a_{20} = 58$

3. $a_{25} = 29.7$

5. $a_{42} = 104.50$

7. $a_{34} = 98.7$

9. $a_{57} = 0$

11. $g_{10} = 1536$

13. $g_{12} = 885{,}735$

15. $g_{20} = -65{,}536$

17. $g_{14} = 32{,}768$

19. $g_{12} \approx 46.57$

21. The sequence is geometric.

$g_5 = 64$

23. The sequence is geometric.

$g_4 = -54$ $g_6 = -486$

25. The sequence is arithmetic.

$a_4 = 590$ $a_5 = 680$

27. The sequence is arithmetic.

$a_4 = -113$ $a_5 = -128$ $a_6 = -143$

29. $a_{20} = 790$

31. $a_{30} = 248$

33. $a_{30} = 10{,}500$

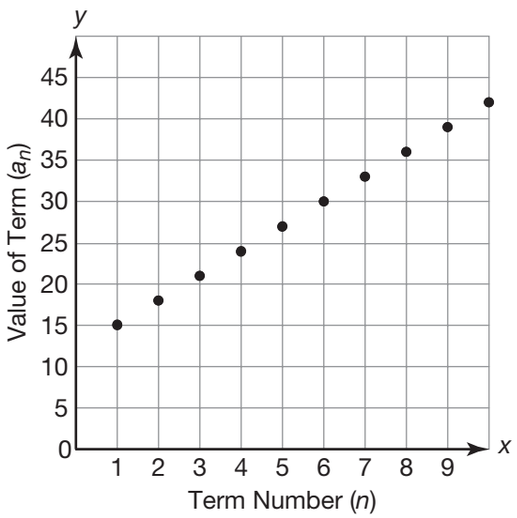
35. $a_{24} = 68.9$

37. $a_{20} = 13{,}900$

LESSON 4.4

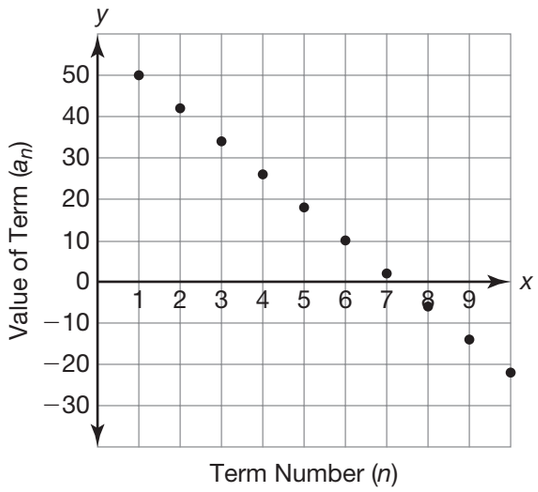
1.

Term Number (n)	Value of Term (a_n)
1	15
2	18
3	21
4	24
5	27
6	30
7	33
8	36
9	39
10	42



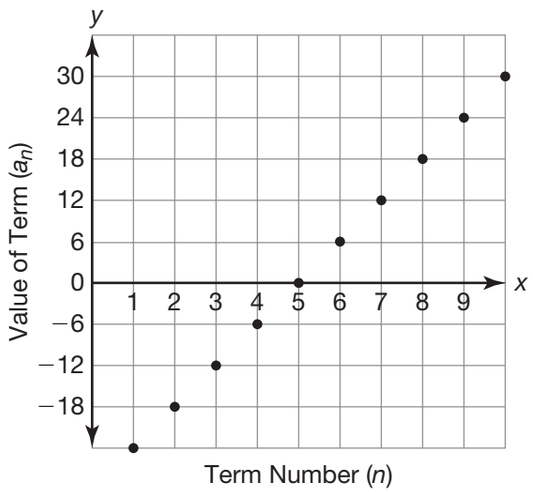
3.

Term Number (n)	Value of Term (a_n)
1	50
2	42
3	34
4	26
5	18
6	10
7	2
8	−6
9	−14
10	−22



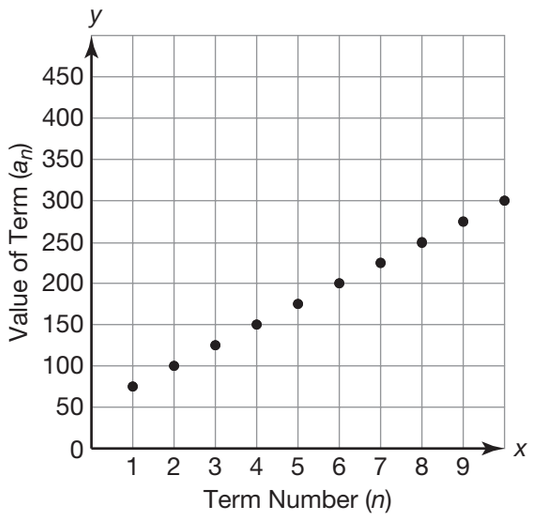
5.

Term Number (n)	Value of Term (a_n)
1	−24
2	−18
3	−12
4	−6
5	0
6	6
7	12
8	18
9	24
10	30



7.

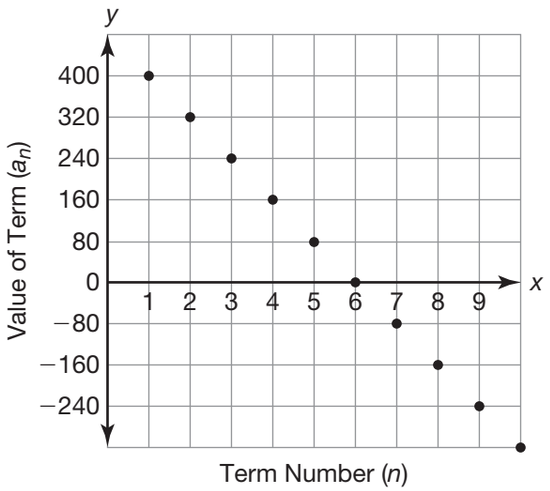
Term Number (n)	Value of Term (a_n)
1	75
2	100
3	125
4	150
5	175
6	200
7	225
8	250
9	275
10	300



Answers

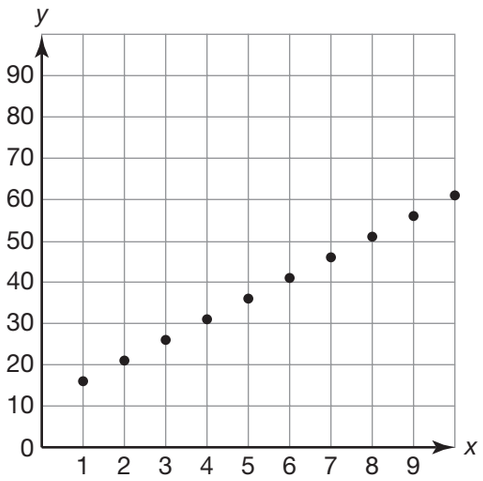
9.

Term Number (n)	Value of Term (a_n)
1	400
2	320
3	240
4	160
5	80
6	0
7	−80
8	−160
9	−240
10	−320

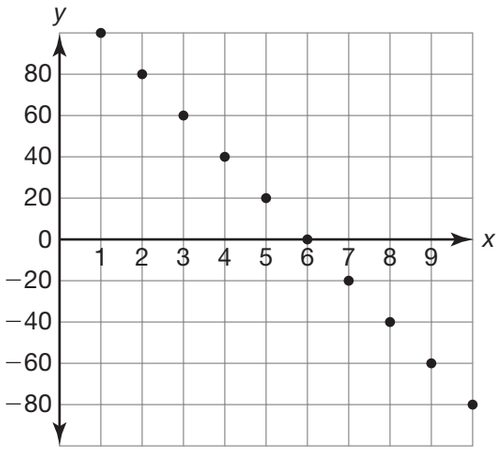


LESSON 4.5

1. $f(n) = 5n + 11$

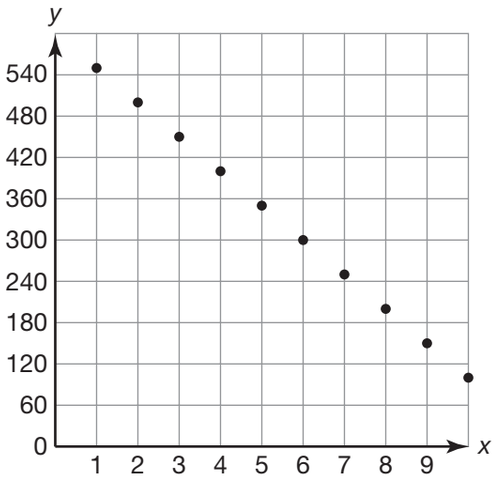


3. $f(n) = -20n + 120$

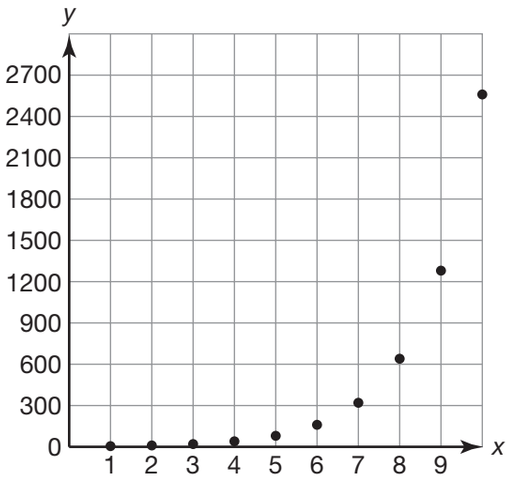


Answers

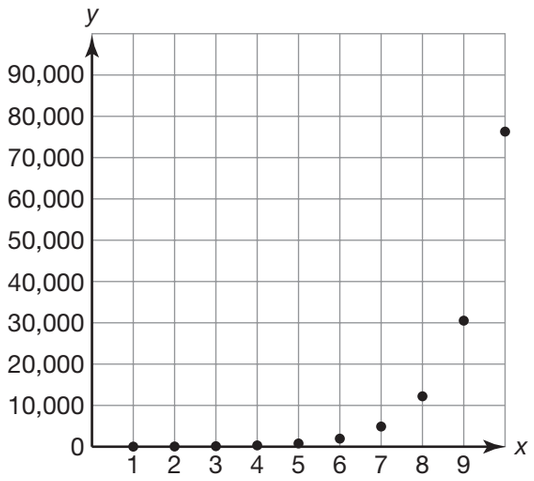
5. $f(n) = -50n + 600$



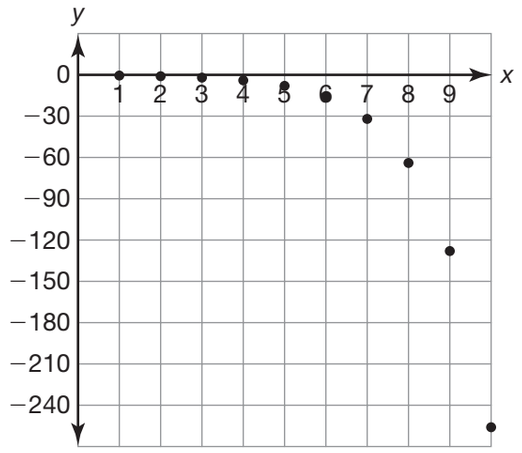
7. $f(n) = \frac{5}{2} \cdot 2^n$



9. $f(n) = 8 \cdot 2.5^n$



11. $f(n) = -0.25 \cdot 2^n$



Answers

Chapter 5

LESSON 5.1

1. $P(t) = 500 + 15t$
3. $P(t) = 250 + 6.25t$
5. $P(t) = 175 + 7.4375t$
7. In 3 years, the account balance will be $556.25.
9. In 10 years, the account balance will be $687.50.
11. In 50 years, the account balance will be $1437.50.
13. It will take 5 years for the account balance to reach $505.
15. It will take 50 years for the account balance to reach $1450.
17. It will take about 19 years for the account balance to reach $800.
19. $P(t) = 500 \cdot 1.04$
21. $P(t) = 1200 \cdot 1.035^t$
23. $P(t) = 300 \cdot 1.0175^t$
25. In 2 years, the account balance will be $533.03.
27. In 15 years, the account balance will be $807.83.
29. In 50 years, the account balance will be 2474.42.
31. It will take about 8.3 years for the account balance to reach $1500.
33. It will take about 36.7 years for the account balance to reach $6000.
35. It will take about 14.2 years for the account balance to reach $2000.

Answers

37.

Quantity	Time	Simple Interest Balance	Compound Interest Balance
Units	years	dollars	dollars
Expression	t	$300 + 12t$	$300 \cdot 1.04t$
	0	300.00	300.00
	2	324.00	324.48
	6	372.00	379.60
	10	420.00	444.07

39.

Quantity	Time	Simple Interest Balance	Compound Interest Balance
Units	years	dollars	dollars
Expression	t	$1100 + 38.5t$	$1100 \cdot 1.035^t$
	0	1100.00	1100.00
	5	1292.50	1306.45
	10	1485.00	1551.66
	30	2255.00	3087.47

41.

Quantity	Time	Simple Interest Balance	Compound Interest Balance
Units	years	dollars	dollars
Expression	t	$2300 + 86.25t$	$2300 \cdot 1.0375^t$
	0	2300.00	2300.00
	2	2472.50	2475.73
	5	2731.25	2764.83
	15	3593.75	3995.30

Answers

LESSON 5.2

1. $P(t) = 7000 \cdot 1.014^t$

3. $P(t) = 8000 \cdot 0.9825^t$

5. $P(t) = 9500 \cdot 0.028^t$

7. The population after 1 year will be 16,240.

9. The population after 5 years will be about 17,237.

11. The population after 20 years will be about 21,550.

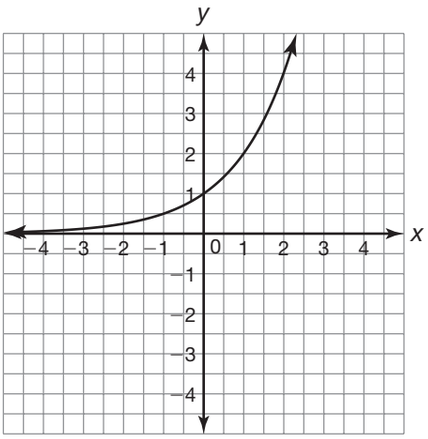
13. It will take about 4.7 years for the population to reach 17,000.

15. It will take about 57.4 years for the population to reach 9000.

17. The range of the function is all numbers greater than 0. The function never actually reaches 0.

19.

x	$f(x)$
-2	$\frac{1}{4}$
-1	$\frac{1}{2}$
0	1
1	2
2	4



x-intercept: none

y-intercept: (0, 1)

asymptote: $y = 0$

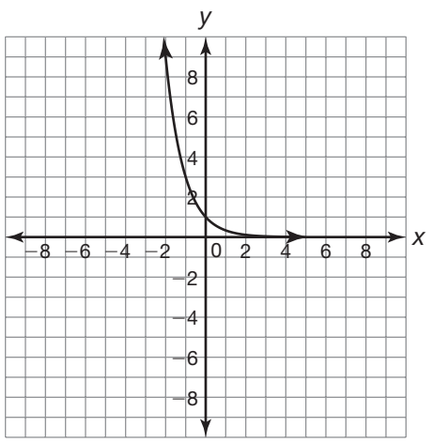
domain: all real numbers

range: $y > 0$

interval(s) of increase or decrease: increasing over the entire domain

21.

x	$f(x)$
-2	9
-1	3
0	1
1	$\frac{1}{3}$
2	$\frac{1}{9}$



x-intercept: none

y-intercept: (0, 1)

asymptote: $y = 0$

domain: all real numbers

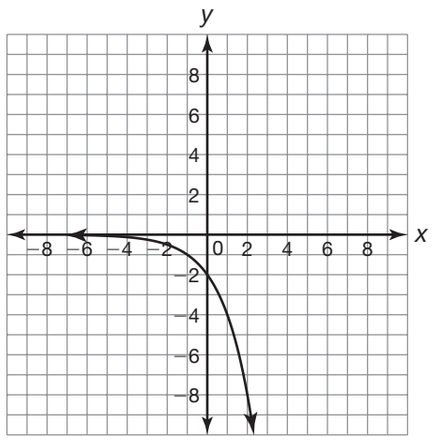
range: $y > 0$

interval(s) of increase or decrease: decreasing over the entire domain

Answers

23.

x	$f(x)$
-2	$-\frac{1}{2}$
-1	-1
0	-2
1	-4
2	-8



x-intercept: none

y-intercept: $(0, -2)$

asymptote: $y = 0$

domain: all real numbers

range: $y < 0$

interval(s) of increase or decrease: decreasing over the entire domain

LESSON 5.3

1. $g(x) = f(x) + 4$

3. $g(x) = f(x) - 8$

5. $g(x) = f(x) + 2$

7. $(x, y) \rightarrow (x, y + 8)$

9. $(x, y) \rightarrow (x, y - 4)$

11. $(x, y) \rightarrow (x, y + 6)$

13. $g(x) = 3^{(x+1)} = f(x + 1)$

15. $g(x) = 2^{(x-1)} = f(x - 1)$

17. $g(x) = 2(x - 3) = f(x - 3)$

19. $(x, y) \rightarrow (x + 2, y)$

21. $(x, y) \rightarrow (x - 1, y)$

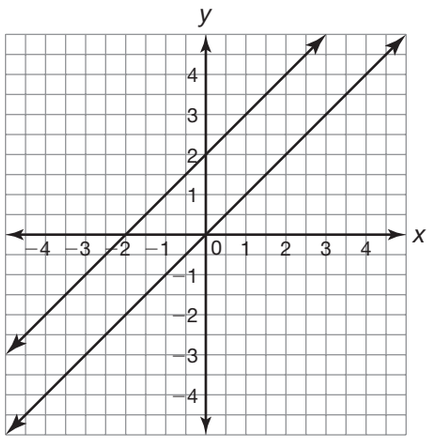
23. $(x, y) \rightarrow (x + 1, y)$

25. The graph of $f(x)$ is b units below the graph of $h(x)$.

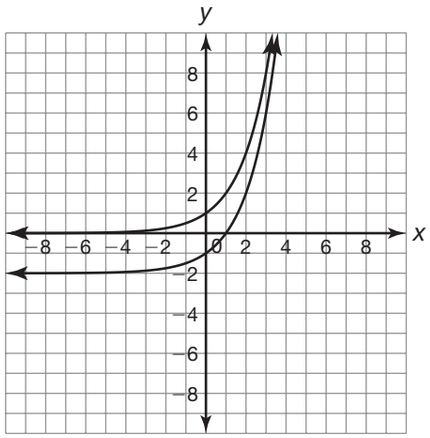
27. The graph of $f(x)$ is b units to the right of $h(x)$.

29. The graph of $f(x)$ is k units up from the graph of $h(x)$.

31.

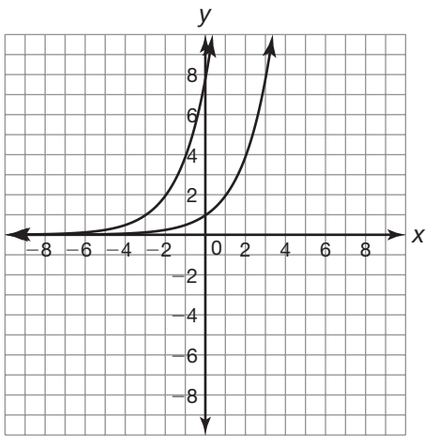


33.

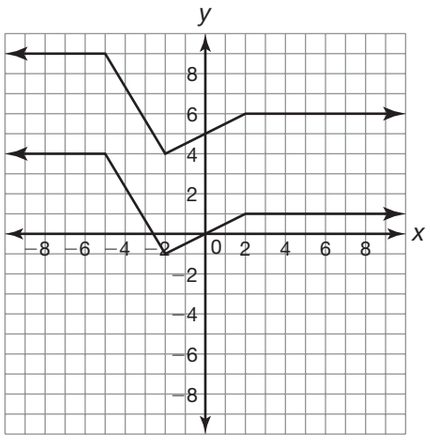


Answers

35.



37.



