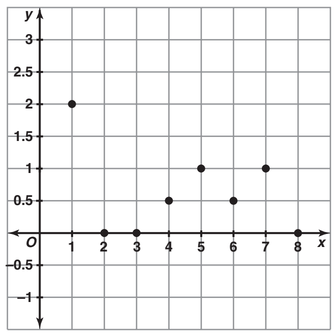
Answers

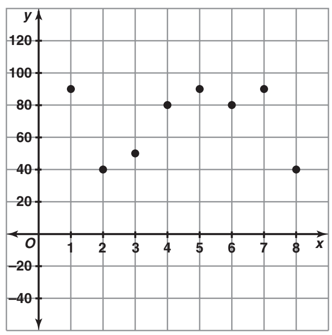
Chapter 1

Lesson 1.1

1. Yes, the relation is a function.



3. Yes, the relation is a function.



5. The domain is all ages between 1 year and 20 years.

   The range is all heights between 3 feet and 28 feet.

   The average height of a tree that is 6 years old is about 17 to 18 feet.

7. The domain is all times between 0 weeks and 20 weeks.

   The range is all snowfalls between 0 inches and 46 inches.

   The cumulative snowfall after 11 weeks would be about 22 inches.

9. The domain is all integers between 5 people and 18 people.

   The range is all times between 15 minutes and 50 minutes.

   If the average wait time is 30 minutes then 14 people are working.

11. The domain is all numbers between 10,000 gallons and 30,000 gallons.

    The range is all amounts between \$120 and \$380.

    The size of a pool that costs \$300 to heat would be about 22,500 gallons.

13. $y = 500x + 150$, where y represents the amount of money in dollars that Marissa makes in her new job after x weeks.

15. $y = -5x + 100$, where y represents Eric's remaining tickets after x rides.

17.

Number of Mugs Ordered	Total Cost (dollars)
16	101
25	132.5
40	185
80	325

19.

Number of Hours Working	Number of Candlesticks
5	0
10	60
12	84
20	180

Answers

Lesson 1.2

1. Let t represent the time in hours and let w represent the amount of water in the pool in gallons.

$w = 1000t$

3. Let t represent the time in seconds and let h represent the height of the elevator in feet.

$h = 300 - 20t$

5. Let t represent the time in hours and let w represent the amount of water in the fish tank in gallons.

$w = |50 - 10t|$

7. Let h represent the time in hours and let t represent the temperature of the room in degrees Fahrenheit.

$t = 72 - |32 - 4h|$

9. The constants are 18,000 and −2000. The constant 18,000 represents the amount of water in the pool at time $x = 0$ hours, or when the pool is full. The constant −2000 represents the rate at which the pool drains in gallons per hour. The negative sign indicates that the pool is draining.

11. The constant is 500. The constant 500 represents the rate at which the balloon fills up with hot air in cubic feet per minute.

13.

Time (hours)	Amount of Grain Left in Silo (bushels)
0	50,000
5	46,250
24	32,000
36	23,000
60	5,000
66	500

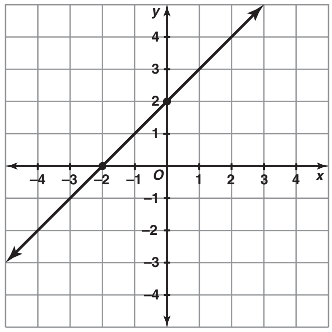
15.

Time (minutes)	Altitude (feet)
0	10,000
10	14,000
15	16,000
25	20,000
40	26,000
50	30,000

17. Domain: all real numbers

Range: all real numbers

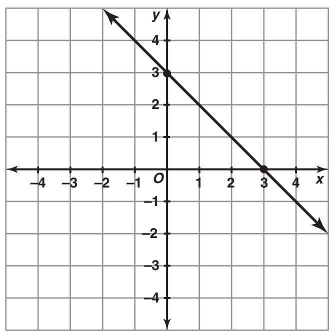
Extrema: none



19. Domain: all real numbers

Range: all real numbers

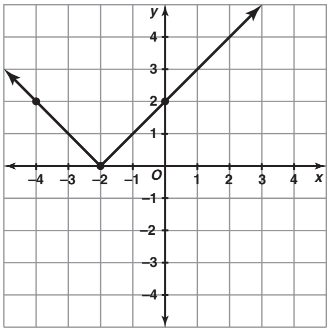
Extrema: none



21. Domain: all real numbers

Range: $y \geq 0$

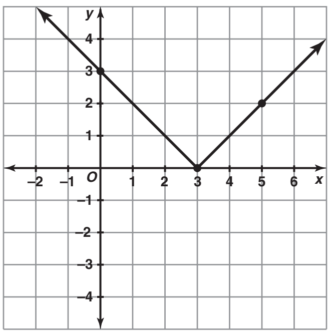
Extrema: minimum at $(-2, 0)$



23. Domain: all real numbers

Range: $y \geq 0$

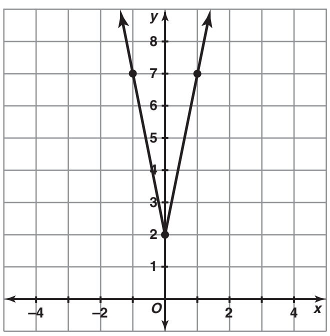
Extrema: minimum at $(3, 0)$



25. Domain: all real numbers

Range: $y \geq 2$

Extrema: minimum at $(0, 2)$

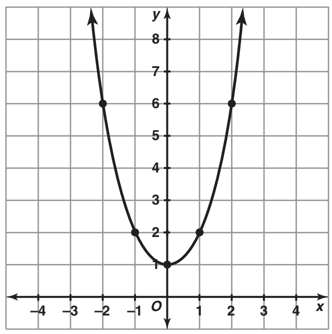


Lesson 1.3

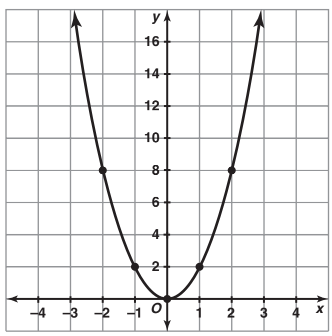
1. The domain is (0, 7), which means that the trip lasted for 7 hours. The range is (0, 7), which means that John traveled 7 miles down the beach. John traveled 2 miles in his first hour and 2 more miles in his second hour, then rested for an hour, and traveled 3 miles during the next hour. Then he turned back, traveling 3 miles in the first hour, 2 miles in the next, and 2 miles in the next, which brought him back to his starting point.

3. The domain is (0, 10), which means that the trip lasted for 10 hours. The range is (0, 9), which means that Tonya ended up going 9 miles from home. Tonya traveled 2 miles in the first hour, then turned around and traveled 2 miles back home in the next hour. Leaving home again, she traveled 3 miles, 3 miles, 1 mile, and 2 miles in the next 5 hours. She then spent 1 hour at Alexandra's house and went back home, traveling 4 miles in the first hour and 5 miles in the second hour.

5.



7.



Answers

9. Interval of decrease: (2, 5)

Intervals of increase: (0, 2), (5, 8)

11. Interval of decrease: $x < 0$

Intervals of increase: $x > 0$

13. Domain: all real numbers

Range: all real numbers greater than or equal to -2

15. Domain: all real numbers

Range: all real numbers less than or equal to 2

17. Minimum at $(2, -2)$

Line of symmetry: $x = 2$

19. Maximum at $(-2, 0)$

Line of symmetry: $x = -2$

Lesson 1.4

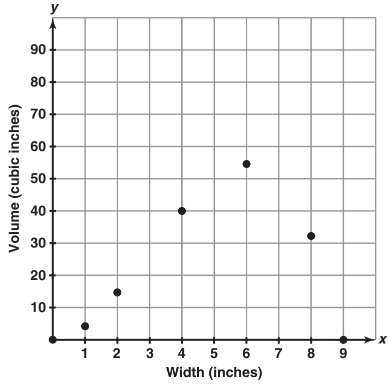
1.

Width (feet)	Length (feet)	Depth (feet)	Volume (cubic feet)
0	20	0	0
2	18	1	36
6	14	3	252
10	10	5	500
16	4	8	512
18	2	9	324
20	0	10	0

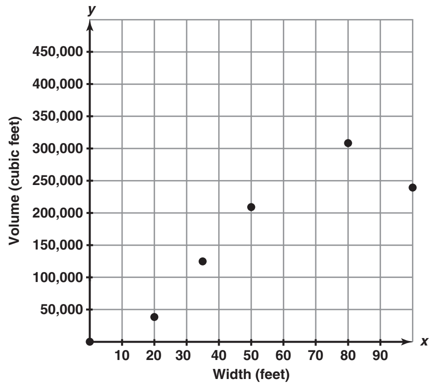
3.

Width (feet)	Length (feet)	Height (feet)	Volume (cubic feet)
0	8	0	0
1	7	1.5	10.5
2	6	3	36
4	4	6	96
5	3	7.5	112.5
6	2	9	108
8	0	12	0

5.



7.



9.

Width (feet)	Length (feet)	Width (feet)	Length (feet)
1	300	20	15
2	150	30	10
3	100	50	6
5	60	60	5
6	50	100	3
10	30	150	2
15	20	300	1

11.

Width (feet)	Length (feet)	Width (feet)	Length (feet)
1	480	16	30
4	120	20	24
6	80	30	16
8	60	40	12
10	48	60	8
12	40	80	6
15	32	480	1

13. $V = w^3 + 6w^2 + 8w$

15. $w = \frac{500}{l}$

17. $V = -\frac{1}{2}w^3 + 20w^2$

19. $A = -l^2 + 100l$

21. The maximum volume is around 40 cubic feet.

23. There is no maximum. As w gets close to zero, the length gets larger and larger.

Chapter 2

Lesson 2.1

1. g is the independent variable, and t is the dependent variable.

3. s is the independent variable, and c is the dependent variable.

5. m is the independent variable, and g is the dependent variable.

7. $f(4) = 13$

For $4, one can get 13 downloads.

9. $f(6) = 95$

It takes 95 minutes to write 6 thank-you notes.

11. $50 = b$

For $1000, one can get 50 books printed.

13. $7 = w$

In 75 minutes a person can wash 7 windows.

15. $f(5) = 20$

17. $f(3.5) = 0$

19. $w(c) = \frac{1}{2}c + 1$

21. $d(h) = 200 - 50h$

23. $s(80) = 12$

Twelve students received a grade of 80 on the quiz.

25. $r(7) \approx 24$

The tomato plant was approximately 24 inches high 7 weeks after having been planted. (7 weeks is halfway between 6 and 8 weeks, and 24 inches is halfway between 23 and 25 inches.)

27. **a.** $w = 12$. The average rainfall after the first 12 weeks is 11 inches.

b. $w = 40$. The average rainfall after 40 weeks is 51 inches.

29. **a.** $N(80) = 6$. Six students got an 80 on the test.

b. $N(20) = 0$. Zero students got a 20 on the test.

31. **a.** $h = 0$ and $h = 8$

It was 50 degrees Fahrenheit at 0 hours past midnight (at midnight) and it was 50 degrees Fahrenheit at 8 hours past midnight (at 8 am).

b. $h = 16$

It was 77 degrees Fahrenheit at 16 hours past midnight (that is, at 4 pm).

Lesson 2.2

1. The next two terms are 81 and 243. The sequence is formed by starting at 1 and multiplying by 3 at each step.

3. The next two terms are 11 and 13. The sequence is formed by starting at 3 and adding 2 at each step.

5. $\frac{1}{2}, 1, \frac{3}{2}, 2, \frac{5}{2}, 3, \frac{7}{2}, 4$

7. 0, 2, 6, 12, 20, 30, 42, 56

9. 

The numbers in the sequence are 2, 4, 6, 8, 10, 12, ...

11. 

The numbers in the sequence are 2, 4, 6, 8, 10 (by counting the line segments).

Alternative answer (by counting *X*s): 1, 2, 3, 4, 5

Alternative answer (by counting diamonds): 0, 1, 2, 3, 4

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

15. $f(n) = 2n - 1$

17. 1, 6, 11, 16, . . . , 46 (10th term), ...

19. $3, \frac{3}{2}, 1, \frac{3}{4}, \ldots, \frac{3}{10}$ (10th term), ...