39. $g(x) = x + 2$

41. $g(x) = 3^{x-4}$

43. $g(x) = 3^x - 5$

45. $g(x) = x - 3$

47. $g(x) = 2^x + 2$

49. $g(x) = 2^{x-3}$

LESSON 5.4

1. $g(x) = -f(x)$

3. $g(x) = -f(x)$

5. $g(x) = f(-x)$

7. $(x, y) \rightarrow (x, -y)$

$g(x)$ is a horizontal reflection about $y = 0$.

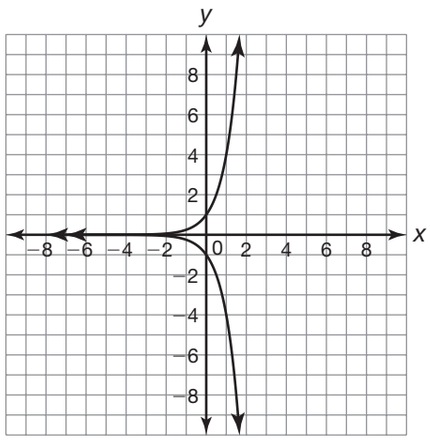
9. $(x, y) \rightarrow (x, -y)$

$g(x)$ is a horizontal reflection about $y = 0$.

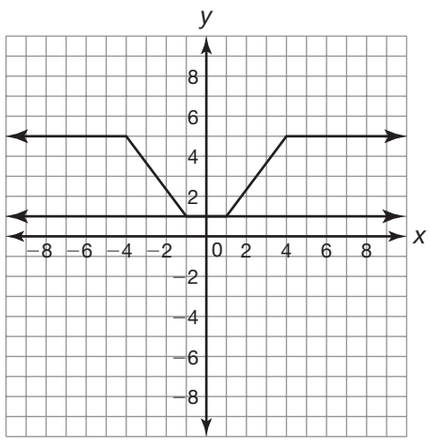
11. $(x, y) \rightarrow (-x, y)$

$g(x)$ is a vertical reflection about $x = 0$.

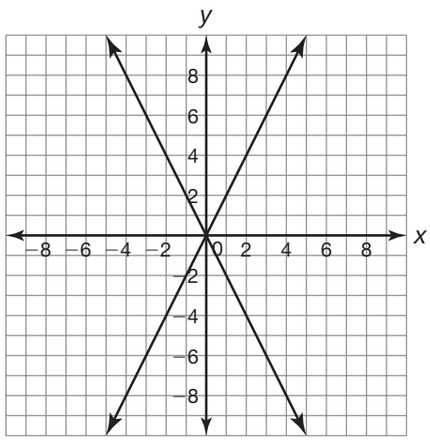
13.



15.



17.

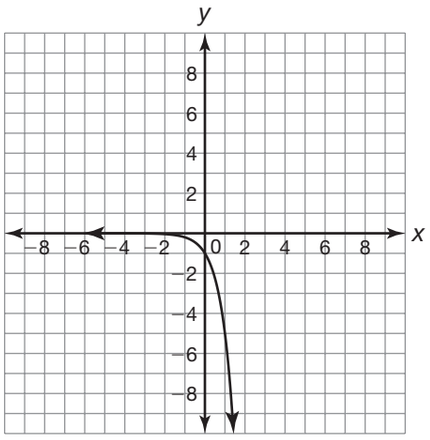


19. $g(x) = -3^x$

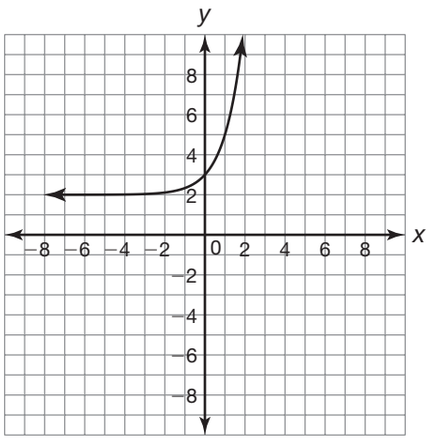
21. $g(x) = 12x$

23. $g(x) = -(2^x + 9)$

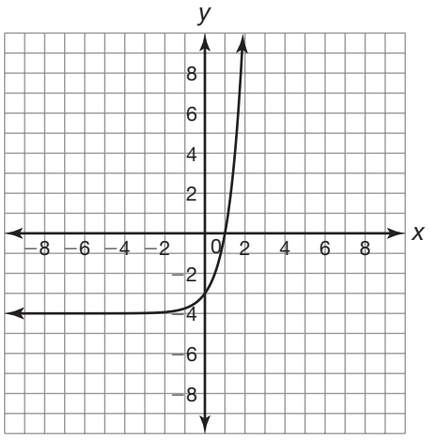
25. $g(x) = -5^x$



27. $g(x) = 3^x + 2$



29. $g(x) = 4^x - 4$



31. $g(x)$ is a reflection of $f(x)$ over the line $x = 0$.

33. $g(x)$ is a translation of $f(x)$ up 10 units or $g(x)$ is a translation of $f(x)$ left 5 units.

35. $g(x)$ is a translation of $f(x)$ right 4 units.

37. $g(x)$ is a reflection of $f(x)$ over the line $y = 0$.

39. $g(x)$ is a translation of $f(x)$ down 5 units.

41. $g(x)$ is a translation of $f(x)$ up 2 units.

LESSON 5.5

1. $\frac{10^5}{10^8} = 10^{5-8} = 10^{-3}$

3. $\frac{10^2}{10^5} = 10^{2-5} = 10^{-3}$

5. $\frac{5^3}{5^{10}} = 5^{3-10} = 5^{-7}$

7. $\sqrt[3]{216} = 6$

9. $\sqrt[3]{-125} = -5$

11. $\sqrt[3]{729} = 9$

13. $\sqrt[5]{32} = 2$

15. $\sqrt[6]{729} = 3$

17. $\sqrt[7]{-128} = -2$

19. $\sqrt[4]{15} = 15^{\frac{1}{4}}$

21. $\sqrt[4]{31} = 31^{\frac{1}{4}}$

23. $\sqrt[6]{y} = y^{\frac{1}{6}}$

25. $12^{\frac{1}{3}} = \sqrt[3]{12}$

27. $18^{\frac{1}{4}} = \sqrt[4]{18}$

29. $d^{\frac{1}{5}} = \sqrt[5]{d}$

31. $5^{\frac{2}{3}} = \sqrt[3]{5^2}$

33. $18^{\frac{3}{4}} = \sqrt[4]{18^3}$

35. $y^{\frac{4}{3}} = \sqrt[3]{y^4}$

37. $\sqrt[4]{6^3} = 6^{\frac{3}{4}}$

39. $\sqrt[3]{12^2} = 12^{\frac{2}{3}}$

41. $\sqrt[4]{p^7} = p^{\frac{7}{4}}$

Answers

LESSON 5.6

1.

x	$f(x)$	Expression
0	1	3^0
1	3	3^1
2	9	3^2
3	27	3^3
4	81	3^4
5	243	3^5
x	3^x	-----

The exponents of the expressions in the third column equal x. So, $f(x) = 3x$.

3.

x	$f(x)$	Expression
0	-1	-2^0
1	-2	-2^1
2	-4	-2^2
3	-8	-2^3
4	-16	-2^4
5	-32	-2^5
x	-2^x	-----

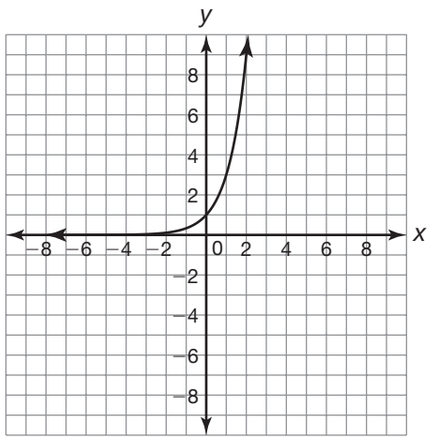
The exponents of the expressions in the third column equal x. So, $f(x) = -2^x$.

5.

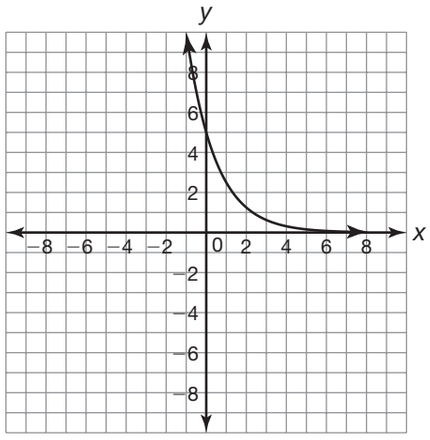
x	$f(x)$	Expression
0	$-\frac{1}{25}$	-5^{-2}
1	$-\frac{1}{5}$	-5^{-1}
2	-1	-5^0
3	-5	-5^1
4	-25	-5^2
5	-125	-5^3
x	-5^{x-2}	-----

The exponents of the expressions in the third column equal $x - 2$. So, $f(x) = -5^{x-2}$.

7.

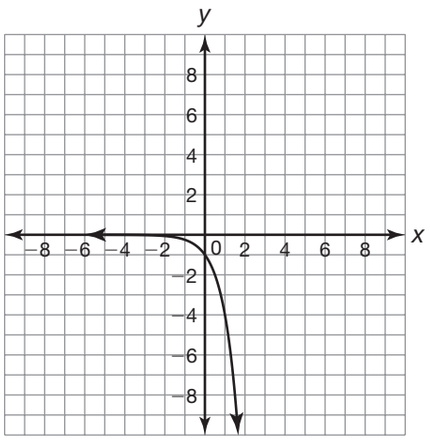


9.



Answers

11.



13. $f(x) = 7776$ when $x = 6$.

15. $f(x) = 625$ when $x = -3$.

17. $f(x) > -9$ when $x < 1$.

19. $x = 4$

21. $x = 9$

23. $x = -2$

25. $x = -2$

27. $2^{-1} \cdot 2s$

2^{s-1}

29. $2^1 \cdot 2^{2x}$

2^{2x+1}

31. $64^x \cdot 4$

$4(64)^x$

33. $f(x) = 2\left(\frac{1}{2}\right)^x$

35. $f(x) = \left(\frac{3}{4}\right)^x$

37. $f(x) = 3\left(\frac{1}{3}\right)^x$

Chapter 6

LESSON 6.1

1. The break-even point is between 6 and 7 model cars. Eric must sell more than 6 model cars to make a profit.

3. The break-even point is between 11 and 12 yards mowed. Chen must mow more than 11 yards to make a profit.

5. The break-even point is between 13 and 14 boxes of fruit. The Spanish Club must sell more than 13 boxes of fruit to make a profit.

7. $x + 3y = 8$ $\quad 2x - y = 21$

9. $15x - 36 = 2y$ $\quad 2x + y = 9$

11. $2x - 4y = 20$ $\quad -x - 5y = 11$

13. The solution is (4, 5). The system is consistent.

15. There is no solution. The system is inconsistent.

17. The solution is (2, 0.5). The system is consistent.

LESSON 6.2

1. $\begin{cases} 10x + 15y = 20 \\ 5x + 6y = 8.50 \end{cases}$

The solution is (0.5, 1). The band charges \$0.50 for each apple and \$1.00 for each orange.

3. $\begin{cases} 3x + 2y = 30 \\ 4x + 3y = 41 \end{cases}$

The solution is (8, 3). The Pizza Barn sells each pepperoni pizza for \$8 and each order of breadsticks for \$3.

5. $\begin{cases} 4x + 2y = 63.8 \\ 9x + 4y = 139.8 \end{cases}$

The solution is (12.2, 7.5). Each large block is 12.2 inches tall and each small block is 7.5 inches tall.

7. The solution is (6, −2).

9. The solution is (−3, −4).

11. The solution is (0, 7).

13. The solution is (2, −2).

LESSON 6.3

1. $\begin{cases} 4x + 10y = 200 \\ 6x + 5y = 200 \end{cases}$

The solution is (25, 10). Each large plate weighs 25 pounds. Each small plate weighs 10 pounds.

3. $\begin{cases} y = 0.25x + 2.50 \\ y = 0.50x + 1.50 \end{cases}$

The solution is (4, 3.50). Both vendors charge \$3.50 for a sundae with 4 toppings. If Raja wants fewer than 4 toppings, then Colder & Creamier Sundaes is the better buy. If Raja wants more than 4 toppings, Cold & Creamy Sundaes is the better buy.

5. $\begin{cases} 10x + 6y = 193 \\ 8x + 10y = 183 \end{cases}$

The solution is (16, 5.5). Alicia charges $16 for each purse and $5.50 for each wallet.

LESSON 6.4

1. $\begin{cases} y = 0.02x + 20{,}000 \\ y = 0.01x + 25{,}000 \end{cases}$

The solution is (500,000, 30,000). Both real estate companies will pay Jun $30,000 per year for $500,000 in real estate sales. If Jun expects to sell less than $500,000 of real estate per year, then he should accept the offer from Amazing Homes. If Jun expects to sell more than $500,000 of real estate per year, then he should accept the offer from Dream Homes.

3. $\begin{cases} y = 25x + 15{,}000 \\ y = 21x + 18{,}000 \end{cases}$

The solution is (750, 33,750). Both companies will pay Renee $33,750 for selling 750 food processors. If Renee expects to sell fewer than 750 food processors in one year, then she should accept the offer from Puree Processors. If Renee expects to sell more than 750 food processors in one year, then she should accept the offer from Pro Process Processors.

5. $\begin{cases} y = 0.01x + 22{,}000 \\ y = 0.025x + 13{,}000 \end{cases}$

The solution is (600,000, 28,000). Both dealerships will pay Serena $28,000 for $600,000 in car sales. If Serena expects to have fewer than $600,000 in car sales in one year, then she should accept the offer from Classic Cars. If Serena expects to have more than $600,000 in car sales in one year, then she should accept the offer from Sweet Rides.

Chapter 7

LESSON 7.1

1. $x + y \geq 500$

3. $y > 6x + 20$

5. $7x + 3y > 28$

7. The line will be solid because the symbol is $\leq$.

9. The line will be dashed because the symbol is $<$.

11. The line will be solid because the symbol is $\geq$.

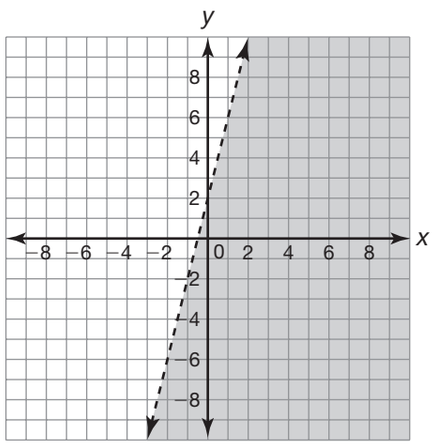
13. The line will be solid because the symbol is $\geq$.

15. The half-plane that includes (0, 0) should be shaded because the inequality is true for that point.

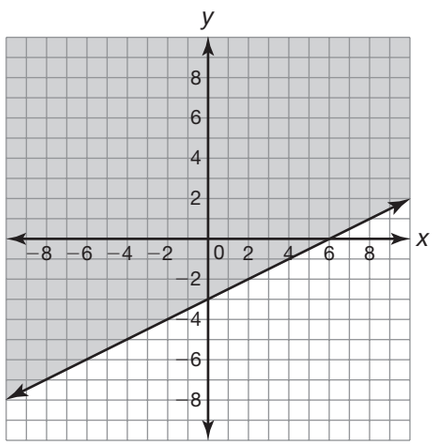
17. The half-plane that does not include (0, 0) should be shaded because the inequality is false for that point.

19. The half-plane that does not include (0, 0) should be shaded because the inequality is false for that point.

21.

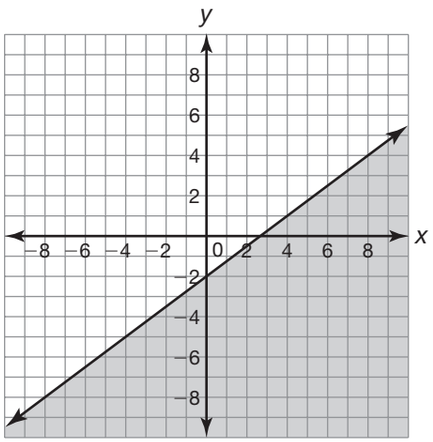


23.

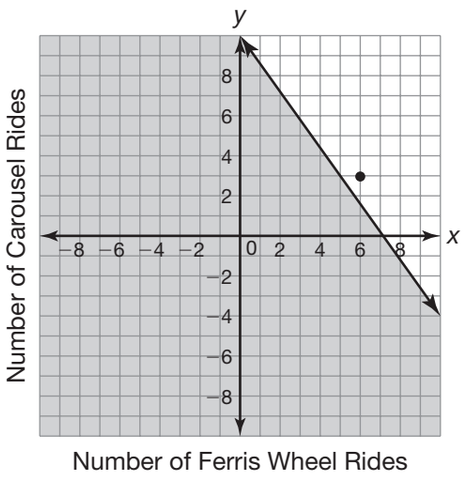


Answers

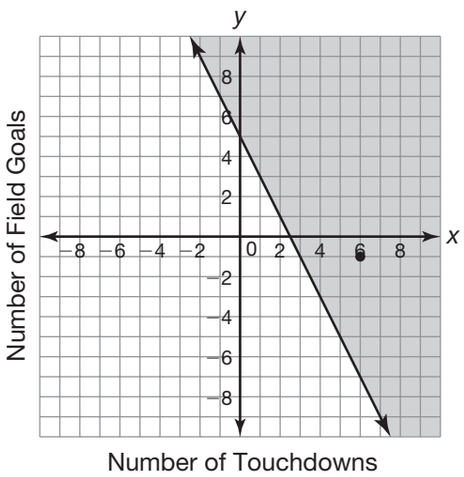
25.



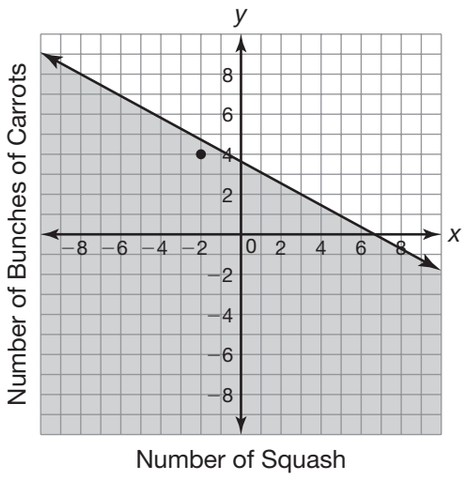
27. No. The ordered pair (6, 3) is not a solution to the inequality. It is not in the shaded half-plane.



29. No. The ordered pair (6, −1) is not a solution for the problem situation.



31. No. The ordered pair (−2, 4) is not a solution for the problem situation.



LESSON 7.2

1. $\begin{cases} 3x + 2y \geq 24 \\ 200x + 100y \leq 1200 \end{cases}$

3. $\begin{cases} x + y \leq 15 \\ 200x + 100y \leq 3000 \end{cases}$

5. $\begin{cases} 10x + 25y \geq 200 \\ 15x + 45y \leq 480 \end{cases}$

7. The point (−2, −10) is a solution to the system of inequalities.

9. The point (3, 7) is not a solution to the system of inequalities.

11. The point (14, 8) is not a solution to the system of inequalities.

13. Answers will vary. (2, 3) and (6, 0)

15. Answers will vary. (1, 2) and (−2, 2)

17. Answers will vary. (−1, 6) and (1, 10)

LESSON 7.3

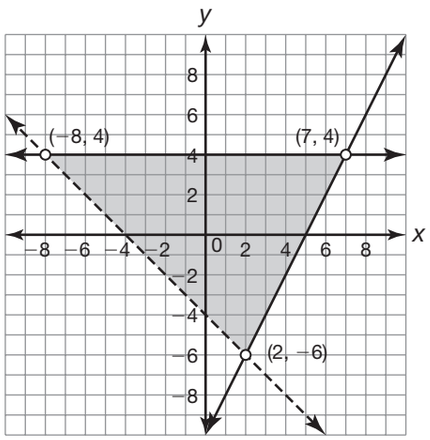
1. $\begin{cases} r \geq 65 \\ r \leq 180 \\ s \leq 0.65r \end{cases}$

3. $\begin{cases} r \geq 55 \\ r \leq 325 \\ c \leq 0.80r \\ c \geq 0.60r \end{cases}$

5. $\begin{cases} t \geq 5 \\ q \geq 5 \\ t + q \leq 20 \end{cases}$

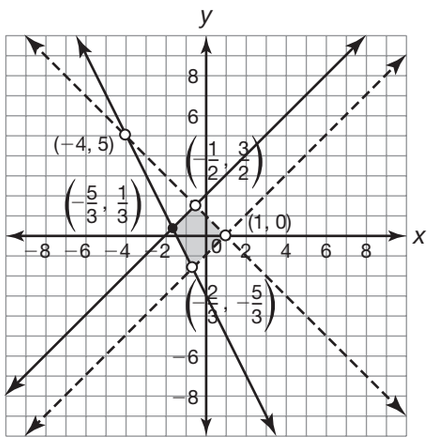
Answers

7.



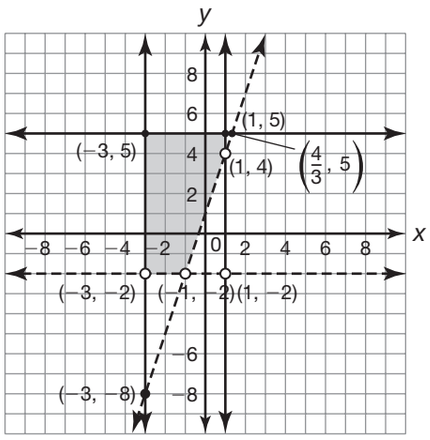
Answers will vary. A solution to the system of inequalities would be (0, 0).

9.



Answers will vary. A solution to the system of inequalities would be (0, 0).

11.



Answers will vary. A solution to the system of inequalities would be (−1, 1).

13. The most Pedro can save is $240 represented by the point (400, 240).

15. The most he will pay is $320.

17. The least he will pay is $160.

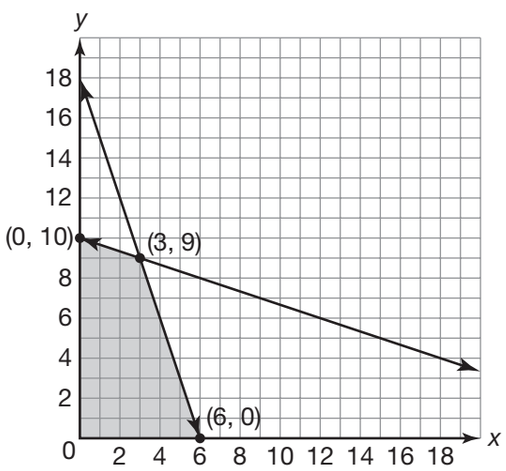
LESSON 7.4

1.
$$\begin{cases} t \geq 0 \\ f \geq 0 \\ t + f \leq 40 \\ t + 2f \leq 72 \end{cases}$$

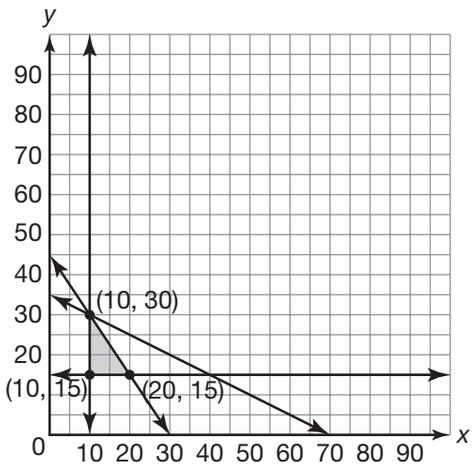
3.
$$\begin{cases} t \geq 0 \\ p \geq 0 \\ t + p \leq 50 \\ 300t + 600p \leq 20{,}000 \end{cases}$$

5.
$$\begin{cases} i \geq 0 \\ a \geq 0 \\ 2i + 3a \leq 168 \\ 65i + 85a \leq 5000 \\ i + a \leq 65 \end{cases}$$

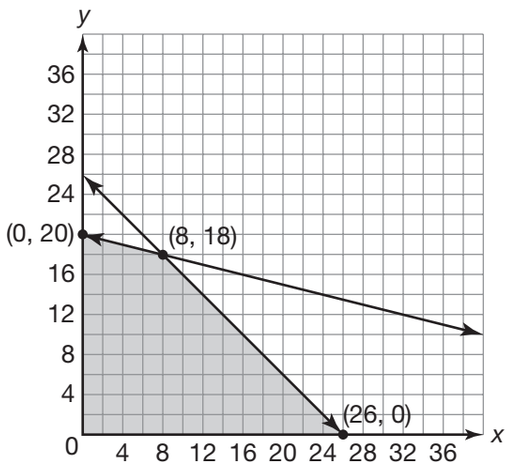
7.



9.



11.



13. The minimum daily cost is $1080. To minimize their daily cost, the company should produce 3 basic models and 8 touch screen models.

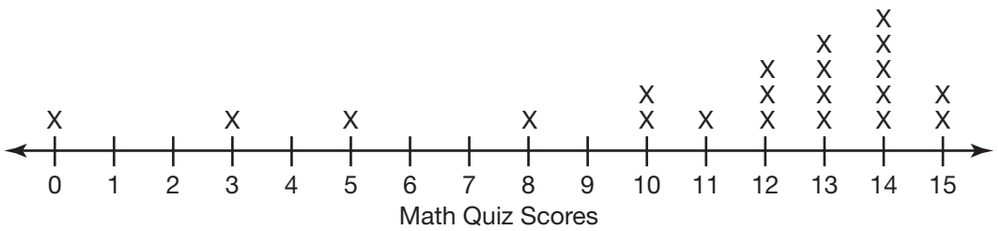
15. The maximum profit is $960. To maximize their profit, the company should produce 12 basic models and 12 touch screen models.

17. The minimum number of work hours utilized is 60 hours per day. To minimize the number of work hours utilized per day, the company should produce 3 basic models and 8 touch screen models.

Chapter 8

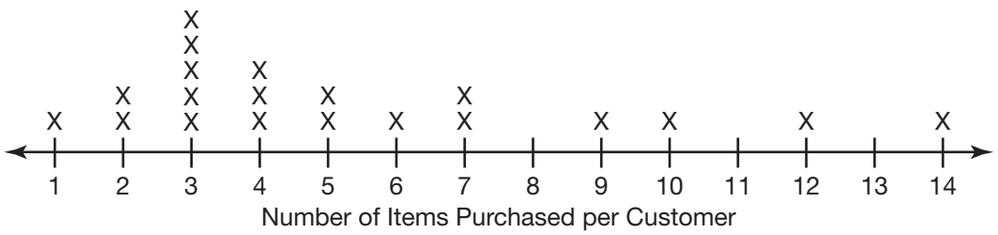
LESSON 8.1

1.



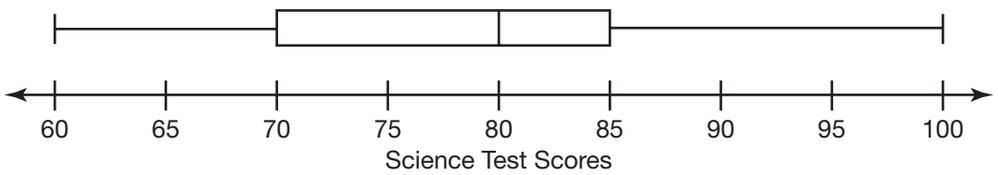
The data are skewed left.

3.



The data are skewed right.

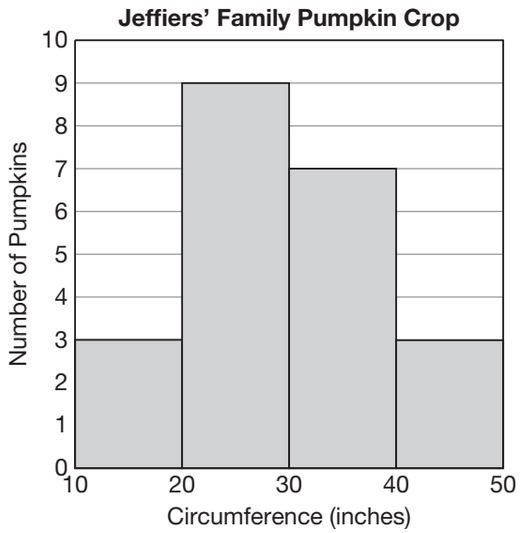
5.



The data are symmetric.

Answers

7.



The data are symmetric.

9. The data are skewed right, because a majority of the data values are on the left of the plot and only a few of the data values are on the right of the plot. This means that a majority of the players on the softball team hit a small number of home runs, while only a few players on the team hit a large number of home runs.

11. Five players hit more than 2 home runs.

13. Six players hit more than 1 and fewer than 9 home runs.

15. The middle 50 percent of the surveyed adults are at least 65 inches and at most 72 inches tall.

17. Fifty percent of the surveyed adults are 68 inches tall or shorter.

19. One hundred percent of the surveyed adults are at least 58 inches tall. Therefore, all 40 of the surveyed adults are at least 58 inches tall.

21. There are a total of 31 students represented by the histogram.

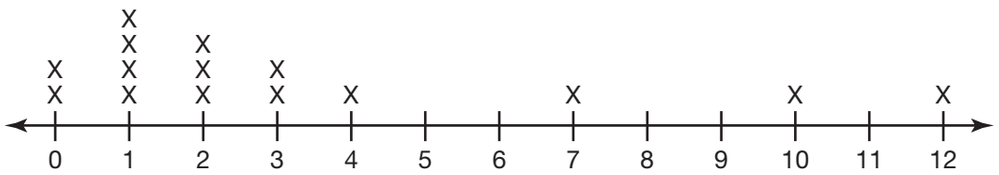
23. It is not possible to determine the number of students who scored exactly 25.

25. Twenty-six students had an ACT composite score less than 30.

Answers

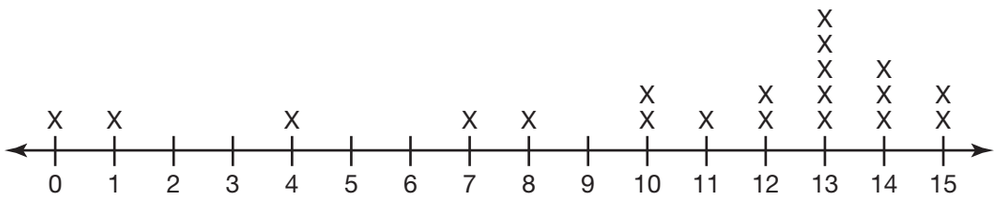
LESSON 8.2

1.



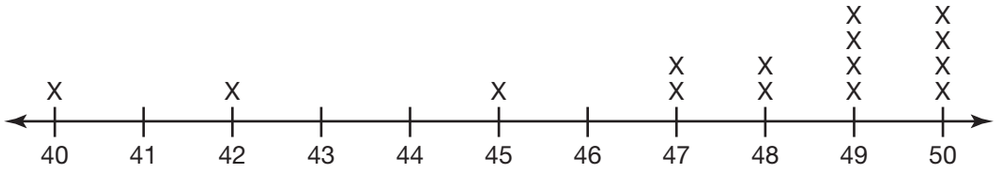
The mean is approximately 3.27 and the median is 2. The median is the best measure of center because the data are skewed right.

3.



The mean is 10.6 and the median is 12.5. The median is the best measure of center because the data are skewed left.

5.



The mean is approximately 47.53 and the median is 49. The median is the best measure of center because the data are skewed left.

7. The mean is the best measure of center to describe the data because the data are symmetric. The mean and median cannot be determined because the data values are not given.

9. The median is the best measure of center to describe the data because the data are skewed right. The median number of movies watched last month is 6. The mean cannot be determined because the data values are not given.

11. The median is the best measure of center to describe the data because the data are skewed right. The mean number of fish caught is approximately 3.14 and the median number of fish caught is 2.

LESSON 8.3

1. IQR = Q3 − Q1
= 14 − 5
= 9

The value 30 is an outlier because it is greater than the upper fence.

3. IQR = Q3 − Q1
= 40 − 28
= 12

The value 9 is an outlier because it is less than the lower fence. The value 59 is an outlier because it is greater than the upper fence.

5. IQR = Q3 − Q1
= 25 − 18.5
= 6.5

The value 8 is an outlier because it is less than the lower fence.

7. IQR = Q3 − Q1
= 10 − 7
= 3

There is at least 1 outlier less than the lower fence because the minimum value of the data set is 1.

9. IQR = Q3 − Q1
= 60 − 45
= 15

There is at least 1 outlier less than the lower fence because the minimum value of the data set is 15. There is at least 1 outlier greater than the upper fence because the maximum value of the data set is 90.

11. IQR = Q3 − Q1
= 550 − 350
= 200

There is at least 1 outlier less than the lower fence because the minimum value of the data set is 0.

LESSON 8.4

1. The mean is 5. The standard deviation is approximately 3.16.

3. The mean is 13. The standard deviation is approximately 7.56.

5. The mean is 4. The standard deviation is approximately 1.15.

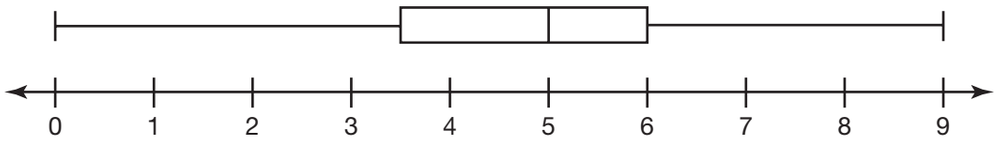
7. The mean is approximately 6.56. The standard deviation is approximately 3.34.

9. The mean is approximately 104.45. The standard deviation is approximately 1.44.

11. The mean is 7.9. The standard deviation is approximately 3.42.

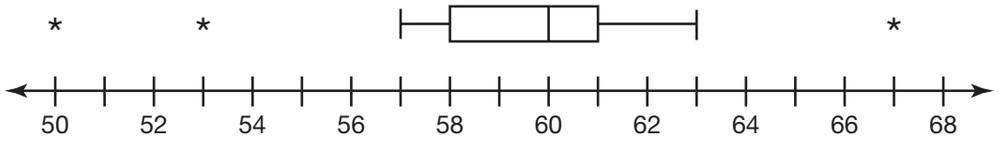
LESSON 8.5

1.



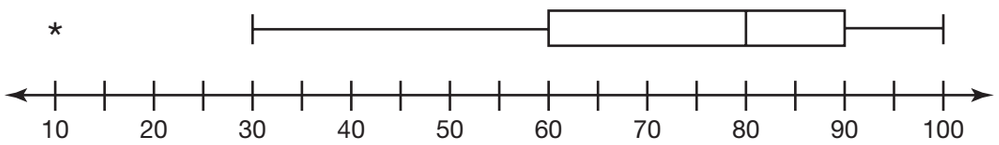
The most appropriate measure of center is the mean, and the most appropriate measure of spread is the standard deviation because the data are symmetric. The mean is 4.75 and the standard deviation is approximately 2.35.

3.



The most appropriate measure of center is the mean, and the most appropriate measure of spread is the standard deviation because the data are symmetric. The mean is 59.2 and the standard deviation is approximately 3.85.

5.



The most appropriate measure of center is the median, and the most appropriate measure of spread is the IQR because the data are skewed left. The median is 80 and the IQR is 30.

7. For each data set, the most appropriate measure of center is the median and the most appropriate measure of spread is the IQR, because the data are skewed right. For Data Set 1, the median is 11 and the IQR is 14. For Data Set 2, the median is 11 and the IQR is 15.

9. For Data Set 1, the most appropriate measure of center is the mean, and the most appropriate measure of spread is the standard deviation because the data are symmetric. For Data Set 1, the mean is 69.9 and the standard deviation is approximately 8.40. For Data Set 2, the most appropriate measure of center is the median, and the most appropriate measure of spread is the IQR because the data are skewed left. For Data Set 2, the median is 74 and the IQR is 16.5.

11. For Data Set 1, the most appropriate measure of center is the median, and the most appropriate measure of spread is the IQR because the data are skewed right. For Data Set 1, the median is 42 and the IQR is 11. For Data Set 2, the most appropriate measure of center is the mean, and the most appropriate measure of spread is the standard deviation because the data are symmetric. For Data Set 2, the mean is 49.5 and the standard deviation is approximately 7.98.

Chapter 9

LESSON 9.1

1. The least squares regression line for the points is $y = 1.13x - 1.02$.

3. The least squares regression line for the points is $y = -0.83x + 0.61$.

5. The least squares regression line for the points is $y = 1.00x + 1.25$.

7. The total number of T-shirts sold in 2008 should be about 143. The actual number of T-shirts sold was 175, so the predicted value is fairly close to the actual value.

9. The total number of T-shirts sold in 2012 should be about 371. The actual number of T-shirts sold was 375, so the predicted value is very close to the actual value.

11. The total number of T-shirts sold in 2020 should be about 829. The prediction is reasonable.

LESSON 9.2

1. These data have a positive correlation. Because of this the *r-value* must be positive. Also, the data are fairly close to forming a straight line, so $r = 0.8$ (A) would be the most accurate.

3. These data have no correlation. Because there is not a linear relationship in the data, the *r*-value will be close to 0, so $r = 0.01$ (A) would be the most accurate.

5. These data have a positive correlation. Because of this the *r*-value must be positive. Also, the data are fairly close to forming a straight line, so $r = 0.7$ (D) would be the most accurate.

7. The correlation coefficient of this data set is 0.8846.

9. The correlation coefficient of this data set is 0.9226.

11. The correlation coefficient of this data set is -0.4193.

13. $y = 34{,}571.4286x + 50{,}238.0952$

$r = 0.9571$

Because the *r*-value is close to 1, the linear regression equation is appropriate for the data set.

15. $y = -0.6286x + 20.2381$

$r = -0.0915$

Because the *r*-value is close to 0, the linear regression equation is not appropriate for the data set.

17. $y = -311.1429x + 9304.5238$

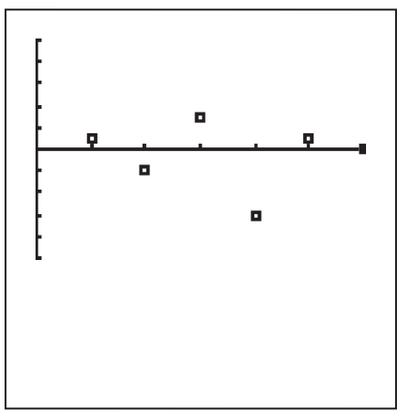
$r = -0.0857$

Because the *r*-value is close to 0, the linear regression equation is not appropriate for the data set.

LESSON 9.3

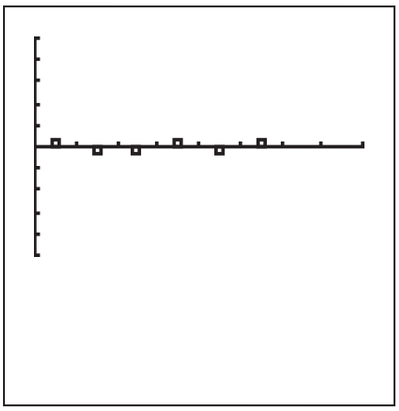
1.

x	*y*	Predicted Value	Residual Value
5	3	2.5	0.5
10	4	5	−1
15	9	7.5	1.5
20	7	10	−3
25	13	12.5	0.5
30	15	15	0



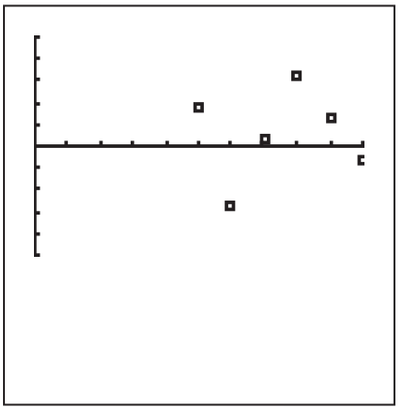
3.

x	*y*	Predicted Value	Residual Value
1	1.5	0.9	0.6
3	6.5	6.9	−0.4
5	12.5	12.9	−0.4
7	19.5	18.9	0.6
9	24.5	24.9	−0.4
11	31.5	30.9	0.6



5.

x	*y*	Predicted Value	Residual Value
100	505	506.4	−1.4
90	460	457.4	2.6
80	415	408.4	6.6
70	360	359.4	0.6
60	305	310.4	−5.4
50	265	261.4	3.6



7. Based on the shape of the scatter plot and the correlation coefficient, a linear model appears to be appropriate for the data. Based on the residual plot, a linear model appears to be appropriate for the data.