Answers

21. $a_n = 5n + 5$

23. $a_n = n^2 - 1$

25. $\frac{1}{8}, \frac{1}{4}, \frac{1}{2}, 1$

27. 2, 7, 22, 67

29. $a_1 = 5, a_n = a_{n-1} + 2$

31. $a_1 = 2, a_n = 2a_{n-1} - 3$

Lesson 2.3

1. $a_1 = 2, a_2 = 5, a_3 = 8, a_4 = 11$

3. $a_1 = 3, a_2 = 2, a_3 = 1, a_4 = 0$

5. The initial term is 10, and the common difference is 5.

7. The initial term is 31, and the common difference is -14.

9. $a_1 = 4, a_n = a_{n-1} + 8$

11. $a_1 = \frac{15}{2}, a_n = a_{n-1} - \frac{5}{2}$

13. Recursive: $a_1 = 7, a_n = a_{n-1} + 4$

    Explicit: $a_n = 4n + 3$

15. Recursive: $a_1 = \frac{17}{5}, a_n = a_{n-1} + \frac{8}{5}$

    Explicit: $a_n = \frac{8}{5}n + \frac{9}{5}$

17. $a_1 = 4, a_2 = 12, a_3 = 36, a_4 = 108$

19. $a_1 = 5, a_2 = 8, a_3 = 14, a_4 = 26$

21. The initial term is 10, and the common ratio is 2.

23. The initial term is 3, and the common ratio is $-\frac{1}{3}$.

25. $a_1 = 4, a_n = -2a_{n-1}$

27. $a_1 = 10, a_n = \frac{1}{2}a_{n-1}$

29. Recursive: $a_1 = 2, a_n = -3a_{n-1}$

    Explicit: $a_n = 2(-3)^{n-1}$

31. Recursive: $a_1 = 16, a_n = \frac{1}{4}a_{n-1}$

    Explicit: $a_n = 16\left(\frac{1}{4}\right)^{n-1}$

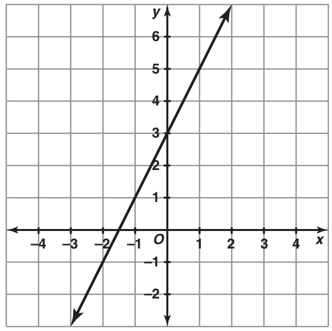
33. The sequence is geometric. The explicit formula is $a_n = 128 \cdot \left(\frac{1}{2}\right)^{n-1}$

35. The sequence is neither.

Lesson 2.4

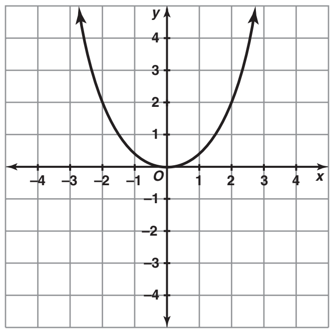
1. The domain is all real numbers.

   The range is all real numbers.



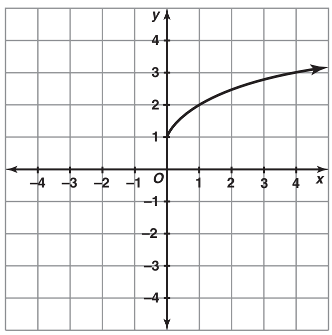
3. The domain is all real numbers.

   The range is all real numbers greater than or equal to 0.



5. The domain is all real numbers greater than or equal to 0.

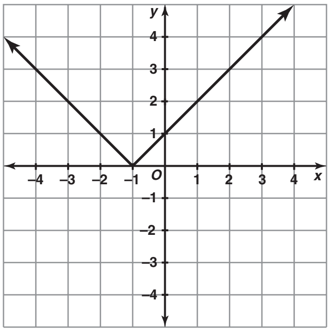
   The range is all real numbers greater than or equal to 1.



Answers

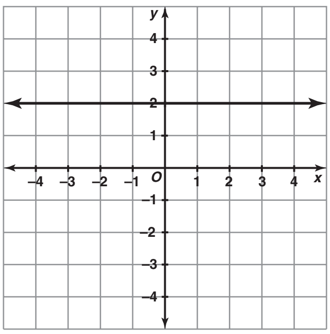
7. The domain is all real numbers.

   The range is all real numbers greater than or equal to 0.



9. The domain is all real numbers.

   The range is the real number 2.



11. The domain is all real numbers.

    The range is all integers, or all positive and negative counting numbers (including 0).

13. The domain is all real numbers.

    The range is all real numbers.

15. Domain of the function: all real numbers

    Range of the function: all real numbers

    Domain of the problem situation: all numbers greater than or equal to 0

    Range of the problem situation: all numbers greater than or equal to 0

17. Domain of the function: all real numbers

    Range of the function: all real numbers less than or equal to 64

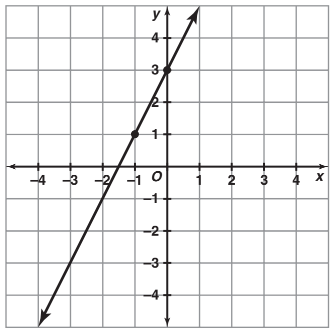
    Domain of the problem situation: all numbers greater than or equal to 0 and less than or equal to 4

    Range of the problem situation: all numbers greater than or equal to 0 and less than or equal to 64

Lesson 2.5

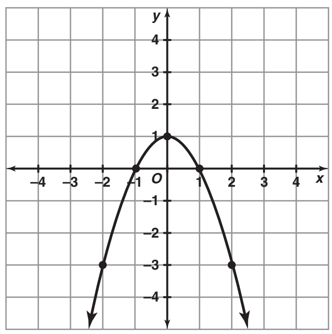
1. The x-intercept is at $-\frac{3}{2}$.

   The y-intercept is at 3.



3. The x-intercepts are at 1 and -1.

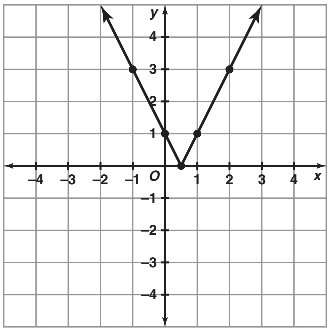
   The y-intercept is at 1.



Answers

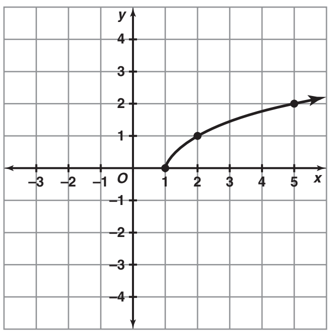
5. The x-intercept is at $\frac{1}{2}$.

The y-intercept is at 1.

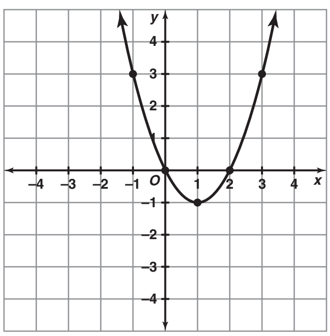


7. The x-intercept is at 1.

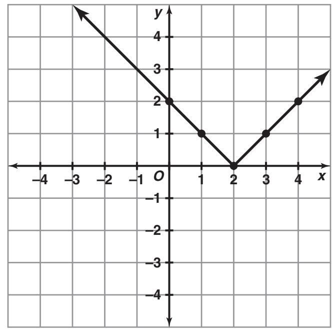
The graph does not intercept the y-axis.



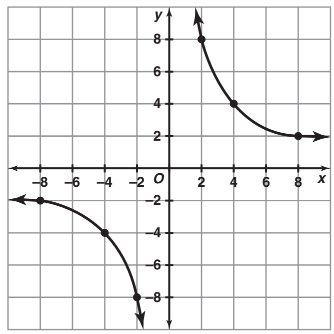
9. There is an extreme point at $(1, -1)$.



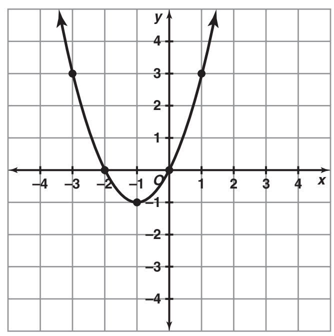
11. There is an extreme point at $(2, 0)$.



13. There are no extreme points.

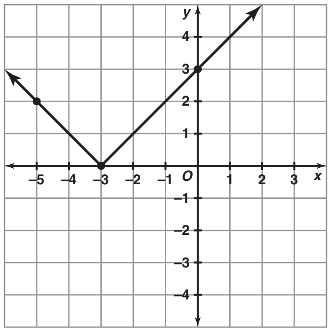


15. The line of symmetry is $x = -1$.

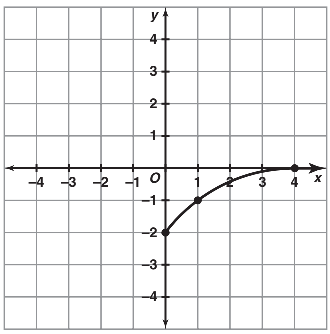


Answers

17. The line of symmetry is $x = -3$.



19. There is no line of symmetry.



Lesson 2.6

1.

x	y	Δx	Δy	$\frac{\Delta y}{\Delta x}$
-4	-10			
-1	-4	3	6	2
0	-2	1	2	2
2	2	2	4	2
3	4	1	2	2

The rate of change is constant.

3.

x	y	Δx	Δy	$\frac{\Delta y}{\Delta x}$
-2	1			
-1	-2	1	-3	-3
0	-3	1	-1	-1
1	-2	1	1	1
2	1	1	3	3

The rate of change is constant.

5.

x	y	Δx	Δy	$\frac{\Delta y}{\Delta x}$
-1	$\frac{1}{4}$			
0	$\frac{1}{2}$	1	$\frac{1}{4}$	$\frac{1}{4}$
1	1	1	$\frac{1}{2}$	$\frac{1}{2}$
2	2	1	1	1
3	4	1	2	2

The rate of change is not constant.

7.

x	y	Δx	Δy	$\frac{\Delta y}{\Delta x}$
0	3			
1	2	1	-1	-1
2	1	1	-1	-1
3	2	1	1	1
4	3	1	1	1

The rate of change is constant on either side of the minimum.

9.

x	y	Δx	Δy	$\frac{\Delta y}{\Delta x}$
-2	9			
-1	2	1	-7	-7
0	1	1	-1	-1
1	0	1	-1	-1
2	-7	1	-7	-7

The rate of change is not constant.

Chapter 3

Lesson 3.1

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. 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.

7. 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.

9. 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.

11. 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. One difference between inductive and deductive reasoning is that inductive reasoning often depends upon a judgment call: How many examples do you need to see before you come up with a general rule? Deductive reasoning, by contrast, depends on logic, not judgment calls.

Lesson 3.2

1. If my age is 15 now, then I will be 16 on my next birthday.

   This is a conditional statement because it is in the form "If *p*, then *q*," where *p* is the statement "my age is 15 now," and *q* is the statement "I will be 16 on my next birthday."

3. If you had read the notice, then you would have known there was no class today.

   This is a conditional statement because it is in the form "If *p*, then *q*," where *p* is the statement "you had read the notice" and *q* is the statement "you would have known there was no class today."

5. If <u>it is sunny tomorrow</u>, <u>we will go to the beach</u>.

7. <u>If a and b are real numbers</u>, <u>then $a^2 + b^2$ is greater than or equal to 0</u>.

9. Direct argument:

   Today is Saturday.

   Therefore, I do not have to go to school.

   Indirect argument:

   I have to go to school today.

   Therefore, it cannot be the weekend.

11. Direct argument:

   This banana is green.

   Therefore, this banana is not ripe.

   Indirect argument:

   This banana is ripe.

   Therefore, this banana is not green.

13. The number 3 is not divisible by 2.

   Therefore, the number 3 is not an even number.

15. I am tired this morning.

   Therefore, I did not get a good night's sleep last night.

17. Let a be -1. The number -1 is a real number, and $\sqrt{(-1)^2} = \sqrt{1} = 1$, which is not equal to -1.

So, the statement is false by counterexample.

19. Let a be -1 and let b be -2. The difference is $-1 - (-2) = -1 + 2 = 1$, and 1 is a positive integer.

So, the statement is false by counterexample.

Lesson 3.3

1.

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.

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.

3.

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.

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

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

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

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

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

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

17. 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.

Answers

19. 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.

Lesson 3.4

1. Associative law of addition

3. Inverse law of multiplication

5. Identity law of multiplication

7. Associative law of multiplication

9. Commutative law of multiplication

11. Commutative law of addition

13. Identity law of addition

15. Inverse law of addition

17. 192

19. $4x + 4y$

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

$ab + ac = ba + bc + ac$
Distributive law

$ab + ac = ab + bc + ac$
Commutative law of addition

$ab + ac - ac = ab + bc + ac - ac$
Subtraction law of equality

$ab = ab + bc$
Inverse law of addition

$ab - ab = ab + bc - ab$
Subtraction law of equality

$0 = bc + ab - ab$
Additive inverse and commutative law

$0 = bc$
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.

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

$x^2 + ax + bx + ab = x^2 + ab$

$(a + b)x = 0$

Either $x = 0$ or $a + b = 0$

$a = -b$

This statement was to be true for all x, so we must ignore the $x = 0$ case, and $a = -b$. The theorem is false.

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

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

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

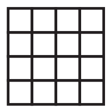
$3(6) = 12 + 2$

$18 \neq 14$

This is false, so the theorem cannot be true.

Chapter 4

Lesson 4.1

1. 

3. 

5. $a_n = 6n$

7. $a_n = n^2 + n$

9. $a_n = 3n - 1$

11. $a_n = 2n^2$

13. $a_n = n^2 - n$

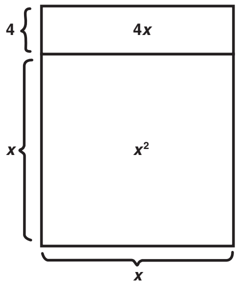
15. $a_5 = 40$, $a_6 = 54$

17. $a_5 = 76$, $a_6 = 109$

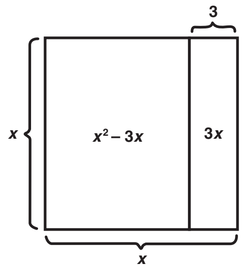
19. $a_5 = 650$, $a_6 = 1332$

Lesson 4.2

1.



3.



5. $A(x) = x^2 + 3x$

7. $A(y) = y^2 - 4y$

9.

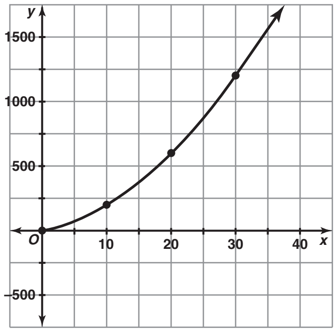
Width of Square Lot	Length of Plot	Area of Square Lot	Area of Driveway	Total Area of Plot
Feet	Feet	Square feet	Square feet	Square feet
20	32	400	240	640
50	62	2500	600	3100
80	92	6400	960	7360
100	112	10,000	1200	11,200
x	$x + 12$	x^2	$12x$	$x^2 + 12x$

11.

Width of Square Lot	Length of Plot not Covered by Driveway	Area of Square Lot	Area of Driveway	Area of Plot not Covered by Driveway
Feet	Feet	Square feet	Square feet	Square feet
20	8	400	240	160
50	38	2500	600	1900
80	68	6400	960	5440
100	88	10,000	1200	8800
y	$y - 12$	y^2	$12y$	$y^2 - 12y$

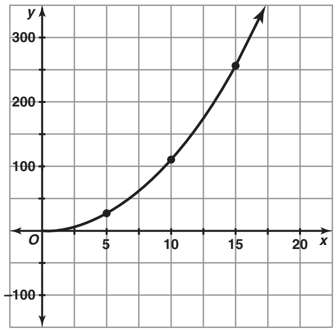
Answers

13.



The domain is all widths $x \geq 0$, and the range is all areas $y \geq 0$.

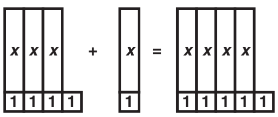
15.



The domain is all widths $x \geq 0$, and the range is all areas $y \geq 0$.

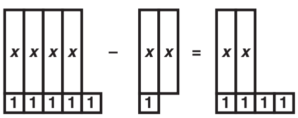
Lesson 4.3

1.



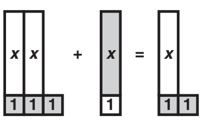
$4x + 5$

3.



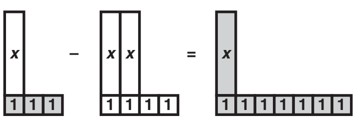
$2x + 4$

5.



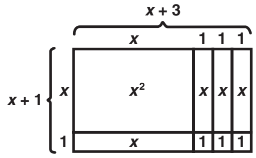
$x - 2$

7.



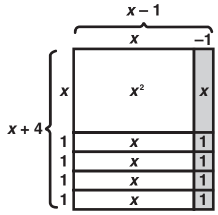
$-x - 7$

9.



$x^2 + 4x + 3$

11.



$x^2 + 3x - 4$

Lesson 4.4

1. $x^2 + 3x + 2$

3. $x^2 + 2x - 3$

5. $x^2 - 6x + 5$

7. $x^2 - 7x - 60$

9. $x - 1$

11. $x - 2$

13. $x - 6$

15. $x + 8$

17. $x - 6$

19. $x + 10$

21. $(x - 1)(x - 5)$

23. $(x - 2)(x + 3)$

Lesson 4.5

1. The factor pairs are (1, 6), (−1, −6), (2, 3), (−2, −3).

$(x + 2)(x + 3)$

3. The factor pairs are (1, 12), (−1, −12), (2, 6), (−2, −6), (3, 4), (−3, −4).

$(x + 3)(x + 4)$

5. The factor pairs are (1, −12), (−1, 12), (2, −6), (−2, 6), (3, −4), (−3, 4).

$(x + 3)(x - 4)$

7. The factor pairs are (1, −30), (−1, 30), (2, −15), (−2, 15), (3, −10), (−3, 10), (5, −6), (−5, 6).

$(x - 5)(x + 6)$

9. The factor pairs are (1, 42), (−1, −42), (2, 21), (−2, −21), (3, 14), (−3, −14), (6, 7), (−6, −7).

$(x + 6)(x + 7)$

11. The factor pairs are (1, −52), (−1, 52), (2, −26), (−2, 26), (4, −13), (−4, 13).

$(x - 4)(x + 13)$

13. The factor pairs are (1, −63), (−1, 63), (3, −21), (−3, 21), (7, −9), (−7, 9).

$(x - 3)(x + 21)$

15. The factor pairs are (1, −75), (−1, 75), (3, −25), (−3, 25), (5, −15), (−5, 15).

$(x - 5)(x + 15)$

Lesson 4.6

1. 6

3. $2\sqrt{6}$

5. $4\sqrt{6}$

7. $5\sqrt{7}$

9. 9

11. $4\sqrt{3}$

13. $6\sqrt{7}$

15. $6 + 6\sqrt{2}$

17. $15\sqrt{3}$

19. 112

21. 240

23. $42\sqrt{13}$

Lesson 4.7

1. $5\sqrt{11}$

3. $3\sqrt{2}$

5. $\sqrt{13}$

7. $8\sqrt{2}$

9. $3\sqrt{7}$

11. $7\sqrt{2}$

13. $2\sqrt{7} + 7\sqrt{2}$

15. 3

17. $\frac{2\sqrt{7}}{3}$

19. $\frac{\sqrt{15}}{3}$

21. $-\frac{2\sqrt{5}}{5}$

Lesson 4.8

1.

Side Length (inches)	Bottom Width (inches)
1	8
1.5	7
2	6
2.5	5
3	4
3.5	3

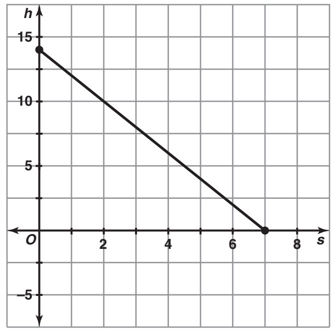
$w(l) = 10 - 2l$

3.

Strip Size (inches)	Height of Remainder (inches)
1	9
1.5	8
2	7
2.5	6
3	5
3.5	4

$h(s) = 11 - 2s$

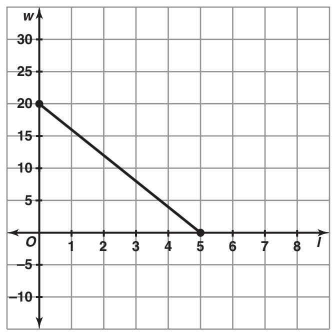
5.



The domain of $h(s)$ is numbers from 0 to 7.

The range of $h(s)$ is numbers from 0 to 14.

7.



The domain of $w(l)$ is numbers from 0 to 5.

The range of $w(l)$ is numbers from 0 to 20.

9.

Side Length (inches)	Cross-Sectional Area (square inches)
1	8
1.5	10.5
2	12
2.5	12.5
3	12
3.5	10.5

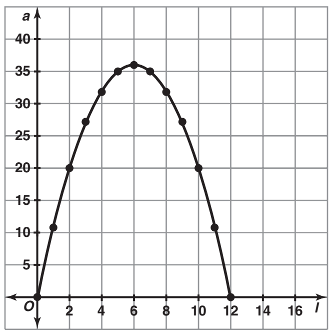
$A(l) = l \cdot w = l(10 - 2l) = 10l - 2l^2$

11.

Side Length (feet)	Fenced-in Area (square feet)
100	40,000
200	60,000
250	62,500
300	60,000
400	40,000

$A(s) = l \cdot w = s(500 - s) = 500s - s^2$

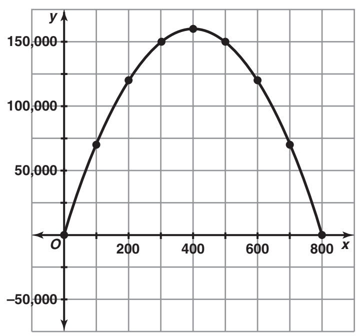
13.



The x-intercepts are (0, 0) and (12, 0).

The y-intercept is (0, 0).

15.

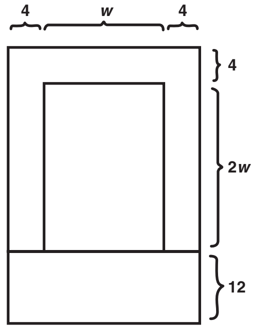


The x-intercepts are (0, 0) and (800, 0).

The y-intercept is (0, 0).

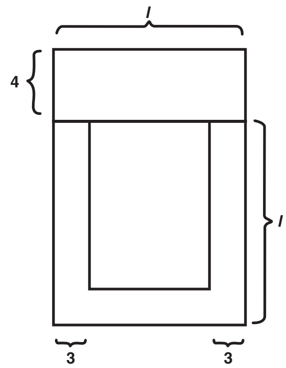
Lesson 4.9

1.



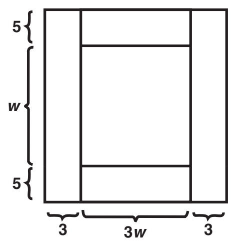
$= 2w^2 + 32w + 128$

3.



$= l^2 - 10l + 24$

5.



$= 3w^2 + 36w + 60$

7. Area $= (x + 28)(x + 12)$

Area $= (16 + 28)(16 + 12)$
$= 44(28) = 1232$

The area of the pool, walkway, and deck combined is 1232 square feet.

9. Area $= (w + 25)(w + 125)$

Area $= (200 + 25)(200 + 125) = 225(325)$
$= 73{,}125$

The area of the parking lot is 73,125 square feet.

11. The inner square has a width of 8 inches. Thus the poster has a width of 12 inches and a height of 14 inches.

13. The garden has dimensions of 20 feet by 26 feet.

Chapter 5

Lesson 5.1

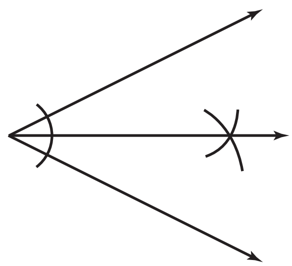
1. obtuse
3. right
5. right
7. equiangular
9. right
11. obtuse
13. acute
15. equiangular
17. x is the shortest, y is the longest
19. y is the shortest, x is the longest
21. z is the shortest, x is the longest
23. $\angle 2$, $\angle 3$
25. $\angle 1$, $\angle 3$
27. $\angle 3$
29. $\angle 1$
31. $x = 130°$
33. $x = 65°$
35. $x = 45°$
37. An exterior angle is equal to the sum of the remote interior angles. In this case, $\angle 1 + \angle 2 = 135°$. Because $\angle 1$ and $\angle 2$ must be positive, and because their sum is 135°, then both $\angle 1$ and $\angle 2$ must be less than 135°. In other words, the measure of the exterior angle, 135°, is greater than the measure of $\angle 1$ and greater than the measure of $\angle 2$.
39. An exterior angle is equal to the sum of the remote interior angles. In this case, $\angle 1 + \angle 3 = 90°$. Because $\angle 1$ and $\angle 3$ must be positive, and because their sum is 90°, then both $\angle 1$ and $\angle 3$ must be less than 90°. In other words, the measure of the exterior angle, 90°, is greater than the measure of $\angle 1$ and greater than the measure of $\angle 3$.

Lesson 5.2

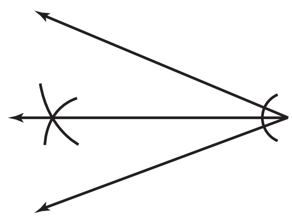
1. equilateral
3. isosceles
5. scalene
7. isosceles
9. equilateral
11. scalene
13. $\angle 1$ is the smallest, $\angle 3$ is the largest
15. $\angle 3$ is the smallest, $\angle 1$ and $\angle 2$ are the same size
17. $\angle 1$ is the smallest, $\angle 2$ is the largest
19. All angles are the same.
21. $\angle 2$ is the smallest, $\angle 1$ and $\angle 3$ are the same size
23. All angles are the same.
25. The measure of the longest side, 10 centimeters, is less than the sum of the measures of the two other sides: 4 cm + 8.5 cm 12.5 = cm.
27. The measure of the longest side, 7 centimeters, is less than the sum of the measures of the two other sides: 3 cm + 7 cm = 10 cm.
29. The measure of the longest side, 9 centimeters, is less than the sum of the measures of the two other sides: 6 cm + 6 cm = 12 cm.
31. Yes
33. No
35. Yes
37. No

Lesson 5.3

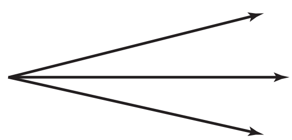
1.



3.

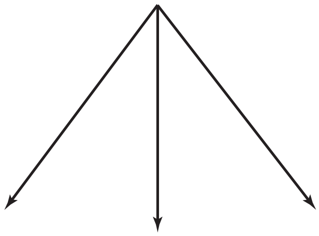


5.



Answers

7.