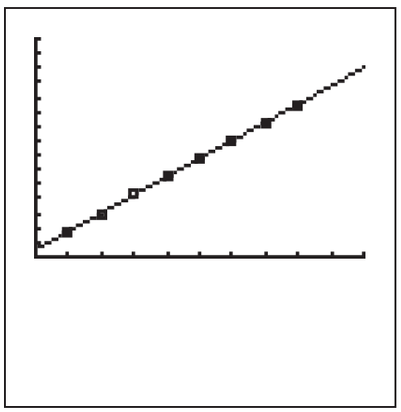
9. Based on the shape of the scatter plot and the correlation coefficient, a linear model appears to be appropriate for the data. Based on the residual plot, there may be a more appropriate model than linear for the data.

11. Based on the shape of the scatter plot and the correlation coefficient, a linear model appears to be appropriate for the data. Based on the residual plot, a linear model appears to be appropriate for the data.

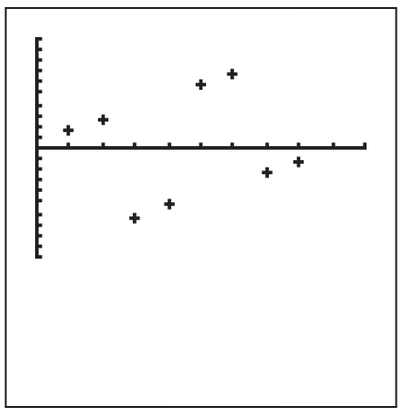
LESSON 9.4

1. Linear regression equation: $y = 24.98x + 100.86$, $r = 1.0000$

Scatter Plot & Line of Best Fit



Residual Plot

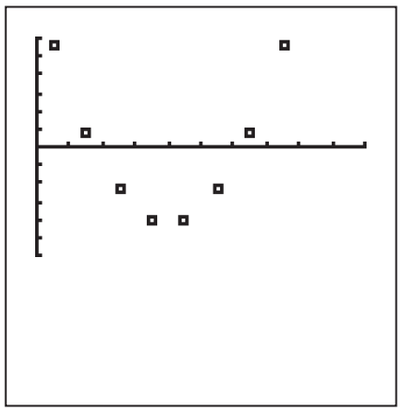


Based on the shape of the scatter plot and the correlation coefficient, a linear model appears to be appropriate for the data. Based on the residual plot, a linear model appears to be appropriate for the data.

3. Linear regression equation: $y = 16x - 42$, $r = 0.9701$

Scatter Plot & Line of Best Fit

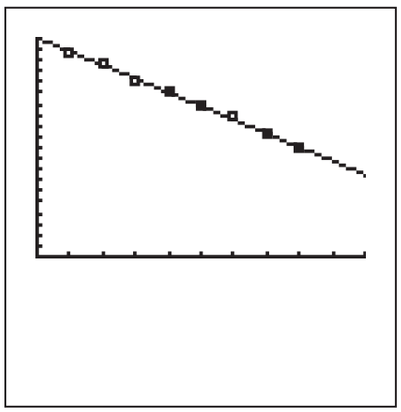
Residual Plot



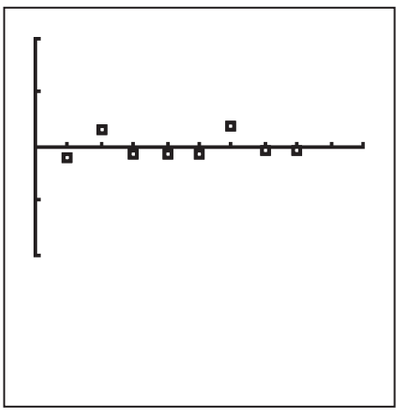
Based on the shape of the scatter plot and the correlation coefficient, a linear model may possibly be appropriate for the data. Based on the residual plot, there may be a more appropriate model than linear for the data.

5. Linear regression equation: $y = -2.51x + 40.18$, $r = -0.9993$

Scatter Plot & Line of Best Fit



Residual Plot



Based on the shape of the scatter plot and the correlation coefficient, a linear model appears to be appropriate for the data. Based on the residual plot, a linear model appears to be appropriate for the data.

Answers

LESSON 9.5

1. The correlation does not imply causation. There may be a correlation between ice cream sales and soup sales. For instance, ice cream sales may increase as soup sales decrease because ice cream sales typically increase in warmer weather and soup sales typically decrease in warmer weather. However, this trend does not mean that an increase in ice cream sales causes the soup sales to decrease.

3. The correlation does not imply causation. There may be a correlation between the amount of money spent on an education and a person's salary. For instance, someone who pays for 10 years of higher education to become a medical doctor may have a higher salary than someone who did not finish high school and is working at minimum wage. However, paying for more education does not cause one's salary to be higher. Other factors, such as available job positions, choice of career, and personal abilities impact the amount of annual salary a person receives.

5. The correlation does not imply causation. There may be a correlation between the number of hours a student plays video games per day and the grades a student receives at school. However, playing video games does not cause bad grades. There may be other factors such as poor study habits or a lack of attention that result in a student receiving bad grades.

7. a. Yes. It is very difficult for a student to perform well in school without a healthy breakfast.

b. No. Not every student who eats breakfast every morning performs well at school.

9. a. No. It may be possible for there to be a large number of fatalities at a disaster site where there are not many paramedics.

b. No. Not every disaster site that has a large number of paramedics in attendance also has a large number of fatalities.

11. a. No. It may be possible for a person to lose weight without reducing their caloric intake.

b. Yes. Reducing caloric intake results in weight loss.

Chapter 10

LESSON 10.1

1. Two-way frequency table:

Favorite Color of Students

Class	Red	Blue	Purple	Green
Class A	////	///	/	/
Class B	/	////	///	///

Frequency marginal distribution:

Favorite Color of Students

Class	Red	Blue	Purple	Green	Total
Class A	4	3	1	1	9
Class B	1	4	3	3	11
Total	5	7	4	4	20

3. Two-way frequency table:

Favorite Fruit of Students

Class	Apple	Banana	Grapes	Orange
5th Grade	////	////	//	/
6th Grade	///	//	/	///

Frequency marginal distribution:

Favorite Fruit of Students

Class	Apple	Banana	Grapes	Orange	Total
5th Grade	4	4	2	1	11
6th Grade	3	2	1	3	9
Total	7	6	3	4	20

Answers

5. Two-way frequency table:

Favorite Sports Girls Play

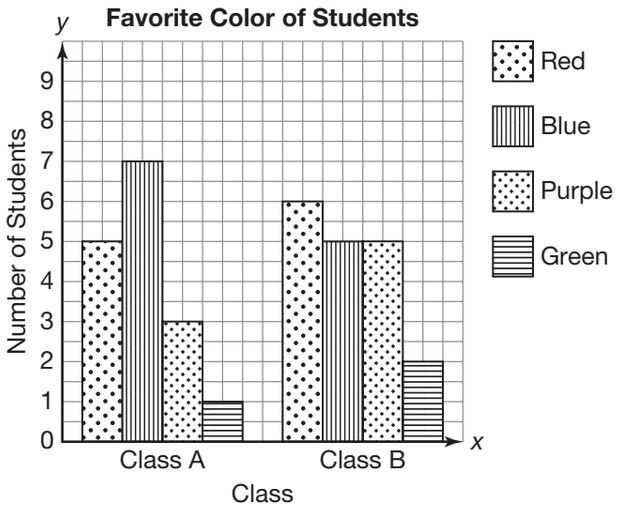
Class	Soccer	Softball	Swimming	Basketball
Class A	/	///	/	///
Class B	///	/	//	
Class C	/	/	/	///

Frequency marginal distribution:

Favorite Sports Girls Play

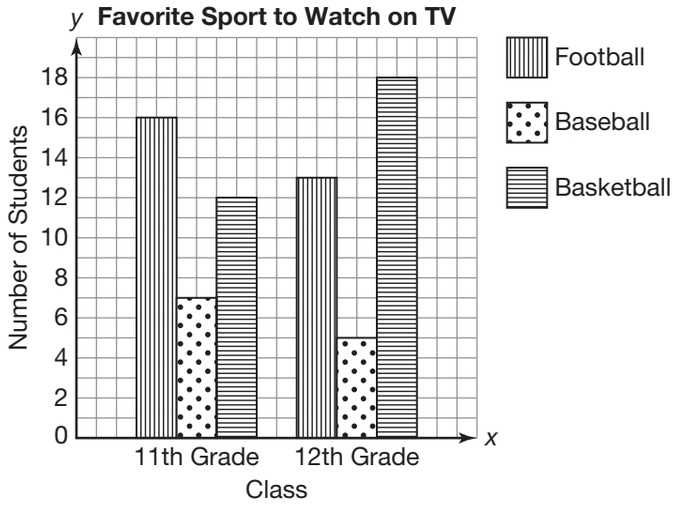
Class	Soccer	Softball	Swimming	Basketball	Total
Class A	1	3	1	3	8
Class B	3	1	2	0	6
Class C	1	1	1	3	6
Total	5	5	4	6	20

7.

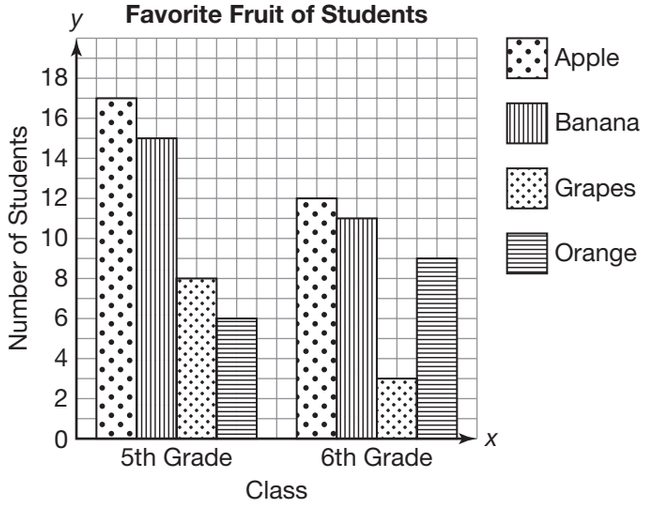


Answers

9.



11.



LESSON 10.2

1.

Favorite Music of Students

Class	Pop	Rap	Country	Rock	Total
Class A	$\frac{15}{76} \approx 0.197$	$\frac{10}{76} \approx 0.132$	$\frac{4}{76} \approx 0.053$	$\frac{7}{76} \approx 0.092$	$\frac{36}{76} \approx 0.474$
Class B	$\frac{12}{76} \approx 0.158$	$\frac{17}{76} \approx 0.224$	$\frac{6}{76} \approx 0.079$	$\frac{5}{76} \approx 0.066$	$\frac{40}{76} \approx 0.526$
Total	$\frac{27}{76} \approx 0.355$	$\frac{27}{76} \approx 0.355$	$\frac{10}{76} \approx 0.132$	$\frac{12}{76} \approx 0.158$	$\frac{76}{76} = 1$

3.

Favorite Books of Students

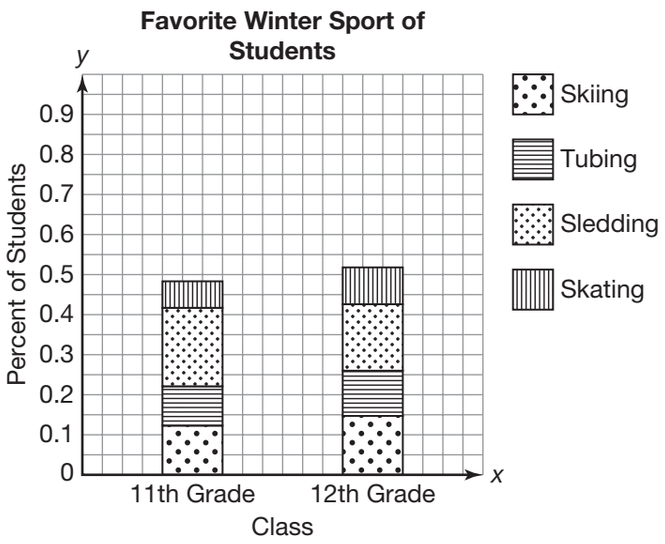
Class	Comedy	Drama	Horror	Total
Class A	$\frac{20}{64} \approx 0.313$	$\frac{8}{64} \approx 0.125$	$\frac{3}{64} \approx 0.047$	$\frac{31}{64} \approx 0.484$
Class B	$\frac{18}{64} \approx 0.281$	$\frac{6}{64} \approx 0.094$	$\frac{9}{64} \approx 0.141$	$\frac{33}{64} \approx 0.516$
Total	$\frac{38}{64} \approx 0.594$	$\frac{14}{64} \approx 0.219$	$\frac{12}{64} \approx 0.188$	$\frac{64}{64} = 1$

5.

Favorite Vegetable of Students

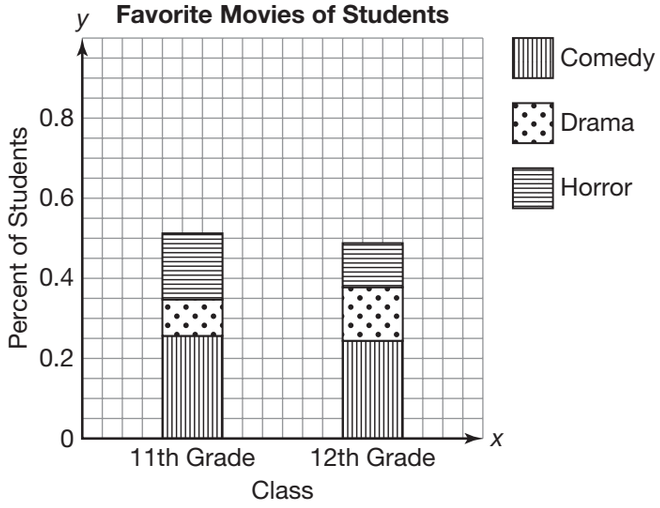
Class	Green Beans	Broccoli	Carrots	Corn	Total
Class A	$\frac{9}{67} \approx 0.134$	$\frac{4}{67} \approx 0.060$	$\frac{12}{67} \approx 0.179$	$\frac{8}{67} \approx 0.119$	$\frac{33}{67} \approx 0.493$
Class B	$\frac{10}{67} \approx 0.149$	$\frac{7}{67} \approx 0.104$	$\frac{6}{67} \approx 0.090$	$\frac{11}{67} \approx 0.164$	$\frac{34}{67} \approx 0.507$
Total	$\frac{19}{67} \approx 0.284$	$\frac{11}{67} \approx 0.164$	$\frac{18}{67} \approx 0.269$	$\frac{19}{67} \approx 0.284$	$\frac{67}{67} = 1$

7.

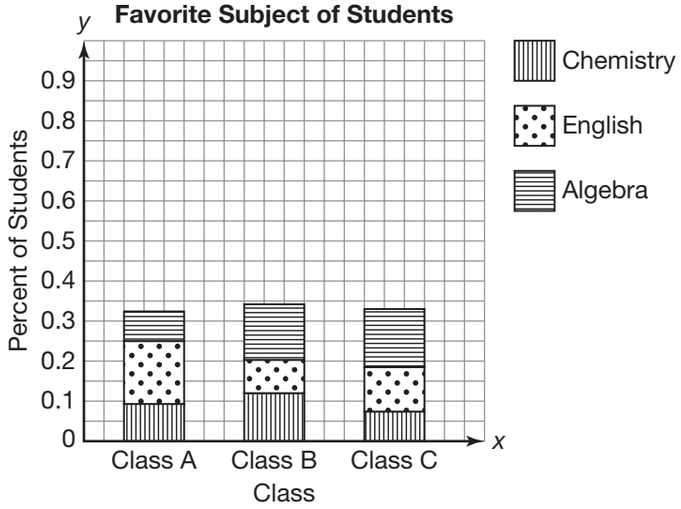


Answers

9.



11.



LESSON 10.3

1.

Grades of Students

Class	A	B	C	D	F	Total
Algebra	$\frac{6}{20} = 30\%$	$\frac{4}{20} = 20\%$	$\frac{8}{20} = 40\%$	$\frac{1}{20} = 5\%$	$\frac{1}{20} = 5\%$	$\frac{20}{20} = 100\%$
Geometry	$\frac{6}{30} = 20\%$	$\frac{11}{30} \approx 36.7\%$	$\frac{9}{30} = 30\%$	$\frac{2}{30} \approx 6.7\%$	$\frac{2}{30} \approx 6.7\%$	$\frac{30}{30} = 100\%$
Trigonometry	$\frac{3}{30} = 10\%$	$\frac{7}{30} \approx 23.3\%$	$\frac{12}{30} \approx 40\%$	$\frac{5}{30} \approx 16.7\%$	$\frac{3}{30} = 10\%$	$\frac{30}{30} = 100\%$

3.

Student's Choice of Shakespeare Play to Study

Class	Hamlet	Macbeth	King Lear	Othello
Class A	$\frac{9}{23} \approx 39.1\%$	$\frac{10}{18} \approx 55.6\%$	$\frac{13}{20} = 65\%$	$\frac{5}{13} \approx 38.5\%$
Class B	$\frac{14}{23} \approx 60.9\%$	$\frac{8}{18} \approx 44.4\%$	$\frac{7}{20} = 35\%$	$\frac{8}{13} \approx 61.5\%$
Total	$\frac{23}{23} = 100\%$	$\frac{18}{18} = 100\%$	$\frac{20}{20} = 100\%$	$\frac{13}{13} = 100\%$

5.

Favorite Lunch Item of Students

Class	Pizza	Salad	Chicken	Burger	Total
Class A	$\frac{12}{33} \approx 36.4\%$	$\frac{3}{33} \approx 9.1\%$	$\frac{10}{33} \approx 30.3\%$	$\frac{8}{33} \approx 24.2\%$	$\frac{33}{33} = 100\%$
Class B	$\frac{9}{35} \approx 25.7\%$	$\frac{8}{35} \approx 22.9\%$	$\frac{13}{35} \approx 37.1\%$	$\frac{5}{35} \approx 14.3\%$	$\frac{35}{35} = 100\%$
Class C	$\frac{7}{35} = 20\%$	$\frac{9}{35} \approx 25.7\%$	$\frac{7}{35} = 20\%$	$\frac{12}{35} \approx 34.3\%$	$\frac{35}{35} = 100\%$

7. Of the female students, 25.9% participate in track & field.

9. Among female students, swimming is the most popular sport with 36.5% of female students participating.

11. Among female students, soccer is the least popular sport with 16.5% of female students participating.

LESSON 10.4

1. Frequency marginal distribution table:

Favorite Senior Picnic Location of Students

Class	Beach	Amusement Park	Water Park	Total
Class A	𝍸 //// 9	/// 2	// 2	13
Class B	//// 4	// 2	𝍸 𝍸 10	16
Class C	/// 3	𝍸 // 7	/// 3	13
Total	16	11	15	42

The beach is the most popular location among all three classes.

3. Frequency marginal distribution table:

Favorite Senior Picnic Location of Students

Class	Beach	Amusement Park	Water Park	Total
Class A	////// 9	/// 2	// 2	13
Class B	//// 4	// 2	///// 10	16
Class C	/// 3	///// 7	/// 3	13
Total	16	11	15	42

In Class B, the water park is the most preferred location.

5. Relative frequency conditional distribution:

Favorite Senior Picnic Location of Students

Class	Beach	Amusement Park	Water Park	Total
Class A	$\frac{9}{13} \approx 69.2\%$	$\frac{2}{13} \approx 15.4\%$	$\frac{2}{13} \approx 15.4\%$	$\frac{13}{13} = 100\%$
Class B	$\frac{4}{16} = 25\%$	$\frac{2}{16} = 12.5\%$	$\frac{10}{16} = 62.5\%$	$\frac{16}{16} = 100\%$
Class C	$\frac{3}{13} \approx 23.1\%$	$\frac{7}{13} \approx 53.8\%$	$\frac{3}{13} \approx 23.1\%$	$\frac{13}{13} = 100\%$

At 62.5%, Class B had the highest percentage of students choose the water park as their favorite senior picnic location.