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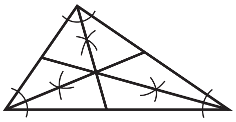

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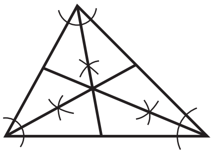

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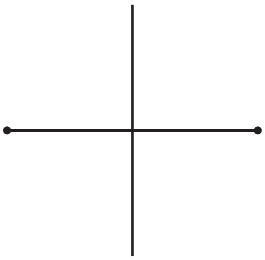

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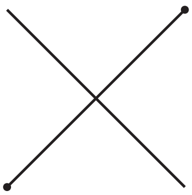

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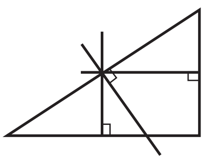
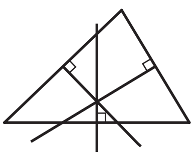


19.



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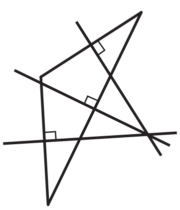
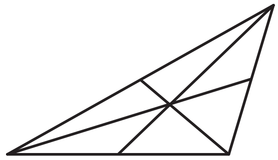
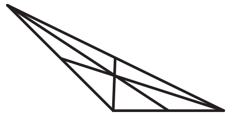


23.



25.



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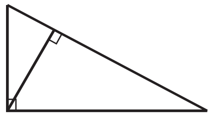

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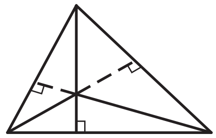

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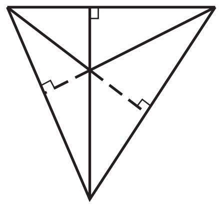


33. For all triangles, both the incenter and the centroid lie on the inside of the triangle.

35. For acute triangles, both the circumcenter and the centroid lie on the inside. For right triangles, the circumcenter lies on the hypotenuse, while the centroid lies on the inside. For obtuse triangles, the circumcenter is outside the triangle and the centroid lies on the inside.

37. For acute triangles, both the centroid and the orthocenter lie on the inside. For right triangles, the centroid lies on the inside of the triangle, while the orthocenter lies on the vertex of the right angle. For obtuse triangles, the centroid lies on the inside, while the orthocenter is outside the triangle.

Lesson 5.4

1.

Statements	Reasons
1. Angle *ABD* is an exterior angle of triangle *BCD*.	**1.** Given
2. $\angle CBD + \angle C + \angle D = 180°$	**2.** Triangle Sum Theorem
3. $\angle ABD$ and $\angle CBD$ are a linear pair	**3.** Linear Pair Postulate
4. $m\angle ABD + m\angle CBD = 180°$	**4.** Definition of a linear pair
5. $m\angle C + m\angle D = m\angle ABD$	**5.** Subtraction Property of Equality
6. $m\angle D > 0$	**6.** Definition of angle measure
7. $m\angle ABD > m\angle C$	**7.** Inequality Property

3.

Statements	Reasons
1. Angle *JKM* is an exterior angle of triangle *KLM*.	**1.** Given
2. $m\angle MKL + m\angle L + m\angle M = 180°$	**2.** Triangle Sum Theorem
3. $\angle JKM$ and $\angle MKL$ are a linear pair	**3.** Linear Pair Postulate
4. $m\angle JKM + m\angle MKL = 180°$	**4.** Definition of a linear pair
5. $m\angle L + m\angle M = m\angle JKM$	**5.** Subtraction Property of Equality
6. $m\angle M > 0$	**6.** Definition of angle measure
7. $m\angle JKM > m\angle L$	**7.** Inequality Property

5.

Statements	Reasons
1. $m\angle 1 = m\angle 4$	**1.** Given
2. $m\angle 2 = m\angle 3$	**2.** Given
3. $m\angle 1 + m\angle 2 + m\angle C = 180°$	**3.** Triangle Sum Theorem
4. $m\angle 3 + m\angle 4 + m\angle D = 180°$	**4.** Triangle Sum Theorem
5. $m\angle 1 + m\angle 2 + m\angle C = m\angle 3 + m\angle 4 + m\angle D$	**5.** Substitution using equations from steps 3 and 4
6. $m\angle 1 + m\angle 2 + m\angle C = m\angle 1 + m\angle 2 + m\angle D$	**6.** Substitution using equations from steps 1, 2, and 5
7. $m\angle C = m\angle D$	**7.** Subtraction Property of Equality

Answers

7.

Statements	Reasons
1. Angle *ABD* is an exterior angle of triangle *BCD*.	**1.** Given
2. $m\angle ABD \leq m\angle C$	**2.** Negation of Conclusion
3. $m\angle CBD + m\angle C + m\angle D = 180°$	**3.** Triangle Sum Theorem
4. $\angle ABD$ and $\angle CBD$ are a linear pair	**4.** Linear Pair Postulate
5. $m\angle ABD + m\angle CBD = 180°$	**5.** Definition of a linear pair
6. $m\angle C + m\angle CBD \geq 180°$	**6.** Substitution using equations from steps 2 and 5
7. $m\angle C + m\angle CBD \geq m\angle C + m\angle D + m\angle CBD$	**7.** Substitution using equations from steps 3 and 6
8. $m\angle C \geq m\angle C + m\angle D$	**8.** Angle Subtraction
9. $m\angle D \leq 0°$	**9.** Angle Subtraction
10. Triangle *BCD* is not a triangle	**10.** Definition of triangle

9.

Statements	Reasons
1. $m\angle 1 = m\angle 4$	**1.** Given
2. $m\angle 2 = m\angle 3$	**2.** Given
3. $m\angle C \neq m\angle D$	**3.** Negation of Conclusion
4. $m\angle C + m\angle 1 + m\angle 2 \neq m\angle D + m\angle 1 + m\angle 2$	**4.** Additive Property of Equality
5. $m\angle C + m\angle 1 + m\angle 2 \neq m\angle D + m\angle 3 + m\angle 4$	**5.** Substitution using equations from steps 1, 2, and 4
6. $m\angle 1 + m\angle 2 + m\angle C = 180°$	**6.** Triangle Sum Theorem
7. $m\angle 3 + m\angle 4 + m\angle D = 180°$	**7.** Triangle Sum Theorem
8. $180° \neq 180°$	**8.** Substitutions using equations from steps 5, 6, and 7

Lesson 5.5

1.

Statements	Reasons
1. $AB = DE = 6, BC = EF = 9, CA = FD = 8$	**1.** Given
2. $\frac{AB}{DE} = 1, \frac{BC}{EF} = 1, \frac{CA}{FD} = 1$	**2.** Division Property of Equality
3. $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$	**3.** Transitive Property of Equality
4. $\Delta ABC \sim \Delta DEF$	**4.** SSS Similarity Postulate
5. $\angle A \cong \angle D, \angle B \cong \angle E, \angle C \cong \angle F$	**5.** Definition of similar triangles
6. $\Delta ABC \cong \Delta DEF$	**6.** Definition of congruence

3.

Statements	Reasons
1. $AB = DE = 10, BC = EF = 11, CA = FD = 12$	**1.** Given
2. $\frac{AB}{DE} = 1, \frac{BC}{EF} = 1, \frac{CA}{FD} = 1$	**2.** Division Property of Equality
3. $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$	**3.** Transitive Property of Equality
4. $\Delta ABC \sim \Delta DEF$	**4.** SSS Similarity Postulate
5. $\angle A \cong \angle D, \angle B \cong \angle E, \angle C \cong \angle F$	**5.** Definition of similar triangles
6. $\Delta ABC \cong \Delta DEF$	**6.** Definition of congruence

5. From the figure, $\overline{AB} \cong \overline{BD}$, $\overline{AC} \cong \overline{CD}$, $\overline{BC} \cong \overline{BC}$. Thus $\Delta ABC \cong \Delta DBC$ by the SSS Congruence Theorem.

7. From the figure, $\overline{LM} \cong \overline{ON}$, $\overline{MN} \cong \overline{NM}$, $\angle LMN \cong \angle ONM$. Thus $\Delta LMN \cong \Delta ONM$ by the SAS Congruence Theorem.

9. From the figure, $\overline{AB} \cong \overline{EB}$, $\overline{BC} \cong \overline{BD}$, $\angle ABC \cong \angle EBD$. Thus $\Delta ABC \cong \Delta EBD$ by the SAS Congruence Theorem.

11. From the figure, $\overline{AB} \cong \overline{EB}$, $\overline{AC} \cong \overline{ED}$, $\overline{BC} \cong \overline{BD}$. Thus $\Delta ABC \cong \Delta EBD$ by the SSS Congruence Theorem.

Lesson 5.6

1. $\angle A = 25°, \angle C = 20°, \overline{AC} = 100$

   $\angle D = 25°, \angle F = 20°, \overline{DF} = 100$

   Therefore $\angle A \cong \angle D$, $\angle C \cong \angle F$, $\overline{AC} \cong \overline{DF}$, and by the ASA Postulate, $\Delta ABC \cong \Delta DEF$.

3. $\angle W = 95°, \angle M = 30°, \overline{WM} = 60$

   $\angle P = 95°, \angle L = 30°, \overline{PL} = 60$

   Therefore $\angle W \cong \angle P$, $\angle M \cong \angle L$, $\overline{WM} \cong \overline{PL}$, and by the ASA Postulate, $\Delta SWM \cong \Delta GPL$.

Answers

5. Because $\angle D = 40°$ and $\angle B = 40°$, $\angle M = 100°$. Then

$\angle Q = 40°$, $\angle Z = 100°$, $\overline{QZ} = 50$ and

$\angle D = 40°$, $\angle M = 100°$, $\overline{DM} = 50$.

Therefore $\angle Q \cong \angle D$, $\angle Z \cong \angle M$, $\overline{QZ} \cong \overline{DM}$, and by the ASA Postulate, $\Delta QZC \cong \Delta DMB$.

7. Because $\angle J = 45°$ and $\angle M = 50°$, $\angle W = 85°$. Then

$\angle D = 45°$, $\angle K = 85°$, $\overline{DK} = 70$ and

$\angle J = 45°$, $\angle W = 85°$, $\overline{JW} = 70$.

Therefore $\angle D \cong \angle J$, $\angle K \cong \angle W$, $\overline{DK} \cong \overline{JW}$, and by the ASA Postulate, $\Delta DPK \cong \Delta JMW$.

9. $\angle L = 70°$, $\angle H = 50°$, $\overline{HN} = 8$

$\angle W = 70°$, $\angle B = 50°$, $\overline{BR} = 8$

Therefore $\angle L \cong \angle W$, $\angle H \cong \angle B$, $\overline{HN} \cong \overline{BR}$, and by the AAS Theorem, $\Delta LHN \cong \Delta WBR$.

11. Since $\angle S = 45°$ and $\angle Y = 85°$, $\angle B = 50°$. Then

$\angle K = 50°$, $\angle F = 85°$, $\overline{KD} = 13$

$\angle B = 50°$, $\angle Y = 85°$, $\overline{BS} = 13$

Therefore $\angle K \cong \angle B$, $\angle F \cong \angle Y$, $\overline{KD} \cong \overline{BS}$, and by the AAS Theorem, $\Delta KDF \cong \Delta BSY$.

13. No, there is not enough information. We can see that $\angle HIG \cong \angle JIK$, and we know that $\overline{GI} = \overline{KI} = 10$ and $\overline{HG} = \overline{JK} = 12$, so two pairs of sides are congruent and one pair of angles is congruent. But these are not the included angles, and the relationship between the remaining angles cannot be determined, so none of the congruence postulates or theorems can be used.

15. Yes, there is enough information. You can see that $\angle A \cong \angle D$ and $\angle B \cong \angle E$, but the included sides are not congruent because $\overline{AB} = 20$ and $\overline{DE} = 25$. Therefore, the triangles are not congruent (although they are similar).

17. No, there is not enough information. You can see that $\angle A \cong \angle D$ and $\overline{AB} = \overline{DE} = 15$ and $\overline{BC} = \overline{EF} = 10$, so two pairs of sides are congruent and one pair of angles is congruent. But these are not the included angles, and the relationship between the remaining angles cannot be determined, so none of the congruence postulates or theorems can be used.

19. Yes, there is enough information. You can see that $\angle A \cong \angle D$ and $\angle B \cong \angle E$, and it is also true that $\overline{AC} = \overline{DF} = 12$. Therefore, by the AAS Theorem, the triangles are congruent.

Lesson 5.7

1. In the first triangle, you can apply the Pythagorean Theorem to get a value for a:

$$3^2 + a^2 = 5^2$$
$$9 + a^2 = 25$$
$$a^2 = 16$$
$$a = 4$$

Similarly, in the second triangle, you can apply the Pythagorean Theorem to get a value for b:

$$b^2 + 4^2 = 5^2$$
$$b^2 + 16 = 25$$
$$b^2 = 9$$
$$b = 3$$

Thus the two right triangles have both legs congruent, and by the SAS, SSS, or HL Theorems, the two triangles are congruent.

3. In the first triangle, you can apply the Pythagorean Theorem to get a value for x:

$$\begin{aligned} x^2 + (\sqrt{3})^2 &= 2^2 \\ x^2 + 3 &= 4 \\ x^2 &= 1 \\ x &= 1 \end{aligned}$$

Similarly, in the second triangle, you can apply the Pythagorean Theorem to get a value for y:

$$\begin{aligned} y^2 + 1^2 &= 2^2 \\ y^2 + 1 &= 4 \\ y^2 &= 3 \\ y &= \sqrt{3} \end{aligned}$$

Thus the two right triangles have both legs and hypotenuses congruent, and by the SAS, SSS, or HL Theorems, the two triangles are congruent.

5. In the first triangle, you can apply the Pythagorean Theorem to get a value for x:

$$\begin{aligned} x^2 + 3^2 &= 4^2 \\ x^2 + 9 &= 16 \\ x^2 &= 7 \\ \mathrm{x} &= \sqrt{7} \end{aligned}$$

Similarly, in the second triangle, you can apply the Pythagorean Theorem to get a value for y:

$$\begin{aligned} y^2 + (\sqrt{7})^2 &= 4^2 \\ y^2 + 7 &= 16 \\ y^2 &= 9 \\ y &= 3 \end{aligned}$$

Thus the two right triangles have both legs and hypotenuses congruent, and by the SAS, SSS, or HL Theorems, the two triangles are congruent.

7. In the first triangle, you can apply the Pythagorean Theorem to get a value for x:

$$\begin{aligned} 2^2 + x^2 &= (\sqrt{13})^2 \\ 4 + x^2 &= 13 \\ x^2 &= 9 \\ x &= 3 \end{aligned}$$

Now the hypotenuse and one leg of the first right triangle are congruent to the hypotenuse and one leg in the other right triangle. Thus by the Hypotenuse-Leg Congruence Theorem, the two triangles are congruent.

9. In the first triangle, you can apply the Pythagorean Theorem to get a value for x:

$$\begin{aligned} x^2 + (\sqrt{11})^2 &= 6^2 \\ x^2 + 11 &= 36 \\ x^2 &= 25 \\ x &= 5 \end{aligned}$$

Now the hypotenuse and one leg of the first right triangle are congruent to the hypotenuse and one leg in the other right triangle. Thus by the Hypotenuse-Leg Congruence Theorem, the two triangles are congruent.

11. In the first triangle, you can apply the Pythagorean Theorem to get a value for x:

$$\begin{aligned} x^2 + 7^2 &= 8^2 \\ x^2 + 49 &= 64 \\ x^2 &= 15 \\ x &= \sqrt{15} \end{aligned}$$

Now the hypotenuse and one leg of the first right triangle are congruent to the hypotenuse and one leg in the other right triangle. Thus by the Hypotenuse-Leg Congruence Theorem, the two triangles are congruent.

13. In the first triangle, you can apply the Pythagorean Theorem to get a value for x:

$x^2 + 3^2 = (\sqrt{13})^2$

$x^2 + 9 = 13$

$x^2 = 4$

$x = 2$

You can also apply the Pythagorean Theorem to the second triangle to solve for y:

$y^2 + 3^2 = (\sqrt{13})^2$

$y^2 + 9 = 13$

$y^2 = 4$

$y = 2$

Therefore, both right triangles have legs of length 2 and 3 and a hypotenuse of length $\sqrt{13}$. By the SAS or SSS Theorems, the two triangles are congruent.

15. In the first triangle, you can apply the Pythagorean Theorem to get a value for x:

$x^2 + 6^2 = 7^2$

$x^2 + 36 = 49$

$x^2 = 13$

$x = \sqrt{13}$

You can also apply the Pythagorean Theorem to the second triangle to solve for y:

$y^2 + 6^2 = 7^2$

$y = \sqrt{13}$

Therefore, both right triangles have legs of length 6 and $\sqrt{13}$ and a hypotenuse of length 7. By the SAS or SSS Theorems, the two triangles are congruent.

Chapter 6

Lesson 6.1

1. rhombus
parallelogram
quadrilateral

3. kite
quadrilateral

5. square
rectangle
rhombus
parallelogram
quadrilateral

7. Rectangle. The quadrilateral has two pairs of parallel sides and four right angles, but the four sides are not all congruent.

9. Rhombus. This quadrilateral has four congruent sides and two pairs of parallel sides, but it has no right angles.

11. Quadrilateral. This figure has no congruent sides or angles, and no parallel sides.

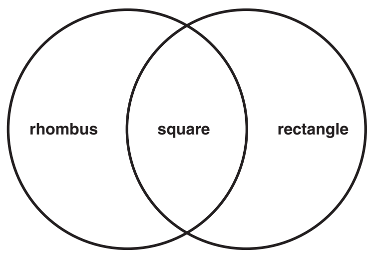
13. *ABDC* *ACDB*
BDCA *BACD*
DCAB *DBAC*
CABD *CDBA*

15. *ILKJ* *IJKL*
LKJI *LIJK*
KJIL *KLIJ*
JILK *JKLI*

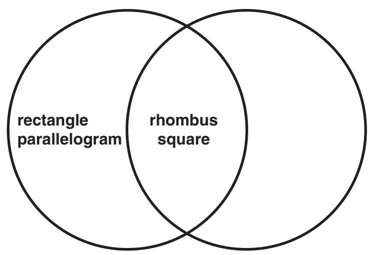
17. *AD* and *BC*

19. $\angle I$ and $\angle K$
$\angle L$ and $\angle J$

21.



23.



Lesson 6.2

1. *AB* and *CB* are congruent.
AD and *CD* are congruent.

3. Triangle *IKL* and triangle *IJL* are both isosceles triangles.

5. $\angle QPS$ and $\angle QRS$ are congruent.
$\angle RQS$ and $\angle PQS$ are congruent.
$\angle RSQ$ and $\angle PSQ$ are congruent.

7. You are given that *ABEF* and *BCDE* are both kites. This fact means that each has two pairs of adjacent sides that are congruent. By visual inspection, $\overline{AB} \cong \overline{AF}$, $\overline{BE} \cong \overline{FE}$, $\overline{BC} \cong \overline{DC}$, and $\overline{BE} \cong \overline{DE}$. By the Transitive Property of Congruence, $\overline{FE} \cong \overline{BE} \cong \overline{DE}$.

   You are also given that $\overline{AB} \cong \overline{CB}$. By the Transitive Property of Congruence, $\overline{AF} \cong \overline{AB} \cong \overline{CB} \cong \overline{CD}$.

   Because each pair of corresponding sides is congruent, *ABEF* and *CBED* are congruent.

   By the definition of congruence, corresponding angles *FAB* and *DCB* are congruent. So, $\angle FAB \cong \angle DCB$.

9. You are given that *ABFG* and *CBED* are both kites. This fact means that each has two pairs of adjacent sides that are congruent. By visual inspection, $\overline{AB} \cong \overline{FB}$, $\overline{AG} \cong FG$, $\overline{BC} \cong \overline{BE}$, and $\overline{CD} \cong \overline{ED}$.

   You are also given that $FB \cong BE$. By the Transitive Property of Congruence, $\overline{FB} \cong \overline{AB} \cong \overline{CB} \cong \overline{EB}$.

   You are also given that $\overline{FG} \cong \overline{ED}$. By the Transitive Property of Congruence, $\overline{AG} \cong \overline{FG} \cong \overline{ED} \cong \overline{CD}$.

   Because each pair of corresponding sides is congruent, *ABFG* and *CBED* are congruent.

   By the definition of congruence, corresponding angles $\angle GAB \cong \angle DEB$.

   Because two of the corresponding pairs of sides and the included angles are congruent, by the SAS Congruence Theorem, $\Delta ABG \cong \Delta EBD$.

11. *AC* and *BD* are congruent.

13. The bases are *IL* and *JK*.

15. $\angle TQS$ and $\angle URV$ are congruent.
$\angle QST$ and $\angle RVU$ are congruent.
$\angle SQR$ and $\angle VRQ$ are congruent.
$\angle QTS$, $\angle RUV$, $\angle QRU$, $\angle QTU$, $\angle TUR$, and $\angle RQT$ are congruent.

17. You are given that *ABCD* is an isosceles trapezoid. This fact means that $\overline{AD} \cong \overline{BC}$, and $\angle ADC$ and $\angle BCD$ are congruent.

    Also, by the Reflexive Property of Congruence, $\overline{DC} \cong \overline{CD}$.

    By the SAS Congruence Theorem, $\Delta CDA \cong \Delta DCB$.

    $\angle ACD$ and $\angle BDC$ are corresponding angles. By the definition of congruent figures, $\angle ACD \cong \angle DBC$.

    Because all three pairs of corresponding sides are congruent, $\Delta ACD \cong \Delta BDC$.

19. You are given that $\overline{AB} \cong \overline{ED}$ and $\overline{AF} \cong \overline{EF}$.

    Because *ABCF* and *FEDC* are isosceles trapezoids, $\overline{AF} \cong \overline{BC}$ and $\overline{EF} \cong \overline{DC}$. By the Transitive Property of Congruence, $\overline{BC} \cong \overline{AF} \cong \overline{EF} \cong \overline{DC}$.

    By the Reflexive Property of Congruence, $\overline{FC} \cong \overline{FC}$.

    Because all four pairs of corresponding sides are congruent, *ABCF* and *FEDC* must be congruent.

    $\angle AFC$ and $\angle EFC$ are corresponding angles. By the definition of congruent figures, $\angle AFC \cong \angle EFC$.

Lesson 6.3

1. *AB* and *BD*
BD and *DC*
DC and *CA*
CA and *AB*

3. $\angle I$ and $\angle K$
$\angle L$ and $\angle J$

Answers

5. Sides AB and CD are parallel segments that are cut by a transversal. By the Alternate Interior Angles Theorem, corresponding angles CDA and BAD are congruent.

   Sides AC and BD are parallel segments that are cut by a transversal. By the Alternate Interior Angles Theorem, corresponding angles CAD and BDA are congruent.

   By the Reflexive Property of Equality, $\overline{AD} \cong \overline{DA}$.

   Because corresponding angles CAD and BDA are congruent and corresponding angles CDA and BAD are congruent (and the included sides are congruent), by the ASA Congruence Theorem, $\Delta ACD \cong \Delta DBA$.

   By the definition of congruence, corresponding angles B and C are congruent. So, $\angle B \cong \angle C$.

7. Sides IK and LJ are parallel segments that are cut by transversal JK. By the Alternate Interior Angles Theorem, corresponding angles IKJ and LJK are congruent.

   Because points J and M both lie on $\overleftrightarrow{KJ}$, $\angle IKJ \cong \angle IKM$.

   Because points K and M both lie on $\overleftrightarrow{JK}$, $\angle LJK \cong \angle LJM$.

   By the Transitive Property of Congruence, $\angle IKM \cong \angle IKJ \cong \angle LJK \cong \angle LJM$.

   By the Vertical Angles Congruence Theorem, $\angle IMK \cong \angle LMJ$.

   Because you know that two pairs of corresponding angles and a non-included pair of corresponding sides are congruent, by the AAS Congruence Theorem, $\Delta IMK \cong \Delta LMJ$.

9. Consecutive angles of a rhombus are supplementary.

11. Consecutive sides of a rhombus must be congruent.

13.

Statement	Reason
1. $\overline{AC}$ bisects $\angle DAB$ and $\angle DCB$.	1. Given
2. $\angle DAC \cong \angle BAC$	2. Definition of angle bisector
3. $\angle DCA \cong \angle BCA$	3. Definition of angle bisector
4. $\overline{AC} \cong \overline{AC}$	4. Reflexive Property of Congruence
5. $\Delta ADC \cong \Delta ABC$	5. ASA Congruence Theorem
6. $\angle D \cong \angle B$	6. Definition of congruence

15.

Statement	Reason
1. $\overline{IK}$ bisects $\angle JIL$.	1. Given
2. $\angle LIM \cong \angle JIM$	2. Definition of angle bisector
3. $\overline{IM} \cong \overline{IM}$	3. Reflexive Property of Congruence
4. $\overline{IL} \cong \overline{IJ}$	4. Given
5. $\Delta JIM \cong \Delta LIM$	5. SAS Congruence Theorem
6. $\angle IMJ \cong \angle IML$	6. Definition of congruence

Lesson 6.4

1. A rectangle must have two pairs of parallel sides, so a rectangle is always a parallelogram.

3. A square is a rectangle with four congruent sides. If all four sides of the rectangle are congruent, then it is a square.

5. The diagonals of a rhombus are perpendicular. Because a square is a special kind of rhombus, the diagonals of a square must also be perpendicular.

7. A rectangle is a rhombus if all of its sides are congruent. In other words, if the rectangle is a square because a square is a special type of rhombus.

9. A rhombus is a rectangle if all of its angles are right angles. In other words, if the rhombus is a square, then it would also be a rectangle.

11. The length of diagonal AD is $2\sqrt{41}$ feet.
$BC = AD = 2\sqrt{41}$
The length of diagonal BC is $2\sqrt{41}$ feet.

13. The length of diagonal PN is $3\sqrt{13}$ feet.
$MO = PN = 3\sqrt{13}$
The length of diagonal MO is $3\sqrt{13}$ feet.