7. Relative frequency conditional distribution:

Favorite Senior Picnic Location of Students

Class	Beach	Amusement Park	Water Park	Total
Class A	$\frac{9}{13} \approx 69.2\%$	$\frac{2}{13} \approx 15.4\%$	$\frac{2}{13} \approx 15.4\%$	$\frac{13}{13} = 100\%$
Class B	$\frac{4}{16} = 25\%$	$\frac{2}{16} = 12.5\%$	$\frac{10}{16} = 62.5\%$	$\frac{16}{16} = 100\%$
Class C	$\frac{3}{13} \approx 23.1\%$	$\frac{7}{13} \approx 53.8\%$	$\frac{3}{13} \approx 23.1\%$	$\frac{13}{13} = 100\%$

Class A, with 69.2%, had the highest percentage of students within their class choose their preferred location, the beach.

9. Relative frequency conditional distribution:

Favorite Senior Picnic Location of Students

Class	Beach	Amusement Park	Water Park
Class A	$\frac{9}{16} \approx 56.3\%$	$\frac{2}{11} \approx 18.2\%$	$\frac{2}{15} \approx 13.3\%$
Class B	$\frac{4}{16} = 25\%$	$\frac{2}{11} \approx 18.2\%$	$\frac{10}{15} \approx 66.7\%$
Class C	$\frac{3}{16} \approx 18.8\%$	$\frac{7}{11} \approx 63.6\%$	$\frac{3}{15} = 20\%$
Total	$\frac{16}{16} = 100\%$	$\frac{11}{11} = 100\%$	$\frac{15}{15} = 100\%$

At 63.6%, Class C had the highest percent of students who supported the least popular overall location, the amusement park.

Answers

Chapter 11

LESSON 11.1

1. The domain is all times from 0 to 7 hours, which means the trip lasted 7 hours. The range is all distances from 0 to 3.5 miles, which means John went a maximum of 3.5 miles away from home. John traveled 1 mile in each of the first 2 hours. He rested for an hour, and then traveled 1.5 miles in the next hour. At this point he started back toward home. He traveled 1.5 miles in the next hour, and 1 mile in each of the following 2 hours, which brought him back home.

3. The domain is all times from 0 to 5 hours, which means the trip lasted 5 hours. The range is all distances from 0 to 4.5 miles, which means Alexandra's house is 4.5 miles from Tonya's house. Tonya traveled 1 mile in the first half hour, then turned around and traveled 1 mile back to her house in the second half hour. Leaving home again, she went 1.5 miles in the next hour, 1.5 miles the following half hour, half a mile the next half hour, and 1 mile the following half hour. She stayed half an hour at Alexandra's house then went back home, traveling 2 miles in the next half hour and 2.5 miles in the final half hour.

5. The domain is all times from 3:25 to 4:20 which means the trip lasts 55 minutes. The range is all distances from 0 to 1.9 miles which means the community center is 1.9 miles away from the school. Kurt jogged 1 mile in 10 minutes, and then stopped for 10 minutes. He then traveled the remaining 0.9 mile in the following 25 minutes.

7. The domain, which is from 0 to 10 hours, represents the time of Alicia's shift. The range, which is from 4 to 8°F, represents the temperature in the freezer.

9. The temperature is 5°F half an hour after the start of Alicia's shift and between 4 and 5 hours after the start of her shift.

11. The absolute maximum value is 8° and it occurs at 6 hours. This means that the freezer was at its warmest temperature 6 hours after Alicia's shift started.

The absolute minimum value is 4° and it occurs at 0 hours. This means that the freezer was at its coldest temperature when Alicia started her shift.

13. The relation is a function because at any time, the shark is exactly one depth. The function is a linear piecewise function.

15. The shark's depth is 2.5 meters one minute after the tracking device is installed.

17. The shark is swimming toward the surface between 5 and 8 minutes after the tracking device is installed.

19. Terrence is 2 miles from the car dealership after 7 minutes.

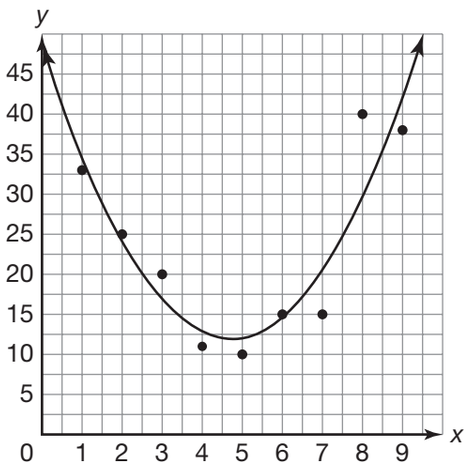
21. The absolute maximum value is 2 miles and it occurs between 6 and 8 minutes. This means that between 6 and 9 minutes, Terrence was farthest from the dealership.

The absolute minimum value is 0 miles and it occurs at 0 minutes and 10 minutes. This means that at 0 minutes and 10 minutes, Terrence was at the dealership.

23. Terrence is driving the fastest between 8 and 10 minutes after the start of his test drive. During this interval, Terrence is driving at a speed of 1 mile per minute.

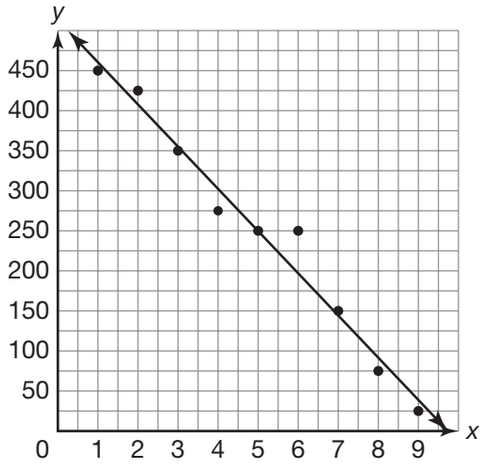
LESSON 11.2

1.



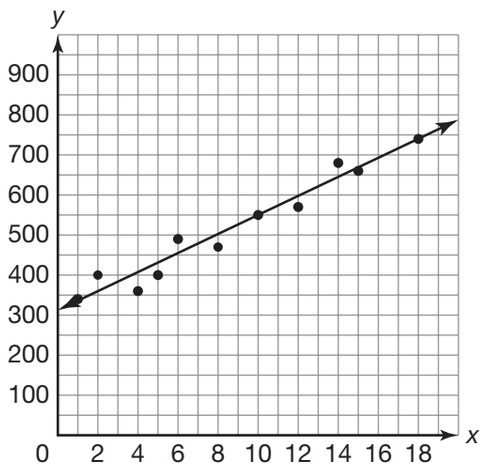
The function belongs to the quadratic function family.

3.



The function belongs to the linear function family.

5.



The function belongs to the linear function family.

7. The domain of the function is all real numbers. The range of the function is all real numbers.

9. My function represents continuous data, because data can exist for any time since 8 AM.

11. The total amount of snow accumulation at 6 PM is predicted to be approximately 3.9 inches.

13. This function has neither an absolute minimum nor an absolute maximum. However, in terms of the problem situation, the number of ants cannot be negative, so the function can never go below the *x*-axis.

Answers

15. The function represents continuous data, because the number of ants is a function of time and time is continuous.

17. According to the function, there will be 100 ants in the farm approximately 46 days after it was started.

19. The quadratic function family best represents the function.

21. The domain of the function is all real numbers. The range of the function is all real numbers less than or equal to approximately 8100. The domain of the problem situation is all real numbers greater than or equal to 0. The range of the problem situation is all real numbers greater than or equal to 0 and less than or equal to approximately 8100.

23. According to the function, the median price per acre of land will be approximately $3000 in the year 2015.

LESSON 11.3

1. $f(x) = 1.88(1.06)^x$

$r \approx 0.98$

3. $f(x) = 6.91(1.07)^x$

$r \approx 0.95$

5. $f(x) = 2101.58(0.25)^x$

$r \approx -0.99$

7. 3.28

9. 1612.46

11. 439.24

13. 31.56

15. 479,377.65

17. $f(x) = 497.63(1.06)^x$

$f(50) = 497.63(1.06)^{50}$

≈ 9166.42

The account's value will be approximately $9166.42 in 2020.

19. $f(x) = 856.83(0.91)^x$

$f(16) = 856.83(0.91)^{16}$

≈ 189.48

There will be approximately 189 sunfish in the lake in his sixteenth year.

21. $f(x) = 14.75(2.74)^x$

$f(7) = 14.75(2.74)^7$

$\approx 17{,}101.96$

There will be approximately 17,102 bacteria cells in the colony after 7 hours.

LESSON 11.4

1. $y = -0.5x^2 - 33.6x + 749.9$

x represents the time in months the television has been for sale

y represents the price in dollars of the television

3. $y = (885.8)(1.1)^x$

x represents the time in months

y represents the population of a town

5. $y = 0.06x^2 - 7x + 412.5$

x represents the vehicle's mileage in thousands of miles

y represents the cost for repairs in dollars

7. The exponential regression equation fits the data better than the quadratic regression equation. The exponential regression equation is closer to more points in the data set.

9. The quadratic regression equation fits the data better than the exponential regression equation. The quadratic regression equation is closer to more points in the data set.

11. The quadratic regression equation fits the data better than the exponential regression equation. The quadratic regression equation is closer to more points in the data set.

13. The height of the ball is 261 feet after 2 seconds.

15. The temperature reaches 152 degrees Fahrenheit about 27.7 minutes after the pot is removed from the stove.

17. The polar bear population is about 234 after 20 years.

19. The domain is all real numbers greater than or equal to 0, because the car did not have a value prior to the year of its manufacture. The range is all real numbers greater than or equal to approximately $1000, because the function's value starts at approximately $3685, and then drops to approximately $1000 before rising from that point onward.

21. The function has no x-intercepts, because it does not cross the x-axis. The function has a y-intercept of \$3685.45, which represents the estimated value of the car in the year 1970 according to the function.

23. The intersection point is at about (40, 19,000) so the value of the car will be about \$19,000 in 2010.

25. The function does not have a maximum value. Even though the given exponential function has no minimum value, the function as it relates to the problem has a minimum value of approximately 5 in the year 2005.

27. The function increases over the entire domain from the year 2005 to infinity.

29. The intersection point is at about (7, 200) so about 200 wild Burmese pythons will be captured in 2012.

Chapter 12

LESSON 12.1

1. $d = 5$

3. $d \approx 12.1$

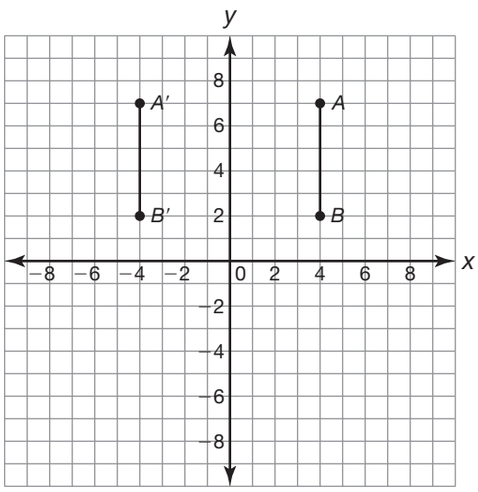
5. $d = 10$

7. $d \approx 7.1$

9. $d \approx 9.2$

11. $d \approx 12.8$

13.



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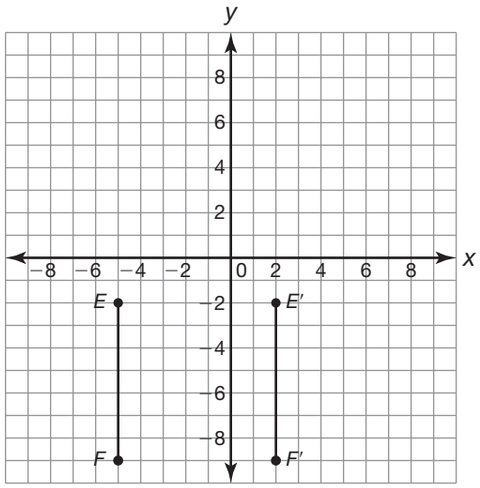
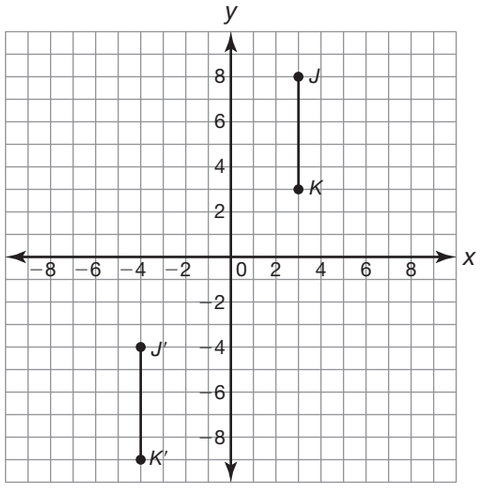
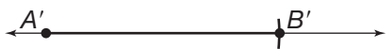


17.



19.



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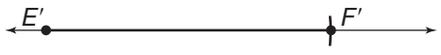
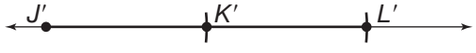


23.



Answers

LESSON 12.2

1. (6, 3)

3. (−2, 4)

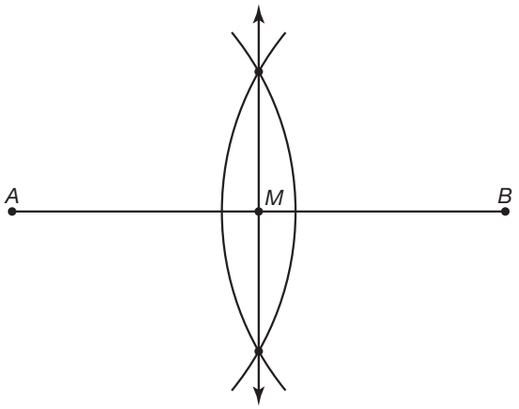
5. (−5, 1.5)

7. (5, 5)

9. (−1, 6)

11. (−4, −5.5)

13.



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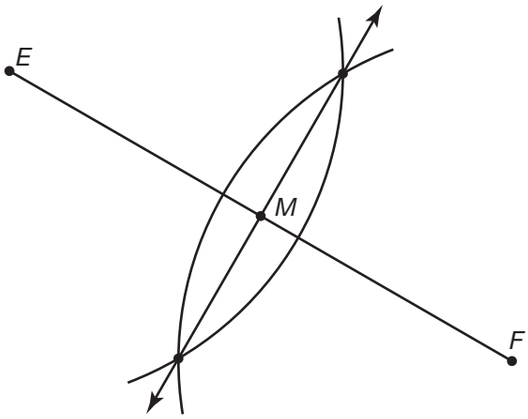

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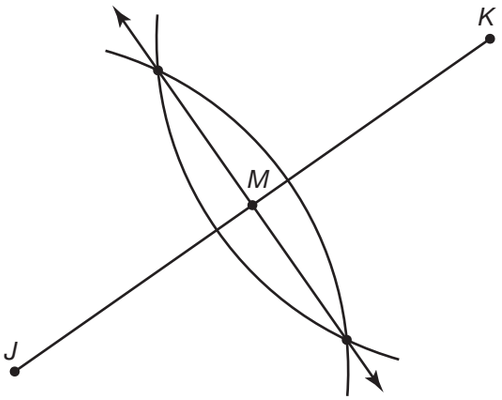
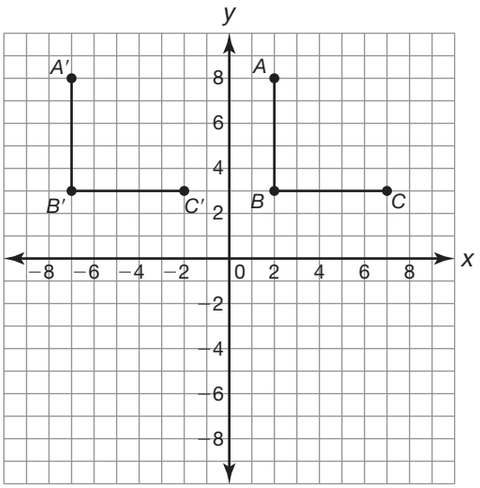


LESSON 12.3

1.



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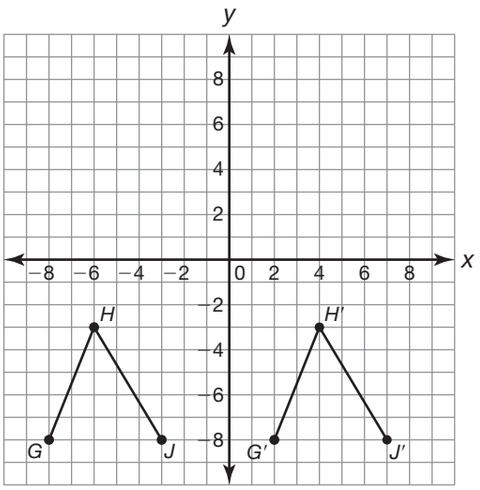

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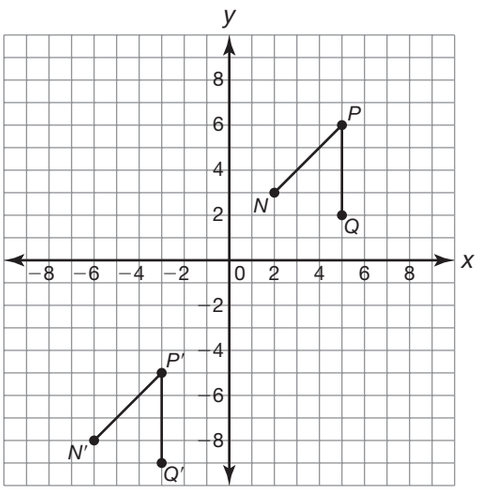
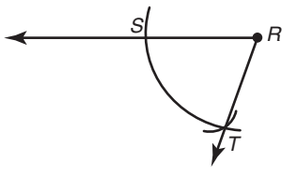


Answers

7.



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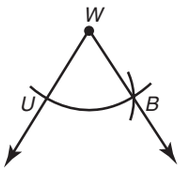

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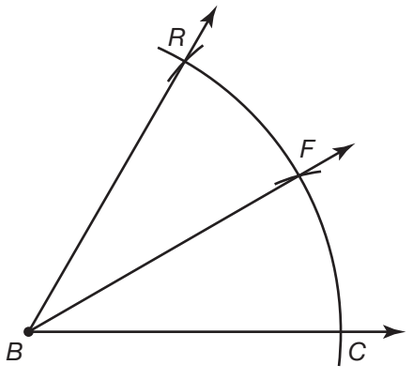

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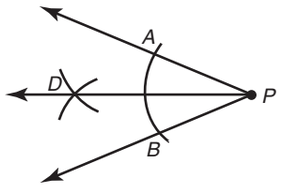

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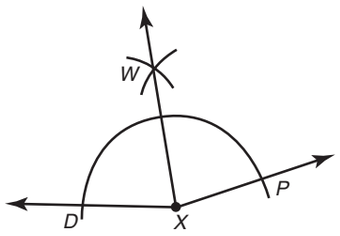

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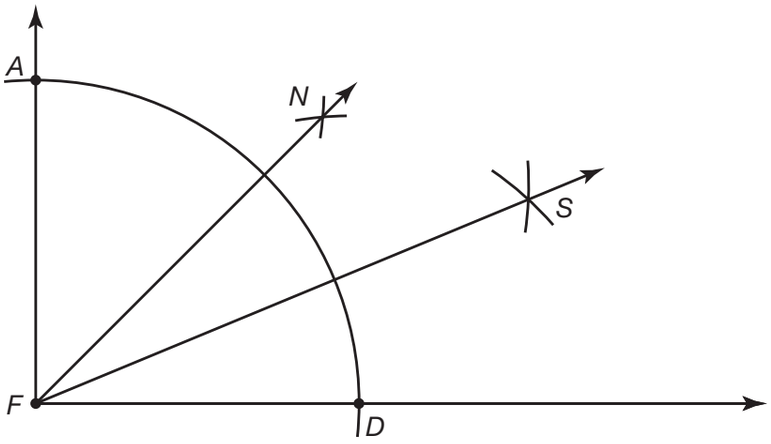


$\angle NFS$ and $\angle SFD$ are each one-fourth the measure of $\angle F$.