15. CD is $5\sqrt{3}$ centimeters.

17. IL is $2\sqrt{39}$ inches.

19. QS is $2\sqrt{23}$ feet.

21. AD is 12 millimeters.

23. The length of each side of the garden is approximately 35.4 meters.

25. The length of the diagonal is approximately 33.9 inches.

Lesson 6.5

1. The sum of the interior angles is 360°.

3. The sum of the interior angles is 720°.

5. The sum of the interior angles of the polygon is 540°.

7. The sum of the interior angles of the polygon is 1080°.

9. The sum of the interior angles of the polygon is 1800°.

11. The sum of the interior angles of the polygon is 2520°.

13. The measure of each interior angle is 135°.

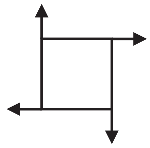
15. The measure of each interior angle is 120°.

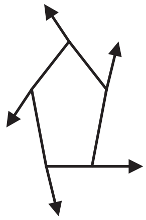
17. The regular polygon has 5 sides. It is a pentagon.

19. The regular polygon has 10 sides. It is a decagon.

21. The regular polygon has 18 sides.

Lesson 6.6

1. 

3. 

5. Interior and exterior angles are supplementary. So subtract 90°, the measure of the interior angle, from 180°:

$180° - 90° = 90°$

7. Interior and exterior angles are supplementary. So subtract 108°, the measure of the interior angle, from 180°:

$180° - 108° = 72°$

9. Interior and exterior angles are supplementary. So subtract 115°, the measure of the interior angle, from 180°:

$180° - 115° = 65°$

11. Each external angle of a square measures 90°.

13. Each external angle of a regular hexagon measures 60°.

15. The sum of the external angle measures of a regular pentagon is 360°.

17. The sum of the external angle measures of a regular octagon is 360°.

19. The sum of the external angle measures of the polygon is 360°.

21. The sum of the external angle measures of the polygon is 360°.

23. The sum of the external angle measures of the polygon is 360°.

Answers

Chapter 7

Lesson 7.1

1. P(not 3) $= \frac{3}{4}$
3. P(5) $= \frac{0}{4} = 0$
5. P(odd) $= \frac{2}{4} = \frac{1}{2}$
7. P(prime number) $= \frac{2}{4} = \frac{1}{2}$
9. P(number greater than 1) $= \frac{3}{4}$

11. $\frac{1}{51}, \frac{1}{52}$

13. $\frac{12}{51}, \frac{13}{52} = \frac{1}{4}$

15. $\frac{25}{51}, \frac{26}{52} = \frac{1}{2}$

17. $\frac{23}{51}, \frac{24}{52} = \frac{6}{13}$

19. $\frac{1}{26}$

21. $\frac{1}{8}$

23. $\frac{5}{26}$

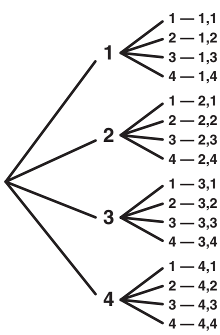
25.

	J	Q	K	A
J	J, J	Q, J	K, J	A, J
Q	J, Q	Q, Q	K, Q	A, Q
K	J, K	Q, K	K, K	A, K
A	J, A	Q, A	K, A	A, A

27.

	2	3	4	5	6
2	2, 2	3, 2	4, 2	5, 2	6, 2
3	2, 3	3, 3	4, 3	5, 3	6, 3
4	2, 4	3, 4	4, 4	5, 4	6, 4
5	2, 5	3, 5	4, 5	5, 5	6, 5
6	2, 6	3, 6	4, 6	5, 6	6, 6

29.



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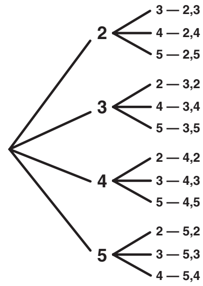

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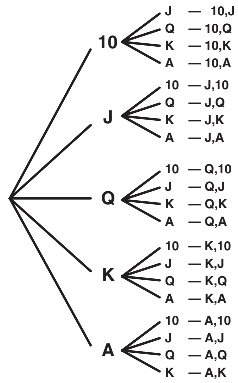


Lesson 7.2

1. $\frac{1}{25}$

3. $\frac{1}{16}$

5. $\frac{1}{25}$

7. $\frac{1}{625}$

9. $\frac{4}{95}$

11. $\frac{1}{19}$

13. $\frac{3}{171}$

15. $\frac{1}{4845}$

17. **a.** $\frac{1}{1140}$ **b.** $\frac{1}{6840}$

19. **a.** $\frac{1}{3060}$ **b.** $\frac{1}{73,440}$

21. There is an 80 percent probability that a student who scored an 80 or above on the first test also scored an 80 or above on the second test.

23. There is a 90 percent chance of actually having the disease given a positive test.

25. There is a 25 percent chance of getting a hit on the second successive at-bat after getting a hit on the first at-bat.

Lesson 7.3

1. 24

3. 1

5. 60

7. $\frac{1}{15}$

9. ${}_8P_4 = 1680$

Answers

11. ${}_{12}P_{10} = 239{,}500{,}800$

13. ${}_{8}C_{4} = 70$

15. ${}_{9}C_{6} = 84$

17. Probability of alphabetical arrangement $= \dfrac{1}{3{,}628{,}800}$

19. Probability of guessing $= \dfrac{20}{30{,}240} = \dfrac{1}{1512}$

21. $\dfrac{33}{66{,}640}$

23. $\dfrac{1}{15{,}504}$

25. 2520

27. 302,400

29. 362,880

31. 3,628,800

Lesson 7.4

1. $\dfrac{9}{64}$

3. $\dfrac{3}{64}$

5. $\dfrac{1}{32}$

7. $\dfrac{125}{324}$

9. $\dfrac{625}{11{,}664}$

11. $\dfrac{27}{128}$

13. $\dfrac{135}{4096}$

15. There are six different ways to get two As and two Bs: AABB, ABAB, ABBA, BABA, BAAB, BBAA. The probability for each individual outcome is $p^2(1 - p)^2$. Therefore, the total probability is six times this, or $6p^2(1 - p)^2$.

17. There are ${}_{10}C_5$ different ways to get five *A*s and five *B*s. The probability for each individual outcome is $p^5(1 - p)^5$. Therefore, the total probability is ${}_{10}C_5\, p^5(1 - p)^5$.

Lesson 7.5

1. \$625

3. \$316.67

5. \$340

7. \$13

9. \$0.50

11. \$0.20

13. \$0.80

15. \$1.30

17. \$1

19. \$2

21. \$0.50

23. \$3

25. \$0.33

27. \$1.33

29. \$3.33

31. \$2

Lesson 7.6

1. $\dfrac{2}{5}$

3. $\dfrac{1}{2}$

5. $\dfrac{21}{26}$

7. $\dfrac{4}{25}$

9. $\dfrac{3}{20}$

11. $\dfrac{1}{5}$

13. $\dfrac{19}{100}$

15. 35

17. 25

19. $7.69 \approx 8$

21. The experimental probabilities are likely to be different, but close in value.

23. The experimental probabilities will get closer to the theoretical probability of $\frac{1}{4}$ as the number of trials increases.

Chapter 8

Lesson 8.1

1.

Key: 8|0 = 80 Points

Stem	Leaves
5	8
6	3
7	4 5
8	1 6 8
9	0 2 7

3.

Key: 8|6 = 86 degrees Fahrenheit

Stem	Leaves
6	8
7	4 4 8 9
8	2 5 5 8
9	1 3 5

5. The data set has a symmetric distribution.

7. The data set is skewed right.

9. The data set is skewed left.

11. The mean is 24.8 birds.

13. The mean is approximately 8.6 miles.

15. The median is 5.5 inches of precipitation.

17. The median is 27 kilometers.

19. The values 29 and 31 each occur 3 times in the data set, so the modes are 29 students and 31 students.

21. The value 25 occurs more than any other value in the data set, so the mode is 25 patients.

23. The distribution is skewed left. So, the median is greater than the mean.

25. The distribution is skewed right. So, the mean is greater than the median.

Lesson 8.2

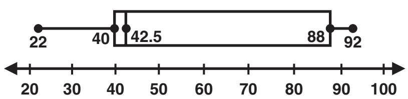
1. The mean of the sample is 45.5.

3. The mean of the sample is 59.6.

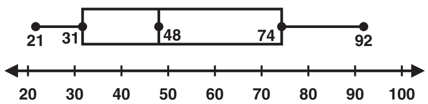
5. The median is 52 years.
The first quartile is 34 years.
The third quartile is 58 years.

7. The median is $72.50.
The first quartile is $45.
The third quartile is $80.

9.



11.



13. Sample 2 has a greater median.

15. The distance between the first quartile and the third quartile is greater for Sample 1.

17. Mean = 35.2 minutes

19. Mean ≈ 3.4

25. The average absolute deviation from the mean is 16.6.

27. The average absolute deviation from the mean is 12.4.

29. The average absolute deviation from the median is 17.8.

31. The average absolute deviation from the median is 15.2.

Lesson 8.3

1. The sample would consist of the following values:

42, 26, 39, 42, 9, 47, 22, 50, 15, 24, 30, 10, 25, 28, 14, 34, 5, 29, 18, 48

3. The sample would consist of the values from the third, sixth, and ninth rows:

38, 7, 27, 22, 18, 21, 17, 23, 30, 12, 13, 23, 45, 7, 16

5. The mean of the sample is 25.9.

7. The mean of the sample is 42.5.

9. The mean of the sample is 276.

11. The mean of the sample is 610.1.

13. Including a very low outlier could make the mean of the random sample less than the mean of the population.

15. No, the mean and the median will vary depending on what values are in each random sample.

21.

Days with Precipitation, October–February					
Value	10	9	4	5	9
Absolute deviation from the median	$\|10 - 9\| = 1$	$\|9 - 9\| = 0$	$\|4 - 9\| = 5$	$\|5 - 9\| = 4$	$\|9 - 9\| = 0$

Values in order: 4, 5, 9, 9, 10
Median = 9 days

23.

Number of Emails Sent					
Value	9	7	2	6	14
Absolute deviation from the median	$\|9 - 7\| = 2$	$\|7 - 7\| = 0$	$\|2 - 7\| = 5$	$\|6 - 7\| = 1$	$\|14 - 7\| = 7$

Values in order: 2, 6, 7, 9, 14
Median = 7

17. Answers will vary. All numbers should be within the given interval.

19. Answers will vary. All numbers should be within the given interval.

21. The sample consists of these values:
4.0, 3.1, 3.5, 2.2, 2.7, 2.3, 2.0, 3.8, 2.1, 1.9
The mean GPA is 2.8.
Sample in numerical order: 1.9, 2.0, 2.1, 2.2, 2.3, 2.7, 3.1, 3.5, 3.8, 4.0
The median GPA is 2.5.

23. The sample consists of these values:
72, 98, 89, 55, 17, 73, 73, 70, 16
The mean is 62.6 fish.
Sample in order: 16, 17, 55, 70, 72, 73, 73, 89, 98
The median is 72 fish.

Lesson 8.4

1. Sample: 21, 2, 37, 14, 22, 4, 32, 59
The mean of the sample is 23.9.

3. Sample: 1, 6, 2, 14, 27, 14, 43, 30
The mean of the sample is 17.1.

5. Sample: 30, 8, 34, 18, 7, 16, 7
The mean of the sample is 17.1.

7. Sample: 32, 14, 57, 63, 65, 75, 57
The mean of the sample is 51.9.

9. Sample: 168, 30, 152, 156, 146, 138, 24
The mean of the sample is 116.3.

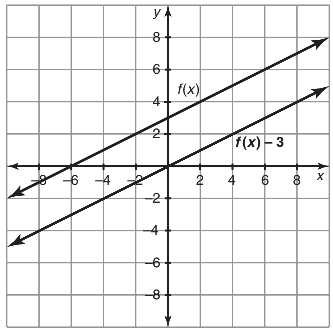
11. If the sample is representative, the mean for the entire population will be about 10.4 raccoons per day. (But it might be different, depending on the sample.)

13. If the sample is representative, the median for the entire population will be about the same as for the sample. So about half of the students should have 4 or fewer absences:
$486 \div 2 = 243$
About 243 students should have 4 or fewer absences.

Chapter 9

Lesson 9.1

1.



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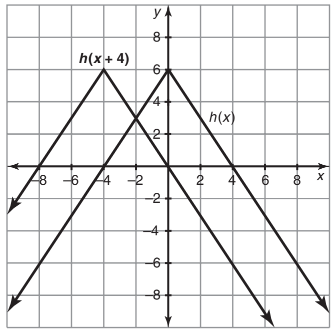

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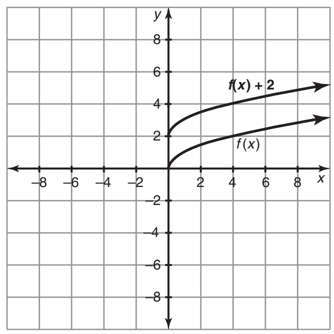
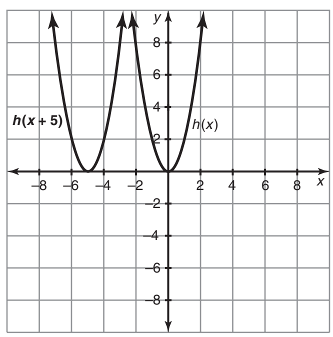


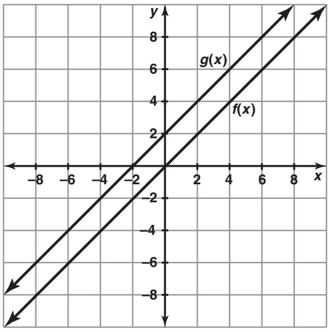
7.