Answers

LESSON 12.4

1. Parallel. The slope of line n is -2, which is equal to the slope of line m, so the lines are parallel.

3. Perpendicular. The slope of line r is -5 and the slope of line s is $\frac{1}{5}$. The product of the slopes is $-5 \times \frac{1}{5} = -1$, so the slopes are negative reciprocals and the lines are perpendicular.

5. Neither. The equation for line p can be rewritten as $y = x + 4$, and the equation for line q can be rewritten as $y = -2x + 8$. The slope of line p is 1 and the slope of line q is -2. The slopes of the lines are not equal, so the lines are not parallel. The product of the slopes is $1 \times (-2) = -2 \neq -1$, so the lines are not perpendicular.

7. The lines are perpendicular. The slope of line p is $\frac{3}{2}$ and the slope of line q is $-\frac{2}{3}$. Because $\frac{3}{2}\left(-\frac{2}{3}\right) = -1$, the lines are perpendicular.

9. The lines are neither parallel or perpendicular. The slope of line t is $\frac{3}{2}$ and the slope of line u is 2. The slopes are not equal, so the lines are not parallel. The slopes are not negative reciprocals, so the lines are not perpendicular.

11. The lines are neither parallel or perpendicular. The slope of line s is $-\frac{4}{3}$ and the slope of line t is $-\frac{9}{7}$. The slopes are not equal, so the lines are not parallel. The slopes are not negative reciprocals, so the lines are not perpendicular.

13. $(y - 2) = \frac{4}{5}(x - 1)$

$y = \frac{4}{5}x + \frac{6}{5}$

15. $(y + 2) = 7(x - 5)$

$y = 7x - 37$

17. $(y - 8) = \frac{1}{3}(x - 9)$

$y = \frac{1}{3}x + 5$

19. $(y - 4) = -\frac{1}{2}(x - 5)$

$y = -\frac{1}{2}x + \frac{13}{2}$

21. $(y + 8) = \frac{5}{2}(x - 2)$

$y = \frac{5}{2}x - 13$

23. $(y + 3) = -\frac{1}{6}(x - 6)$

$y = -\frac{1}{6}x - 2$

25. $x = -2$

27. $x = 9$

29. $x = -5$

31. $y = 7$

33. $y = -3$

35. $y = 8$

37. $y = -\frac{1}{2}x + 4$.

The distance from the point (0, 4) to the line $f(x) = 2x - 3$ is approximately 3.13 units.

39. $y = -\frac{3}{2}x + 2$.

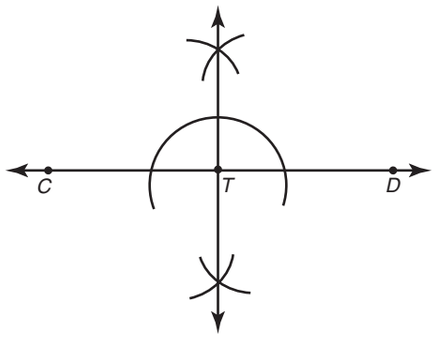
The distance from the point $(-2, 5)$ to the line $f(x) = \frac{2}{3}x - \frac{1}{6}$ is approximately 5.41 units.

41. $y = -3x + 8$.

The distance from the point $(3, -1)$ to the line $f(x) = \frac{1}{3}x - 6$ is approximately 3.79 units.

LESSON 12.5

1.



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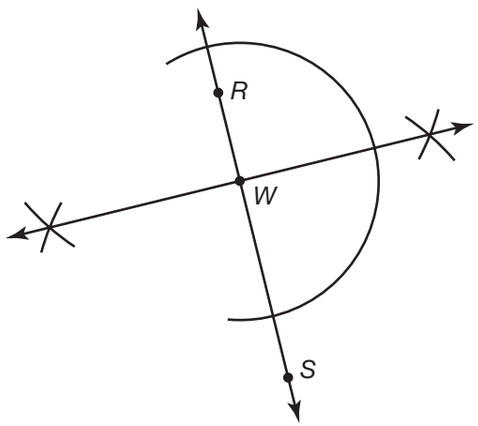
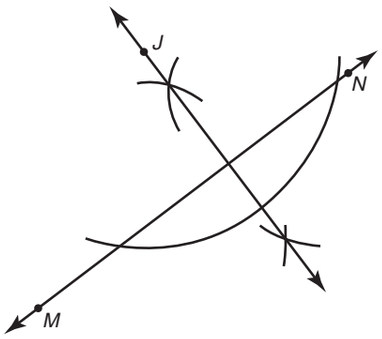


Answers

5.



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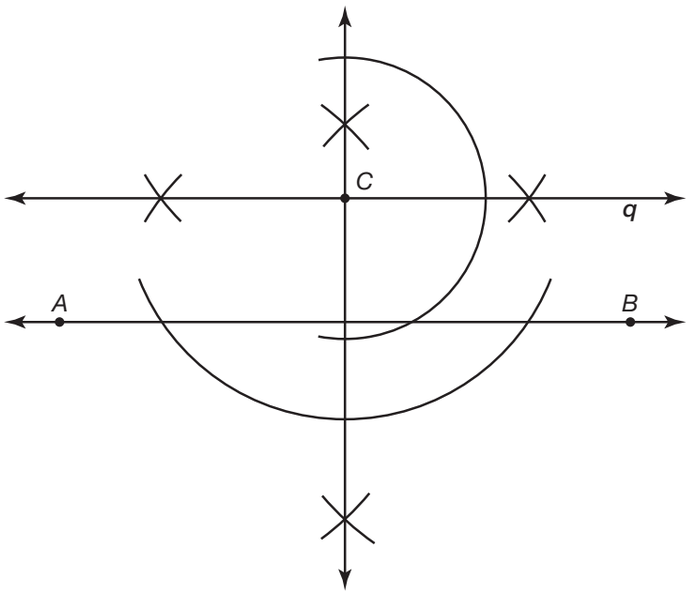

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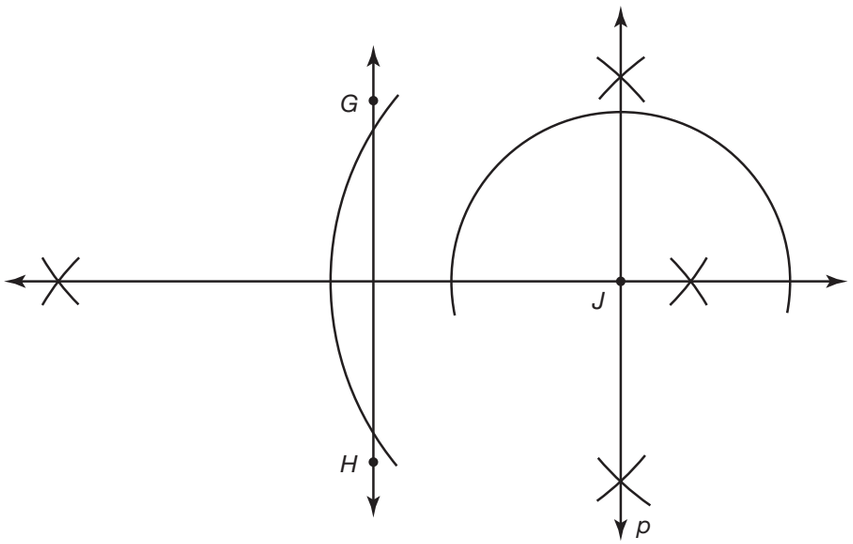
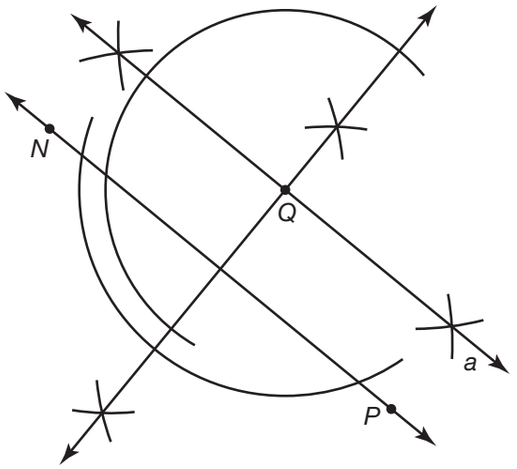


Answers

11.



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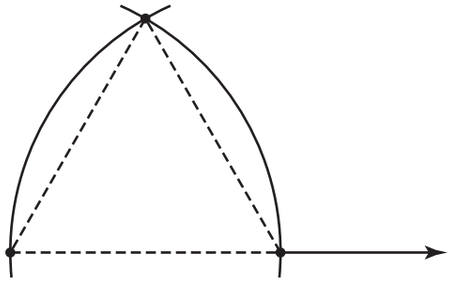

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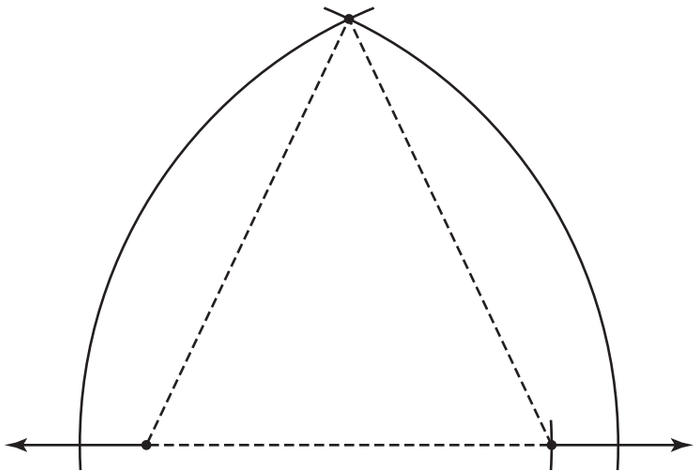

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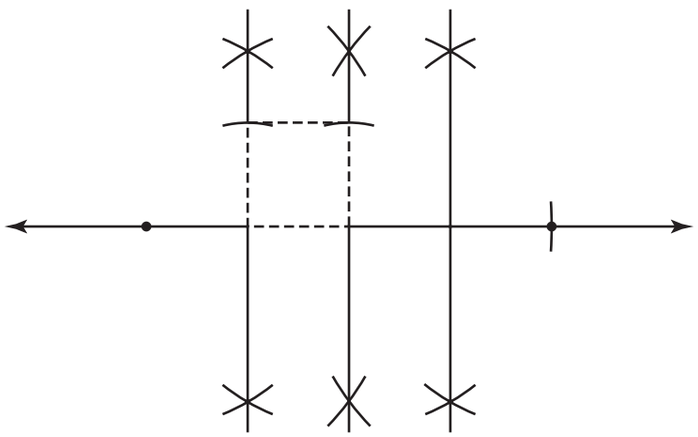
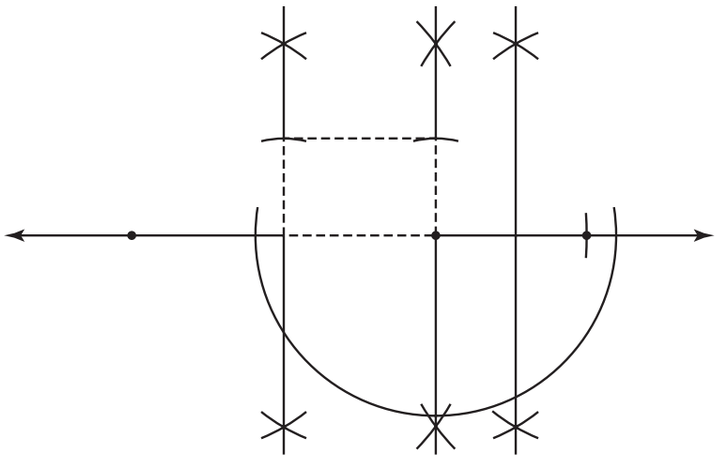


Answers

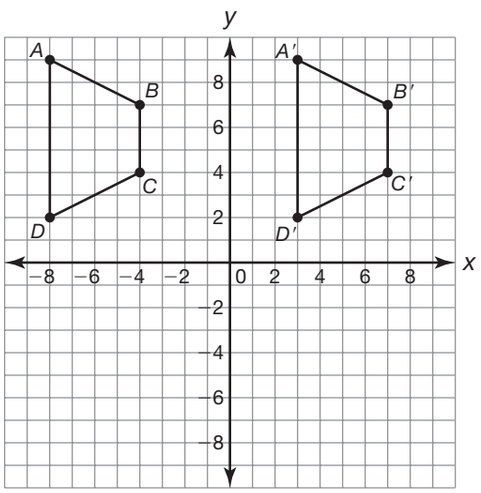
19.



Chapter 13

LESSON 13.1

1.



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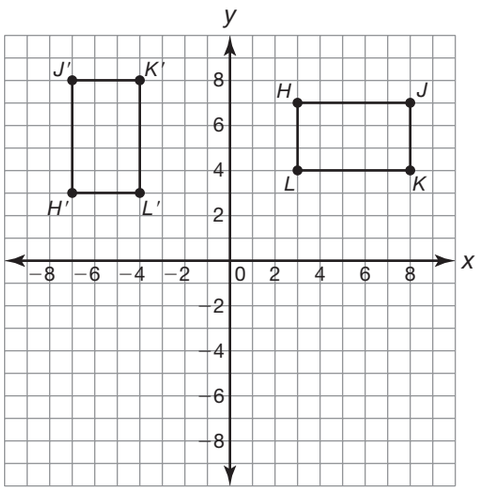

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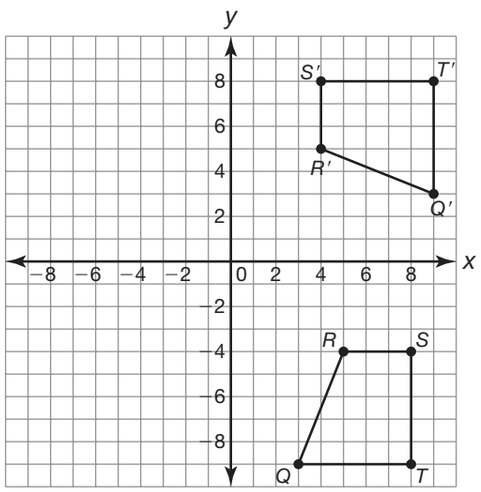

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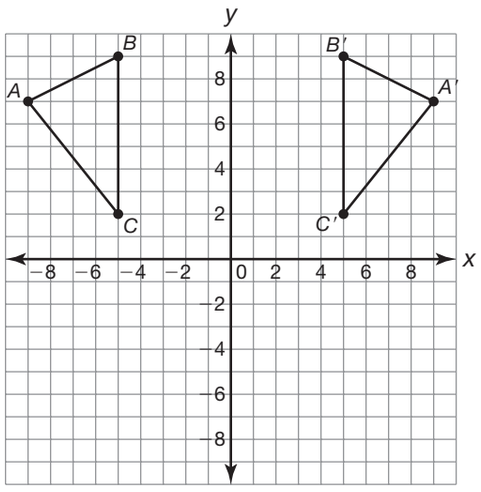
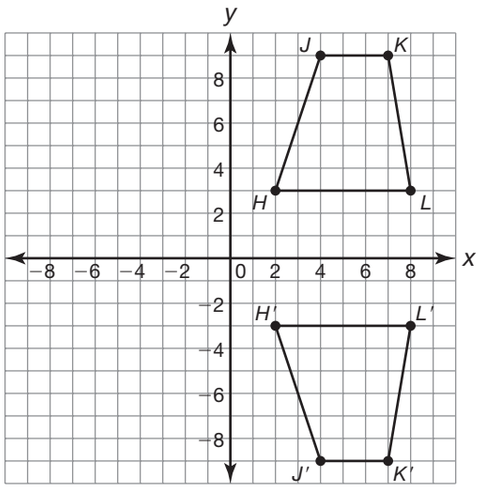


Answers

9.



11. The vertices of triangle A′ B′ C′ are A′ (−1, 3), B′ (−4, 8), and C′ (−10, 5).

13. The vertices of parallelogram *H′ J′ K′ L′* are *H′* (2, 1), *J′* (3, 6), *K′* (7, 6), and *L′* (6, 1).

15. The vertices of triangle *R′ S′ T′* are *R′* (−5, 6), *S′* (−3, 10), and *T′* (−2, 2).

17. The vertices of triangle *A′ B′ C′* are *A′* (−3, 5), *B′* (−8, 2), and *C′* (−5, −4).

19. The vertices of parallelogram *H′ J′ K′ L′* are *H′* (6, 2), *J′* (1, 3), *K′* (1, 7) and *L′* (6, 6).

21. The vertices of triangle *R′ S′ T′* are *R′* (−3, 0), *S′* (−7, 2), and *T′* (1, 3).

23. The vertices of triangle A′ B′ C′ are A′ (5, −3), B′ (2, −8), and C′ (−4, −5).

25. The vertices of parallelogram *H′ J′ K′ L′* are *H′* (2, 6), *J′* (3, 1), *K′* (7, 1), and *L′* (6, 6).

27. The vertices of triangle *R′ S′ T′* are *R′* (0, −3), *S′* (2, −7), and *T′* (3, 1).

LESSON 13.2

1. Triangle *BCA* was reflected over the ***x***-axis to create triangle *XYZ*.

$\overline{BC} \cong \overline{XY}$, $\overline{CA} \cong \overline{YZ}$, and $\overline{BA} \cong \overline{XZ}$; $\angle B \cong \angle X$, $\angle C \cong \angle Y$, and $\angle A \cong \angle Z$.

$\triangle BCA \cong \triangle XYZ$

3. Triangle *MPT* was rotated 180° counterclockwise or clockwise about the origin to create triangle *XYZ*.

$\overline{MP} \cong \overline{XY}$, $\overline{PT} \cong \overline{YZ}$, and $\overline{MT} \cong \overline{XZ}$; $\angle M \cong \angle X$, $\angle P \cong \angle Y$, and $\angle T \cong \angle Z$.

$\triangle MPT \cong \triangle XYZ$

5. Triangle *AWF* was reflected over the *x*-axis to create triangle *XYZ*.

$\overline{AW} \cong \overline{XY}$, $\overline{WF} \cong \overline{YZ}$, and $\overline{AF} \cong \overline{XZ}$; $\angle A \cong \angle X$, $\angle W \cong \angle Y$, and $\angle F \cong \angle Z$.

$\triangle AWF \cong \triangle XYZ$

7. Triangle *GNR* was rotated 90° counterclockwise about the origin to create triangle *XYZ*.

$\overline{GN} \cong \overline{XY}$, $\overline{NR} \cong \overline{YZ}$, and $\overline{GR} \cong \overline{XZ}$; $\angle G \cong \angle X$, $\angle N \cong \angle Y$, and $\angle R \cong \angle Z$.

$\triangle GNR \cong \triangle XYZ$

9. Triangle *VTA* was reflected over the *y*-axis to create triangle *XYZ*.

$\overline{VT} \cong \overline{XY}$, $\overline{TA} \cong \overline{YZ}$, and $\overline{VA} \cong \overline{XZ}$; $\angle V \cong \angle X$, $\angle T \cong \angle Y$, and $\angle A \cong \angle Z$.

$\triangle VTA \cong \triangle XYZ$

11. $\overline{JP} \cong \overline{TR}$, $\overline{PM} \cong \overline{RW}$, and $\overline{JM} \cong \overline{TW}$; $\angle J \cong \angle T$, $\angle P \cong \angle R$, and $\angle M \cong \angle W$.

13. $\overline{LU} \cong \overline{MT}$, $\overline{UV} \cong \overline{TH}$, and $\overline{LV} \cong \overline{HM}$; $\angle L \cong \angle M$, $\angle U \cong \angle T$, and $\angle V \cong \angle H$.

15. $\overline{TO} \cong \overline{BE}$, $\overline{OM} \cong \overline{EN}$, and $\overline{TM} \cong \overline{BN}$; $\angle T \cong \angle B$, $\angle O \cong \angle E$, and $\angle M \cong \angle N$.

17. $\overline{CA} \cong \overline{SU}$, $\overline{AT} \cong \overline{UP}$, and $\overline{CT} \cong \overline{SP}$; $\angle C \cong \angle S$, $\angle A \cong \angle U$, and $\angle T \cong \angle P$.