Answers

Answers

9.



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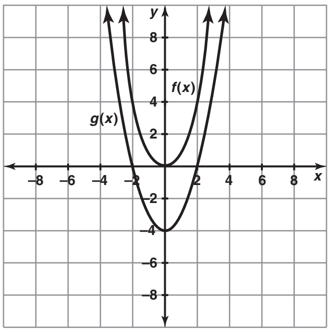

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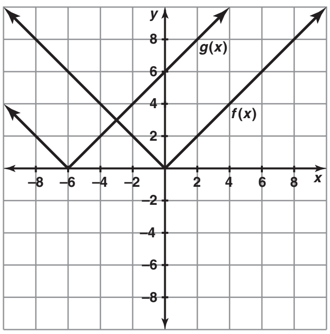

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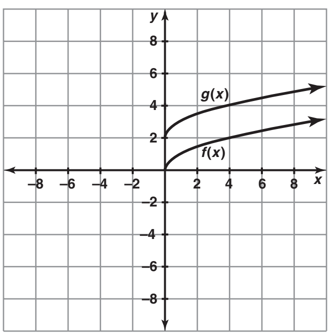


17. The translated graph is 5 units left of $f(x)$, so the equation for the translation is $f(x + 5)$.

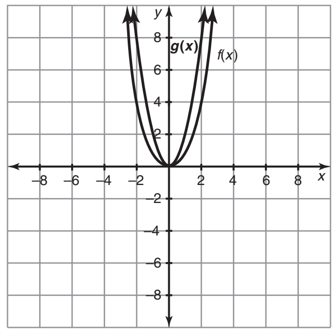
19. The translated graph is 3 units above $h(x)$, so the equation for the translation is $h(x) + 3$.

21. The translated graph is 6 units above $f(x)$, so the equation for the translation is $f(x) + 6$.

23. The translated graph is 4 units to the right of $h(x)$, so the equation for the translation is $h(x - 4)$.

Lesson 9.2

1.



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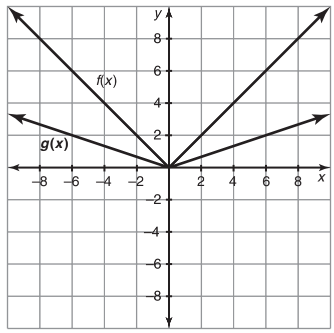

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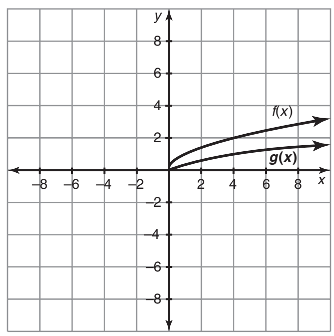

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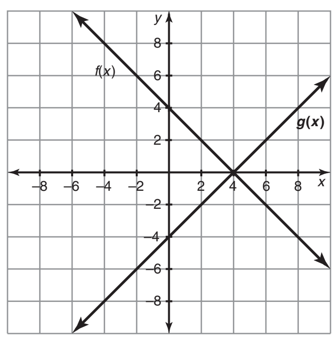

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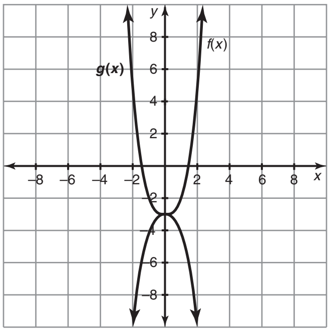

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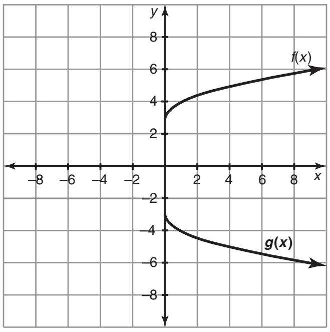


13. The graph of $g(x)$ is the graph of $f(x)$ reflected in the x-axis, so $g(x) = -f(x)$.

15. The graph of $g(x)$ is the graph of $f(x)$ dilated by a factor of 4, so $g(x) = 4f(x)$.

17. The graph of $g(x)$ is the graph of $f(x)$ dilated by a factor of $\frac{1}{4}$, so $g(x) = \frac{1}{4}f(x)$.

19. The graph of $g(x)$ is the graph of $f(x)$ reflected in the y-axis, so $g(x) = f(-x)$.

21.

Function	Value at $x = 0$	Value at $x = 10$	Average Rate of Change
$f(x) = \|x\|$	$f(0) = \|0\| = 0$	$f(10) = \|10\| = 10$	$\frac{\Delta f(x)}{\Delta x} = \frac{f(10) - f(0)}{10 - 0} = \frac{10 - 0}{10}$ $= 1$
$g(x) = 0.25\|x\|$	$g(0) = 0.25\|0\| = 0$	$g(10) = 0.25\|10\| = 2.5$	$\frac{\Delta g(x)}{\Delta x} = \frac{g(10) - g(0)}{10 - 0} = \frac{2.5 - 0}{10}$ $= 0.25$
$h(x) = 6\|x\|$	$h(0) = 6\|0\| = 0$	$h(10) = 6\|10\| = 60$	$\frac{\Delta h(x)}{\Delta x} = \frac{h(10) - h(0)}{10 - 0} = \frac{60 - 0}{10}$ $= 6$

23.

Function	Value at $x = 0$	Value at $x = 4$	Average Rate of Change
$f(x) = x^2$	$f(0) = 0^2 = 0$	$f(4) = 4^2 = 16$	$\frac{\Delta f(x)}{\Delta x} = \frac{f(4) - f(0)}{4 - 0} = \frac{16 - 0}{4}$ $= 4$
$g(x) = 0.5x^2$	$g(0) = 0.5(0^2) = 0$	$g(4) = 0.5(4^2) = 0.5(16)$ $= 8$	$\frac{\Delta g(x)}{\Delta x} = \frac{g(4) - g(0)}{4 - 0} = \frac{8 - 0}{4}$ $= 2$
$h(x) = 3x^2$	$h(0) = 3(0^2) = 0$	$h(4) = 3(4^2) = 3(16)$ $= 48$	$\frac{\Delta h(x)}{\Delta x} = \frac{h(4) - h(0)}{4 - 0} = \frac{48 - 0}{4}$ $= 12$

Answers

25. $f(5) = 13$
$g(5) = -13$

27. $f(-3) = -108$
$g(-3) = 108$

29. $f(8) = -2$
$g(8) = 6$

Lesson 9.3

1. The line of symmetry for the function is $x = -2$.

3. The line of symmetry for the function is $x = 0$.

5. This function does not have a line of symmetry.

7. $f(x)$ does not equal $f(-x)$ so $f(x)$ is not even.
$f(x) = -f(-x)$ so $f(x)$ is odd.

9. $f(x)$ does not equal $f(-x)$ so $f(x)$ is not even.
$f(x)$ does not equal $-f(-x)$ so $f(x)$ is not odd.

11. $f(x)$ is even.
$f(x)$ is not odd.

13. The function is odd.
Explanations may vary; sample answer: Looking at the graph, for each value of x, $f(x) = -f(-x)$. For example, $f(2) = 0 = -f(-2)$.

15. The function is even.
Explanations may vary; sample answer: The function is even because it is symmetric with respect to the y-axis.

Lesson 9.4

1. $c = 15t + 6$

3. $p = 0.1t + 30$

5. $c = 25b + 1.25b = 26.25b$

7. The two points of intersection are (5, 25) and (−4, 16).

9. The point of intersection is (9, 44).

11. $f(x) = g(x)$
Because the two functions form an identity, they have an infinite number of solutions, and every point on $f(x)$ is a point of intersection with $g(x)$.

13. Company A's plan would cost \$37 for the month, so company B's plan would be less expensive for Devon.

15. Bookstore B would charge \$108, which is \$9 less than bookstore A, so Manisha should buy the books from bookstore B.

17. The point of intersection is (2, −1)

19. The point of intersection is (5, 2).

Chapter 10

Lesson 10.1

1. $x = 3$ or $x = 5$

3. $x = -1$ or $x = 21$

5. $x = -2$ or $x = 24$

7. No solutions

9. $x = 5$ or $x = 20$

11. $x = 3$ or $x = 4$

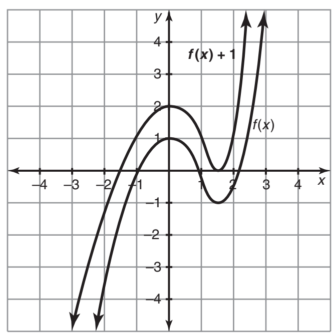
13. $x = -3$ or $x = 13$

15. No zeros

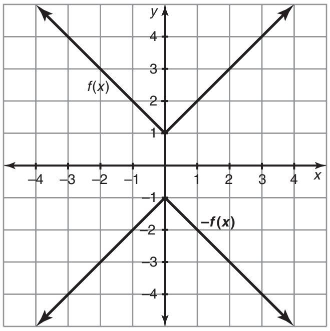
17. $x = -3$ or $x = -21$

19. $x = 11$ or $x = 12$

Lesson 10.2

1.


3.



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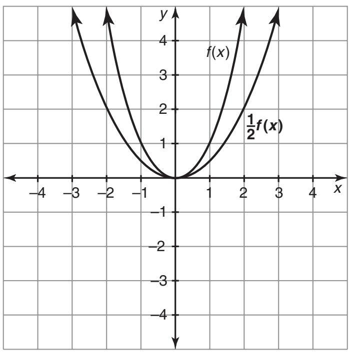


7. $f(x) - 2$

9. $1 - f(x)$

11. $-f(x - 2)$

13. $-2f(x) - 1$

15. $x = 2$ or $x = 11$

17. $x = -2$ or $x = 2$ or $x = -3$ or $x = 3$

19. $x = 0$ or $x = 1$ or $x = 7$

21. $x = 0$ or $x = -3$ or $x = 8$

23. $x = 3$ or $x = -3$ or $x = -4$

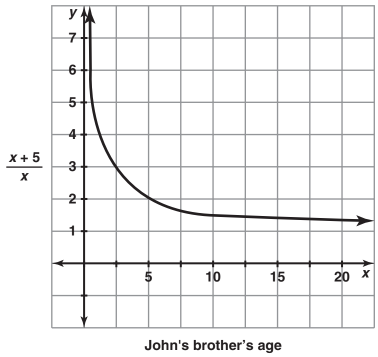
25. $x = 0$ or $x = 2$ or $x = -2$ or $x = -5$

Lesson 10.3

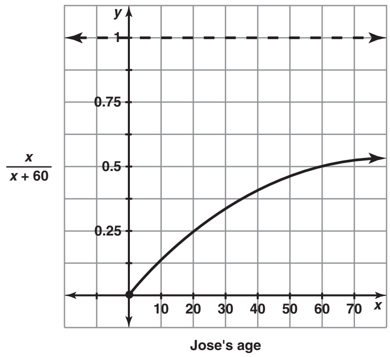
1. $\dfrac{x}{x - 4}$

3. $\dfrac{x}{2x - 10}$

5.



7.



9. $x = -\dfrac{4}{13}$

11. $x = -5$

13. $x = 5$

15. $x = -6$

17. $x = 0, 9$

19. $x = 8$

21. No solution

23. $x = 0$

Lesson 10.4

1. It would take Britney 60 minutes to complete the job if she were working alone.

3. It would take Jason 90 minutes to complete the job if he were working alone.

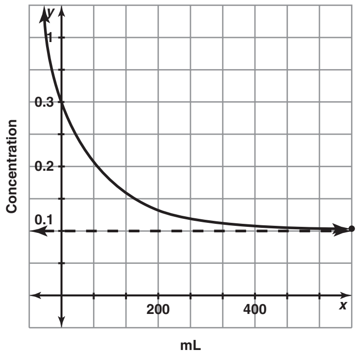
5. It would take Nicholas and Don 40 minutes if they worked together to mow the lawn.

7. To produce a solution with 8% salt, 20 milliliters of water should be added.

9. To produce a solution with 4% salt, 330 milliliters of water should be added.

11. The 30% solution contains 12 milliliters of acid and 28 milliliters of water, and the 10% solution contains $0.1x$ milliliters of acid.