LESSON 13.3

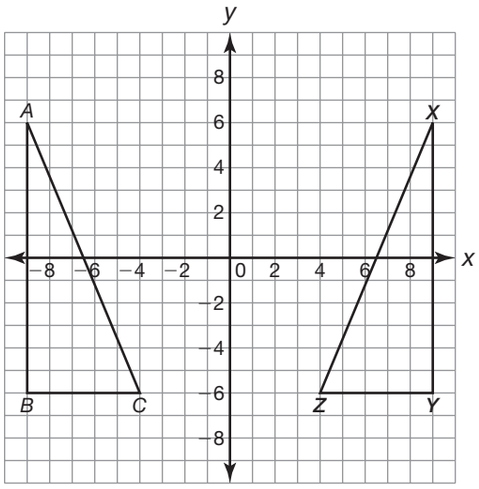
1. The triangles are congruent by the SSS Congruence Theorem.

3. The triangles are not congruent.

5. The triangles are congruent by the SSS Congruence Theorem.

Answers

7.



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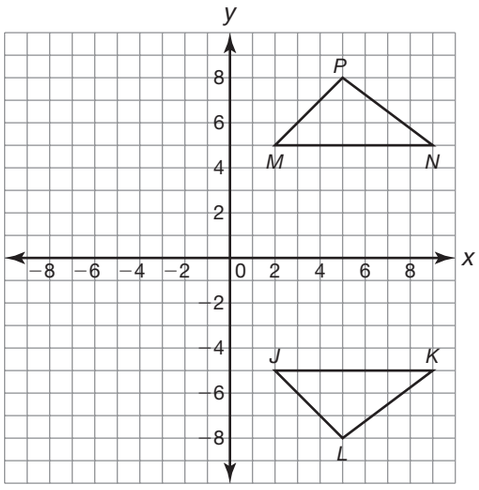

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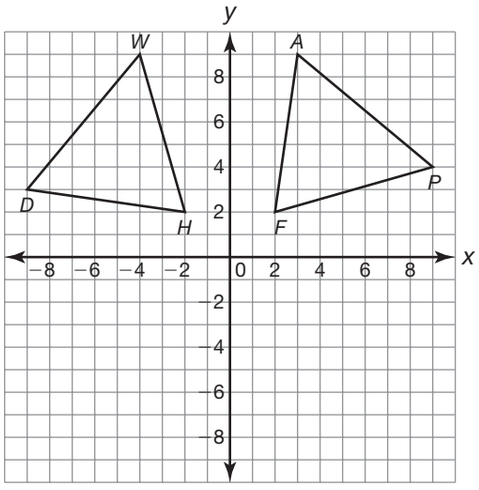


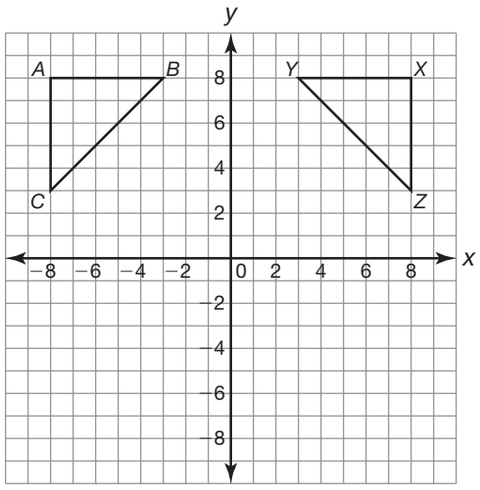
LESSON 13.4

1. The triangles are congruent by the SAS Congruence Theorem.

3. The triangles are congruent by the SAS Congruence Theorem.

5. The triangles are congruent by the SAS Congruence Theorem.

7.



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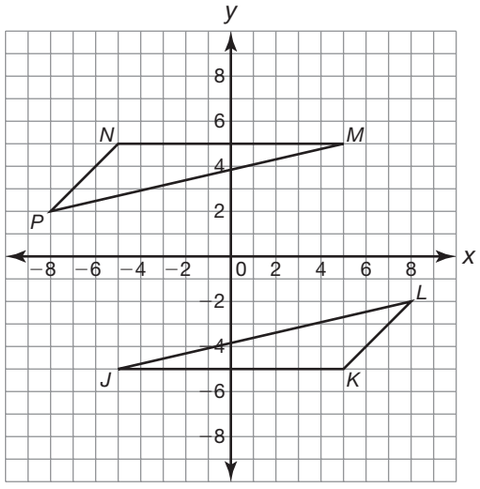
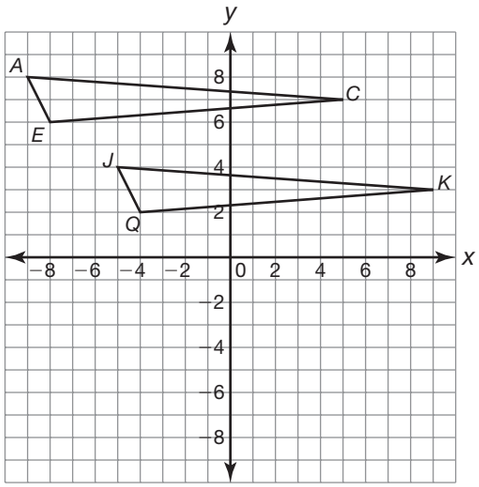


Answers

11.



13. $SW = 8$

15. $MN = 2$

17. $m\angle D = 65°$

19. $m\angle T = 50°$

21. The triangles are congruent by SSS.

$\overline{MN} \cong \overline{PQ}$

$\overline{NP} \cong \overline{QM}$

$\overline{MP} \cong \overline{PM}$

23. The triangles are congruent by SAS.

$\overline{BE} \cong \overline{DF}$

$\angle BEC \cong \angle DFA$

$\overline{CE} \cong \overline{AF}$

25. The triangles are congruent by SSS.

$\overline{PQ} \cong \overline{ST}$

$\angle QPR \cong \angle TSW$

$\overline{PR} \cong \overline{SW}$

27. The triangles are congruent by SAS.

$\overline{BD} \cong \overline{BR}$

$\angle DBW \cong \angle RBN$

$\overline{BW} \cong \overline{BN}$

LESSON 13.5

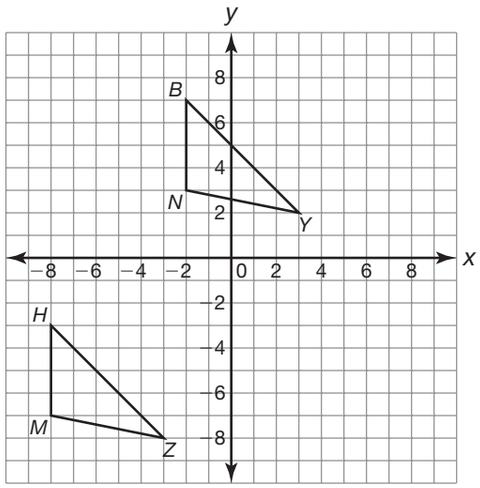
1. The triangles are congruent by the ASA Congruence Theorem.

3. The triangles are not congruent.

5. The triangles are not congruent.

7. The triangles are congruent by the ASA Congruence Theorem.

9.



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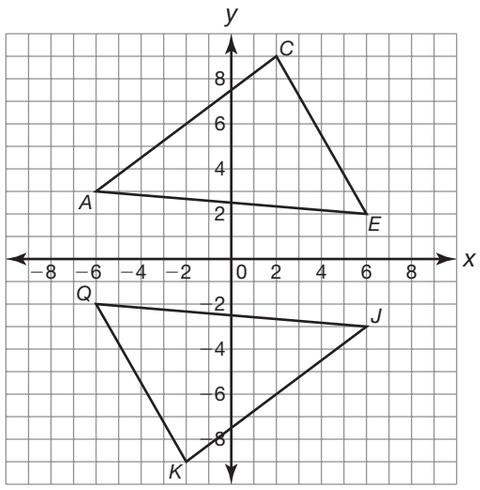


13. $m\angle B = 20°$

15. $m\angle R = 60°$

17. $m\angle T = 40°$

19. $m\angle G = 60°$

LESSON 13.6

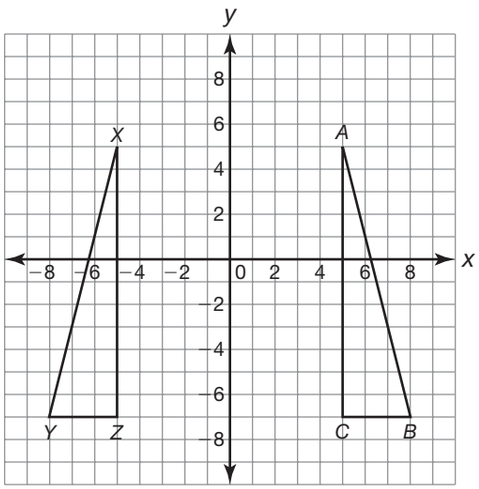
1. The triangles are congruent by the AAS Congruence Theorem.

3. The triangles are congruent by the AAS Congruence Theorem.

5. The triangles are congruent by the AAS Congruence Theorem.

Answers

7.



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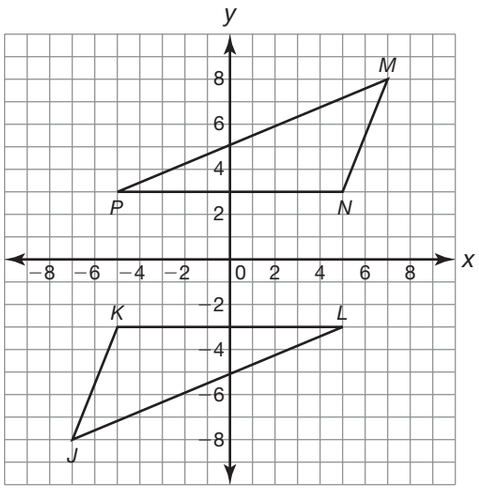

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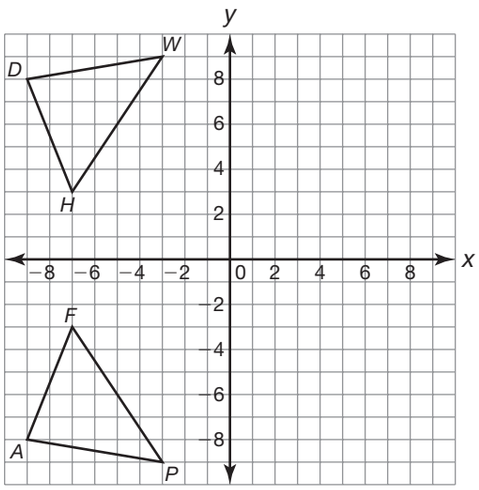


13. $m\angle B = 30°$

15. $m\angle G = 70°$

17. $m\angle Z = 70°$

19. $FR = 25$ m

21. The triangles are congruent by AAS.

$\angle BAD \cong \angle BCD$

$\angle ADB \cong \angle CDB$

$\overline{BD} \cong \overline{BD}$

23. The triangles are congruent by ASA.

$\angle MNQ \cong \angle PQN$

$\overline{NQ} \cong \overline{QN}$

$\angle MQN \cong \angle PNQ$

25. There is not enough information to determine whether the triangles are congruent by ASA or AAS.

27. The triangles are congruent by AAS.

$\angle DGF \cong \angle JTM$

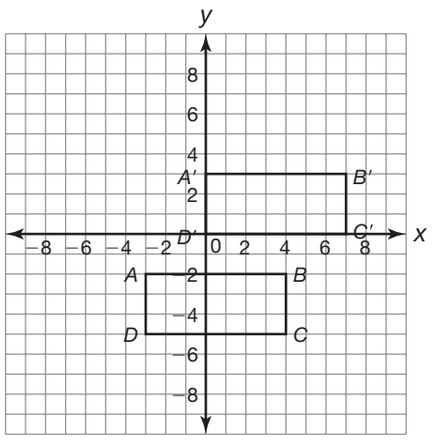
$\angle DFG \cong \angle JMT$

$\overline{DF} \cong \overline{JM}$

Chapter 14

LESSON 14.1

1.

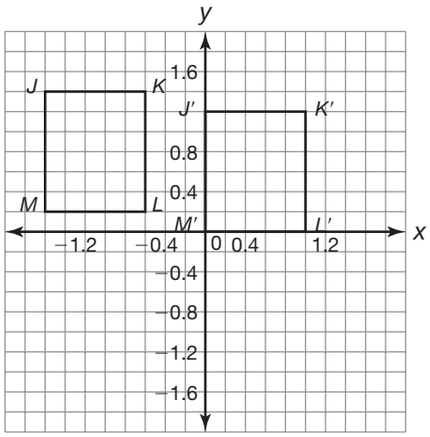


The perimeter of $A'B'C'D'$ is 20 units.

The area of $A'B'C'D'$ is 21 square units.

Answers

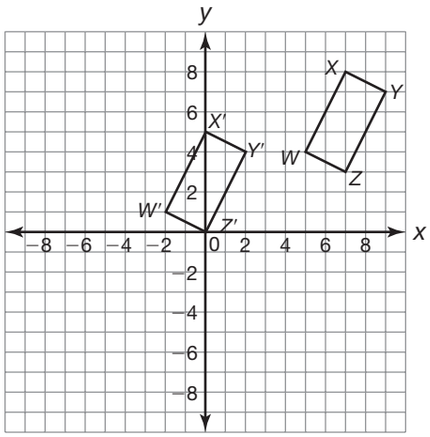
3.



The perimeter of $J'K'L'M'$ is 4.4 units.

The area of $J'K'L'M'$ is 1.2 square units.

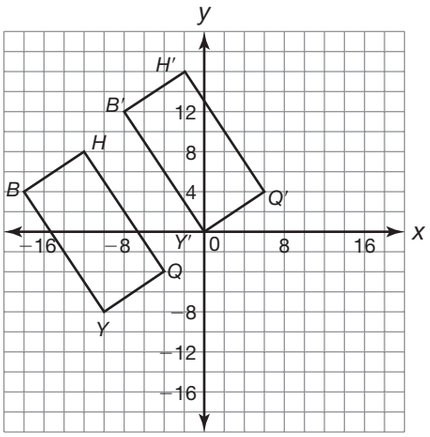
5.



The perimeter of $W'X'Y'Z'$ is approximately 13.42 units.

The area of $W'X'Y'Z'$ is 10 square units.

7.



The perimeter of $B'H'Q'Y'$ is approximately 43.27 units.

The area of $B'H'Q'Y'$ is 104 square units.

LESSON 14.2

1. The perimeter is approximately 16.28 units.

3. The perimeter is 24 units.

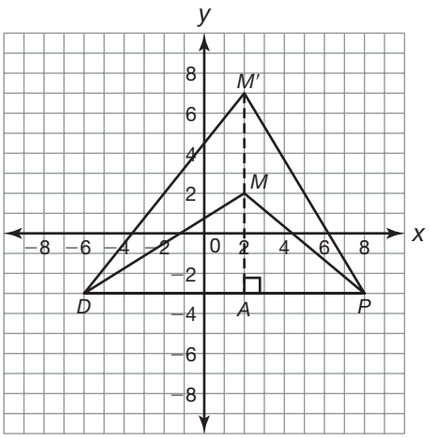
5. The perimeter is approximately 35.9 units.

7. The area is 17.5 square units.

9. The area is 67.5 square units.

11. The area is 15 square units.

13.

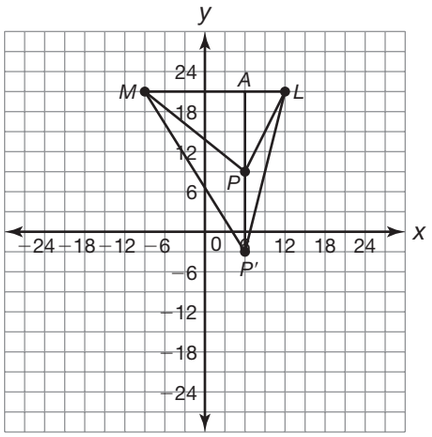


The area of triangle DMP is 35 square units.

The area of triangle $DM'P$ is 70 square units.

Answers

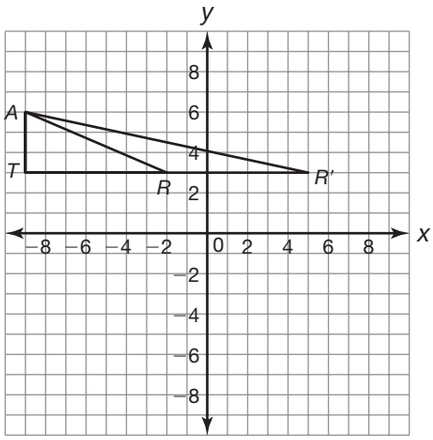
15.



The area of triangle *MLP* is 126 units.

The area of triangle *MLP′* is 252 units.

17.



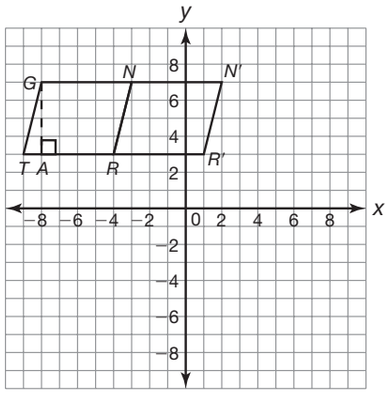
The area of triangle *ART* is 10.5 square units.

The area of triangle *AR′T* is 21 square units.

LESSON 14.3

1. The perimeter is 16 units.
3. The perimeter is 54 units.
5. The perimeter is approximately 4.83 units.
7. The area is 35 square units.
9. The area is 60 square units.
11. The area is 48 square units.

13.



Area of parallelogram *GNRT*:

Area = *bh*

= (5)(4)

= 20

The area is 20 square units.

Area of parallelogram *GN′R′T*:

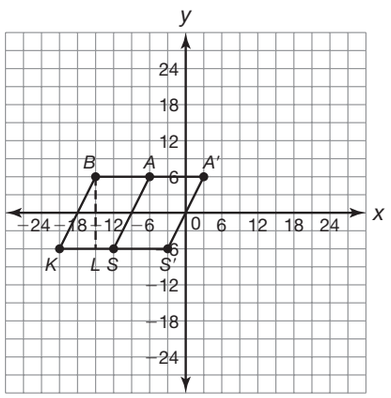
Area = *bh*

= (10)(4)

= 40

The area is 40 square units.

15.



Area of parallelogram *BASK*

Area = *bh*

= (9)(15)

= 135

The area is 135 units.

Area of parallelogram *BA′S′K*

Area = *bh*

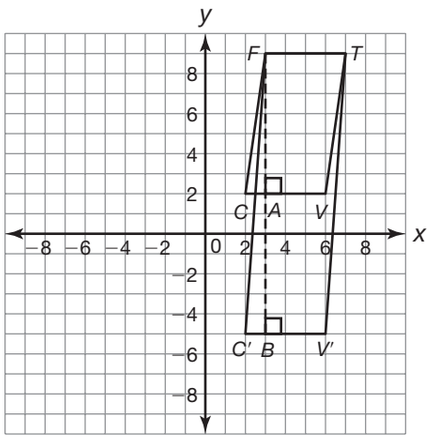
= (18)(15)

= 270

The area is 270 units.

Answers

17.



Area of parallelogram *CFTV:*

$Area = bh$

$= (4)(7)$

$= 28$

The area is 28 square units.

Area of parallelogram $C'FTV'$:

$A = bh$

$= (4)(14)$

$= 56$

The area is 56 square units.

LESSON 14.4

1. The perimeter is approximately 19.83 units.

3. The perimeter is approximately 19.21 units.

5. The perimeter is 60 units.

7. The area is 40 square units.

9. The area is 70 square units.

11. The total area is 42 square units.

Chapter 15

LESSON 15.1

1. Point *C* can have an infinite number of locations as long as the location satisfies one of the following conditions:

- Point *C* could be located anywhere on line $y = 3$ except where $x = 2$.
- Point *C* could be located anywhere on line $y = -3$ except where $x = 2$.

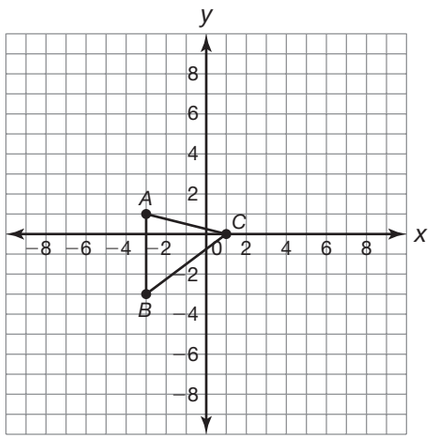
3. Point *C* can have an infinite number of locations as long as the location satisfies one of the following conditions:

- Point *C* could be located anywhere on Circle *A* between the *y*-values of 3 and 9 except where $x = 2$.
- Point *C* could be located anywhere on Circle *B* between the *y*-values of -3 and -9 except where $x = 2$.

5. Point *C* can have an infinite number of locations as long as the location satisfies one of the following conditions:

- Point *C* could be located anywhere on line $y = 0$ except where $x = 2$.
- Point *C* could be located anywhere on Circle *A* except where $x = 2$.
- Point *C* could be located anywhere on Circle *B* except where $x = 2$.

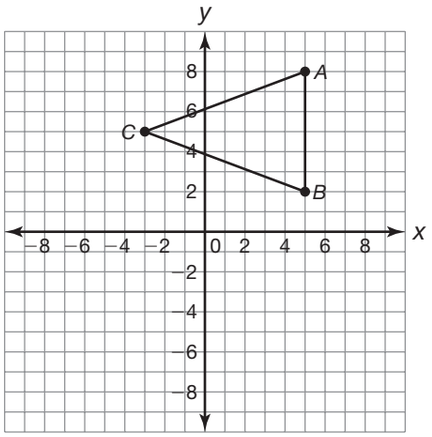
7.



Because each of the side lengths are different, triangle *ABC* is scalene.

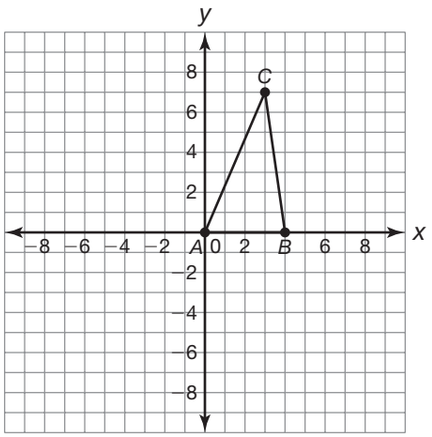
Answers

9.



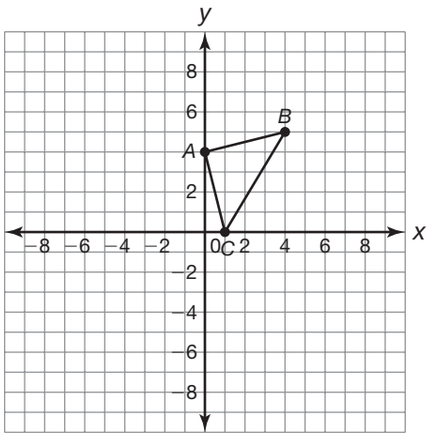
Because sides *AC* and *BC* are equal, triangle *ABC* is isosceles.

11.



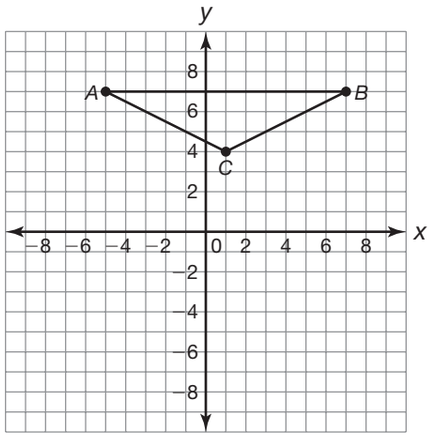
Because each of the side lengths are different, triangle *ABC* is scalene.

13.



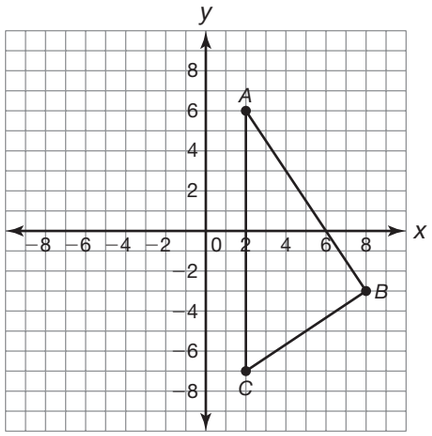
The slope of line segments *AB* and *AC* are negative reciprocals and therefore form a right angle. Triangle *ABC* is a right triangle.

15.



Triangle *ABC* is not a right triangle. Because one angle is greater than 90°, triangle *ABC* is an obtuse triangle.

17.



The slope of line segments *AB* and *BC* are negative reciprocals and therefore form a right angle. Triangle *ABC* is a right triangle.

LESSON 15.2

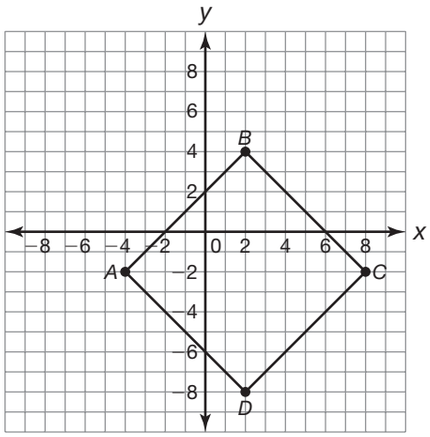
1. The coordinates of point *D* are (7, 4).

3. Point *D* can lie anywhere on the line $y = 2x + 1$ where $x > -1$ and $y > -1$, except at the point (1, 3). Point *D* can lie anywhere on the line $y = -\frac{1}{2}x + \frac{7}{2}$ where $x > -3$ and $y < 5$, except at the point (1, 3).

5. The coordinates of point *D* are (6, −4).

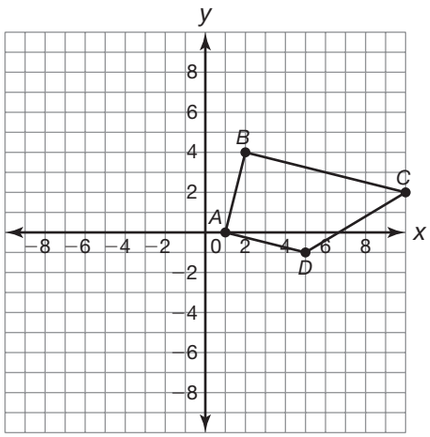
Answers

7.



Quadrilateral *ABCD* can best be described as a square.

9.



parallel. Quadrilateral *ABCD* can best be described as a trapezoid.

LESSON 15.3

1. The length of segment *AB* is the same length as the radius of circle *A*. Therefore point *B* must lie on circle *A*.

3. The length of segment *AB* is the same length as the radius of circle *A*. Therefore point *B* must lie on circle *A*.

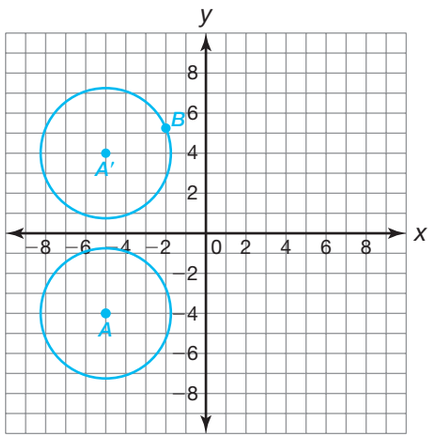
5. The length of segment *AB* is not the same length as the radius of circle *A*. Therefore point *B* does not lie on circle *A*.

7. The length of segment *AB* is the same length as the radius of circle *A*. Therefore point *B* must lie on circle *A*.

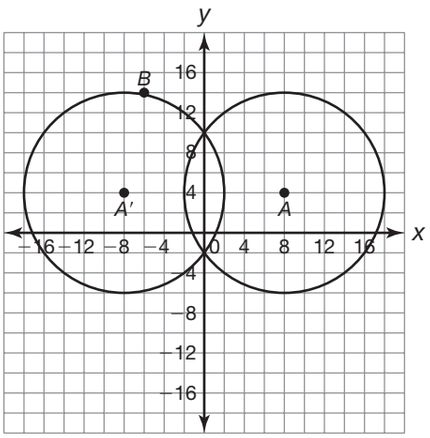
9. The length of segment *AB* is not the same length as the radius of circle *A*. Therefore point *B* does not lie on circle *A*.

11. The length of segment *AB* is not the same length as the radius of circle *A*. Therefore point *B* does not lie on circle *A*.

13. The length of segment *A′B* is the same length as the radius of circle *A′*. Therefore point *B* must lie on circle *A′*.

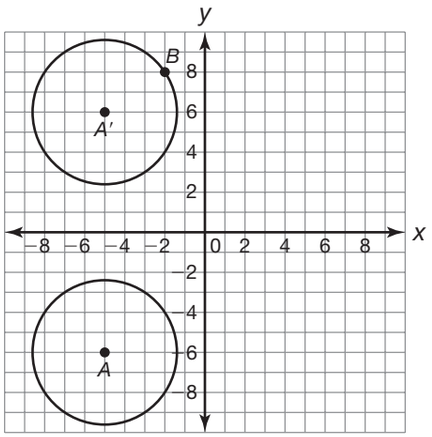


15.



The length of segment *A′B* is not the same length as the radius of circle *A′*. Therefore point *B* does not lie on circle *A′*.

17.



The length of segment $A'B$ is the same length as the radius of circle A'. Therefore point B must lie on circle A'.

LESSON 15.4

1.

Radius of circle *A*	*x*-intercepts	*y*-intercepts	Point in Quadrant I
13	(13, 0)	(0, 13)	(12, 5)
	(−13, 0)	(0, −13)	

3.

Radius of circle *A*	*x*-intercepts	*y*-intercepts	Point in Quadrant III
2.5	(2.5, 0)	(0, 2.5)	(−2, −1.5)
	(−2.5, 0)	(0, −2.5)	

5.

Radius of circle *A*	*x*-intercepts	*y*-intercepts	Point in Quadrant I
6.5	(6.5, 0)	(0, 6.5)	(6, 2.5)
	(−6.5, 0)	(0, −6.5)	

7.

Center	Radius	Points Above & Below Center	Points Right & Left of Center	Point *B*	Point *C*
(3, 2)	5	(3, 7)	(8, 2)	(6, 6)	(0, 6)
		(3, −3)	(−2, 2)		

Answers

9.

Center	Radius	Points Above & Below Center	Points Right & Left of Center	Point *B*	Point *C*
(3, 4)	$3\sqrt{2}$	(3, 4 + $3\sqrt{2}$)	(3 − $3\sqrt{2}$, 4)	(6, 7)	(6, 1)
		(3, 4 − $3\sqrt{2}$)	(3 + $3\sqrt{2}$, 4)		

11.

Center	Radius	Points Above & Below Center	Points Right & Left of Center	Point *B*	Point *C*
(8, −6)	10	(8, 4)	(18, −6)	(16, −12)	(0, −12)
		(8, −16)	(−2, −6)		

Chapter 16

LESSON 16.1

1. Specific information: Your father has a lot of fat in his diet.

General information: High-fat diets increase the risk of heart disease.

Conclusion: Your father is at higher risk of heart disease.

3. Specific information: There have been a lot of people at the mall when Janice has been there.

General information: The problem does not include any general information.

Conclusion: It's always crowded at the mall.

5. Specific information: Mario watched 3 parades this summer with each having a fire truck in the lead.

General information: The problem does not have any general information.

Conclusion: A fire truck always leads a parade.

7. It is inductive reasoning because he has observed specific examples of a phenomenon—the color of school buses—and come up with a general rule based on those specific examples.

The conclusion is not necessarily true. It may be the case, for example, that all or most of the school buses in this school district are yellow, while another school district may have orange school buses.

9. It is deductive reasoning because she has taken a general rule about lightning and applied it to this particular situation.

Her conclusion is not correct because she was given incorrect information. It is a myth that lightning never strikes twice in the same place.

11. It is inductive reasoning because she has observed specific examples of a phenomenon—the color of fire trucks—and come up with a general rule based on those specific examples.

The conclusion is not necessarily true. It may be the case, for example, that all or most fire trucks are red, but other communities may have orange or yellow fire trucks.

13. Madison used inductive reasoning to conclude that the Johnsons were paying her at a rate of $15 per hour. From that general rule, Jennifer used deductive reasoning to conclude that 4 hours of babysitting should result in a payment of $60. The inductive reasoning looks at evidence and creates a general rule from the evidence. By contrast, the deductive reasoning starts with a general rule and makes a prediction or deduction about what will happen in a particular instance.

15. Tamika used inductive reasoning to conclude that the coin flipping was following a pattern of heads, then tails, then heads, etc. Then Javon used deductive reasoning to conclude that the next flip would land tails. Inductive reasoning looks at specific examples and creates a general rule from the evidence. Because of the limited number of specific examples it is easy to create an incorrect rule. Because deductive reasoning makes a prediction based on given general rule the accuracy of the prediction is dependent on the rule being correct.

17. Vance used inductive reasoning to conclude that he was paid $12 per lawn by the Greenvalley Homeowners Association. From that general rule, Sherwin used deductive reasoning to conclude that mowing 7 lawns should result in a payment of $84. The inductive reasoning looks at evidence and creates a general rule from the evidence. By contrast, the deductive reasoning starts with a general rule and makes a prediction or deduction about what will happen in a particular instance.

LESSON 16.2

1. Statement: I am not 15 now.

2. Statement: It is raining today.

3. Statement: I did read the notice.

5. Statement: The sun is not shining today.

7. If it is sunny tomorrow, we will go to the beach.

9. If a and b are real numbers, then $a^2 + b^2$ is greater than or equal to 0.

11. If I get a raise, then I will buy a new car.

13.

p	q	$p \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

Row 1: If p is true, then I can play the violin. If q is true, then I can join the orchestra. It is true that if I can play the violin, I can join the orchestra, so the truth value of the conditional statement is true.

Row 2: If p is true, then I can play the violin. If q is false, then I cannot join the orchestra. It is false that if I can play the violin, I cannot join the orchestra, so the truth value of the conditional statement is false.

Row 3: If p is false, then I cannot play the violin. If q is true, then I can join the orchestra. It could be true that if I cannot play the violin, I can join the orchestra, so the truth value of the conditional statement in this case is true. (For instance, if I play another instrument.)

Row 4: If p is false, then I cannot play the violin. If q is false, then I cannot join the orchestra. It could be true that if I cannot play the violin, I cannot join the orchestra, so the truth value of the conditional statement in this case is true.

15.

p	q	$p \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

Row 1: If p is true, then a plant is an oak. If q is true, then that plant is a tree. It is true that if a plant is an oak, then that plant is a tree, so the truth value of the conditional statement is true.

Row 2: If p is true, then a plant is an oak. If q is false, then that plant is not a tree. It is false that if a plant is an oak, then it is not a tree, so the truth value of the conditional statement is false.

Row 3: If p is false, then a plant is not an oak. If q is true, then the plant is a tree. It could be true that a plant that is not an oak is a tree, so the truth value of the conditional statement in this case is true.

Row 4: If p is false, then a plant is not an oak. If q is false, then the plant is not a tree. It could be true that if a plant is not an oak, then it is not a tree, so the truth value of the conditional statement in this case is true.

17.

p	q	$p \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

Row 1: If p is true, then the traffic light is red. If q is true, then the car is stopped. It is true that if the traffic light is red, the car is stopped. The truth value of the conditional statement is true.

Row 2: If p is true, then the traffic light is red. If q is false, then the car is not stopped. It is false that if the traffic light is red the car is not stopped. The truth value of the conditional statement is false.

Row 3: If p is false the traffic light is not red. If q is true, then the car is stopped. It could be true that if the traffic light is not red, the car is stopped. The truth value of the conditional statement is true.

Row 4: If p is false, then the traffic light is not red. If q is false, then the car is not stopped. It is true that if the traffic light is not red, the car is not stopped. The truth value of the conditional statement is true.

19. If Janis has a piano lesson after school, then today is Tuesday.

21. If he was crazy, then he would believe that the sky is green.

23. If it is a rose, then the flower is red.

25. If you do not go to the grocery store on Saturday, then there will not be very long lines.

27. If the bus arrives on time, then Milo will not be late for work.

29. If the figure does not have 3 sides, then the figure is not a triangle.

31. If the sides of a triangle are not all equal, then the triangle is not an equilateral triangle.

33. If this classroom is not too crowded, there are not more than 30 students in it.

35. If a figure is not a decagon, then the figure does not have 10 sides.

37. If the last digit in N is 0, then N is divisible by 10. True.

Biconditional statement: N is divisible by 10 if and only if the last digit in N is 0.

39. If N is divisible by 5, then the last digit in N is 5.

The converse is not true by counterexample: 10 is divisible by 5, but its last digit is not 5. So a true biconditional statement cannot be written.

41. If a triangle is scalene, then the triangle has no equal sides. True.

Biconditional statement: A triangle has no equal sides if and only if the triangle is scalene.

LESSON 16.3

1. Associative property of addition

3. Inverse property of multiplication

5. Identity property of multiplication

7. Associative property of multiplication

9. $12(6 + 10) = 12(6) + 12(10) = 72 + 120 = 192$

11. $4(x + y) = 4x + 4y$

13. $mn - mp = m(n - p)$

15. $a(b + c) = b(a + c) + ac$

$ab + ac = ba + bc + ac$	Distributive property
$ab + ac = ab + bc + ac$	Commutative property of multiplication
$ab + ac - ac = ab + bc + ac - ac$	Subtraction law of equality
$ab = ab + bc$	Inverse property of addition
$ab - ab = ab + bc - ab$	Subtraction property of equality
$0 = bc + ab - ab$	Commutative property
$0 = bc$	Additive inverse
$b = 0$ or $c = 0$ (or both)	If a product is equal to zero, at least 1 factor in the product is equal to zero.

17. $(x + a)(x + b) = x^2 + ab$

$x^2 + bx + ax + ab = x^2 + ab$	Distributive property
$x^2 + bx + ax + ab - ab = x^2 + ab - ab$	Subtraction property of equality
$x^2 + bx + ax = x^2$	Inverse property of addition
$x^2 - x^2 + bx + ax = x^2 - x^2$	Subtraction property of equality
$bx + ax = 0$	Inverse property of addition
$x(b + a) = 0$	Distributive property
Either $x = 0$ or $a + b = 0$	
$a = -b$	

Even though the statement works for $x = 0$, the statement must be true for all x and $a = -b$ is a counterexample, so the statement is false.

19. Let $a = 3$ and $b = 4$. Then

$a(b + 2) = ab + 2$

$3(4 + 2) = (3)(4) + 2$

$3(6) = 12 + 2$

$18 \neq 14$

This is false, so by counterexample, the conditional statement is false.

Answers

LESSON 16.4

1. So, Shelia's birthday is March 12, 1972.
3. 10 coins in his pocket, pennies cannot be the third coin. So, there must be one quarter, one dime, and three nickels in his pocket.
5. the far right either. So, the brown frame is in the middle, the silver frame is on the right, and the black frame is on the left. The tree photo is to the left of the brown frame, so it is in the black frame. The flower photo is to the right of the bird photo, so the bird must be in the brown frame in the middle and the flower in the silver frame on the right.
7. Math Club is advised by Mr. Juarez and meets in Room 10.

   Yearbook is advised by Mrs. Aiello and meets in Room 6.

   Jazz Band is advised by Mr. Dalton and meets in Room 9.
9. Ella took first place with her Physics experiment.

   Hector took second place with his Biology experiment.

   Mitsu took third place with her Chemistry experiment.
11. John has a nylon duffle bag.

    Yasmine has a canvas messenger bag.

    Zach has a leather backpack.

LESSON 16.5

1. Farmer Gray grows cotton on 500 acres.

   Farmer White grows soy on 750 acres.

   Farmer Brown grows corn on 250 acres.

   Farmer Green grows wheat on 400 acres.
3. The round blue bin holds aluminum.

   The square gray bin holds paper.

   The octagonal green bin holds glass.

   The rectangular yellow bin holds plastic.
5. The Bryants live in a farmhouse at 425.

   The Levines live in a brick house at 427.

   The Smiths live in a modern house at 431.

   The Fogartys live in a Victorian house at 433.

   The Singhs live in a Tudor house at 429.
7. Ty likes history, pizza, and listening to music.

   Maddie likes art, tacos, and riding a bike.

   Eva likes math, spaghetti, and reading.

   Ben likes science, turkey subs, and playing on the computer.

   Zoe likes drama, salad, and walking the dog.