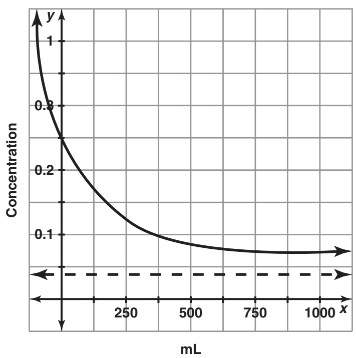
$$S(x) = \frac{12 + 0.1x}{40 + x}$$



Domain: all $x \geq 0$
Range: $0.1 < y \leq 0.3$

13. The 25% solution contains 15 milliliters of acid and 45 milliliters of water, and the 4% solution contains $0.04x$ milliliters of acid.

$$S(x) = \frac{15 + 0.04x}{60 + x}$$



Domain: all $x \geq 0$
Range: $0.04 < y \leq 0.25$

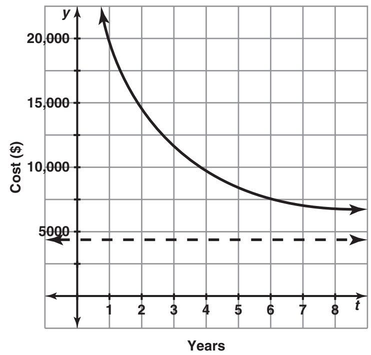
15. The average yearly cost of ownership after 2 years would be $1200.

The average yearly cost of ownership after 5 years would be $600.

17. The average yearly cost of ownership will be $650 after 3 years.

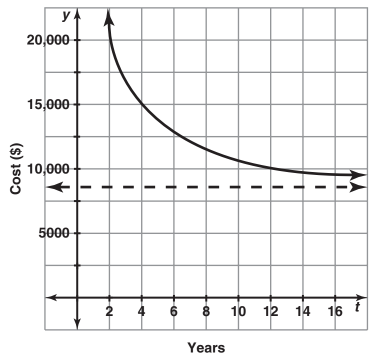
The average yearly cost of ownership will be $450 after 5 years.

19. $C(t) = \dfrac{20{,}000 + 4500t}{t}$



Domain: all $t > 0$
Range: $y > 4500$

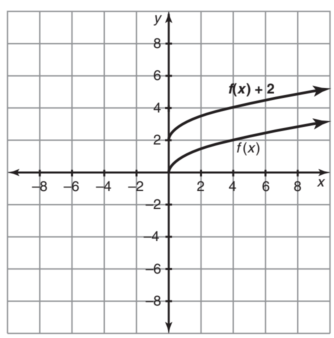
21. $C(t) = \dfrac{25{,}000 + 8500t}{t}$



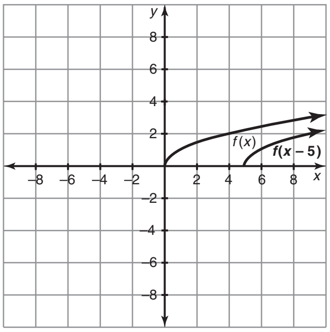
Domain: all $t > 0$
Range: $y > 8500$

Lesson 10.5

1.



3.



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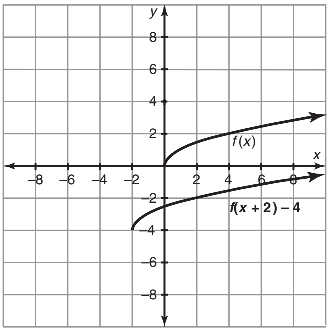
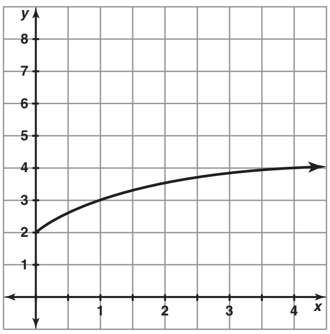


7. $f(x) - 8$

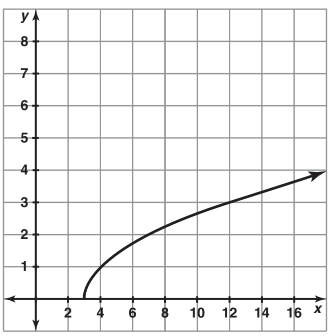
9. $f(x - 4)$

11. $f(x + 1) + 2$

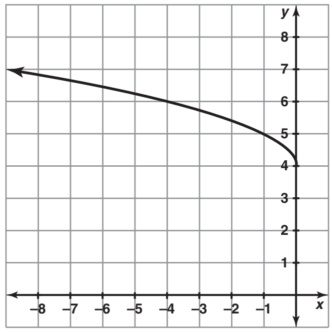
13.



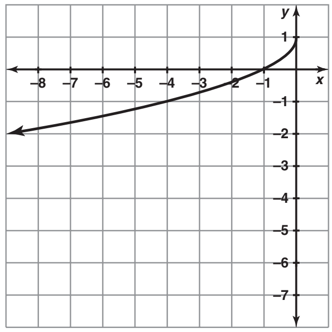
15.



17.



19.



21. $x = 8$

23. $x = 7$

25. $x = 16, 25$

Check: $\sqrt{16} - 16 \neq -20$ Extraneous root

$\sqrt{25} - 25 = -20.$

The solution is $x = 25$.

27. $x = 18, 32$

Check: $18 + \sqrt{2(18)} = 24$

$32 + \sqrt{2(32)} \neq 24$ Extraneous root

The solution is $x = 18$.

Answers

Lesson 10.6

1. To form the graph of $g(x)$, the function $f(x) = |x|$ was:

shifted right 2 units

shifted up 4 units

reflected about the x-axis

expanded by a factor of 2.

To express these transformations algebraically, we write:

$$g(x) = -\frac{1}{2}f(x - 2) + 4$$

$$= -\frac{1}{2}|x - 2| + 4$$

3. To form the graph of $g(x)$, the function $f(x) = x^2$ was:

shifted left 7 units

shifted up 10 units

reflected about the x axis

dilated by a factor of 2.

To express these transformations algebraically, we write:

$$g(x) = -2f(x + 7) + 10$$

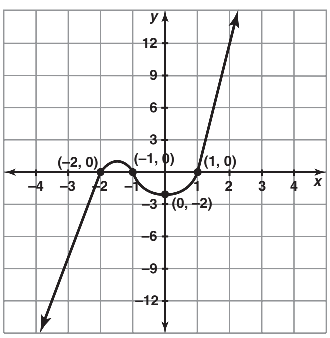
$$= -2(x + 7)^2 + 10$$

$$= -2x^2 - 28x - 88$$

5. $x = 1$ or $x = -1$ or $x = -2$

The x-intercepts are at the roots of the equation: $x = -2, -1, 1.$

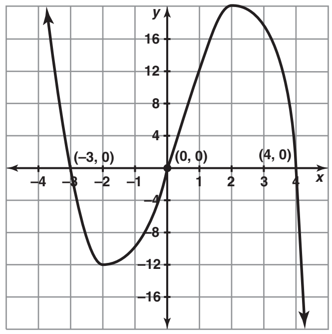
The y-intercept is $y = -2.$



7. $x = 0$ or $x = -3$ or $x = 4$

The x-intercepts are at the roots of the equation: $x = -3, 0, 4.$

The y-intercept is $y = 0.$



9. $x = 3$ or $x = -6$

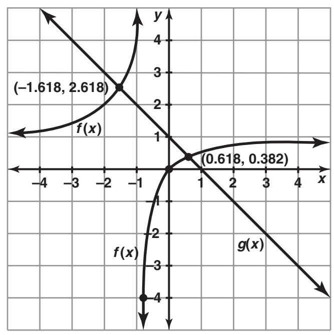
11. $x = 1$ or $x = -11$

13. $x = 45$

15. $x = 7$

17. $x = -1$ or $x = 8$

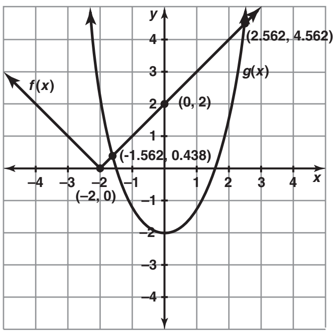
19. $f(x) = \dfrac{x}{x + 1}$ $\quad g(x) = 1 - x$



$x \cong -1.618$ or $x \cong 0.618$

Answers

21. $f(x) = |x + 2|$ $\quad$ $g(x) = x^2 - 2$



$x \cong -1.562$ or $x \cong 2.562$

Chapter 11

Lesson 11.1

1. $c = 10$ cm

3. $c \approx 10.6$ in.

5. $7 - 2 = 5$

7. $4 - (-8) = 12$

9. $x \approx \pm 7.4$

11. $x = 1$

13. $y \approx \pm 2.8$

15. $y = 3$

17. $d = 5$

19. $d = 13$

21. $d = \sqrt{146} \approx 12.1$

23. $d = \sqrt{317} \approx 17.8$

25. ≈ 10.0

27. ≈ 12.5

29. ≈ 10.2

31. ≈ 16.3

Lesson 11.2

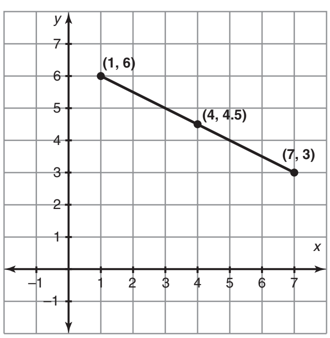
1. (4, 6)

3. (−5, −6)

5. (1, 5)

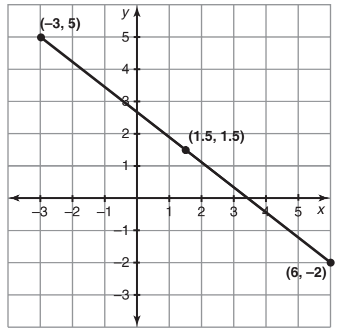
7. $\left(\frac{13}{2}, \frac{-7}{2}\right)$

9.



(4, 4.5)

11.

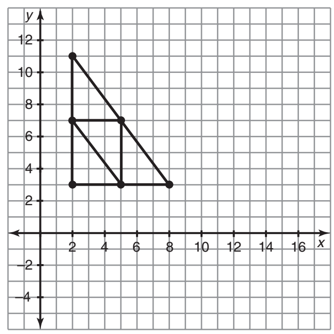


(1.5, 1.5)

13. (2, −2)

15. (4, 5)

17.

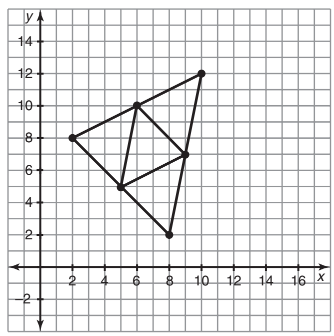


(5, 3)

(5, 7)

(2, 7)

19.



(9, 7)

(5, 5)

(6, 10)

Lesson 11.3

1. Yes, they are parallel.

3. No, they are not parallel.

5. Yes. Same slope, different y-intercepts.

7. No. They have different slopes.

9. $y = 3x - 4$

11. $y = \frac{1}{2}x - \frac{5}{2}$

13. $y = -\frac{1}{3}x - \frac{7}{3}$

15. No, they are not perpendicular.

17. No, they are not perpendicular.

19. Yes. The slopes have a product of -1, so they are perpendicular.

21. No. The slopes do not have a product of -1, so they are not perpendicular.

23. $y = -\frac{1}{4}x + \frac{3}{4}$

25. $y = -2x - 4$

27. $y = 2x$

29. Horizontal: $y = -1$
Vertical: $x = 3$

31. Horizontal: $y = -15$
Vertical: $x = -10$

33. $y = -4$

35. $x = -13$

37. ≈ 2.24

39. ≈ 4.12

Lesson 11.4

1. slope $\overline{AB} = 0$
slope $\overline{BC} = -2$
slope $\overline{AC} = \frac{1}{2}$

3. slope $\overline{AB} = 0$
slope $\overline{BC} = -3$
slope $\overline{AC} = 3$

5. $AB = 3\sqrt{10}$
$BC = \sqrt{10}$
$AC = 10$

7. $AB = 8\sqrt{5}$
$BC = 16$
$AC = 8\sqrt{5}$

9. $M = (4, 5.5)$
$N = (5, 9)$
$P = (3, 6.5)$

11. $M = (-3.5, -3.5)$
$N = (-4.5, 1.5)$
$P = (-2, 0)$

13. ABC has no sides at right angles and no sides of equal length, so it is a scalene triangle.

15. ABC has no sides at right angles and no sides of equal length, so it is a scalene triangle.

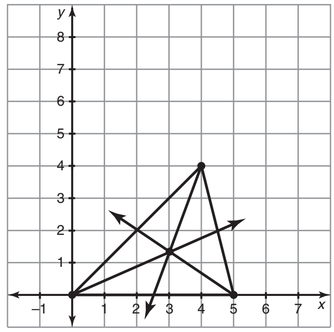
17. ABC has two sides at right angles to each other and no equal length sides, so it is a scalene right triangle.

19. ABC has no sides at right angles and three equal sides, so it is an equilateral triangle.

21. (0, 2.93) or (0, -10.93)

23. (0, 13.66) or (0, -3.66)

25.



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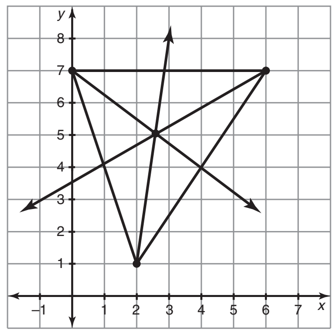

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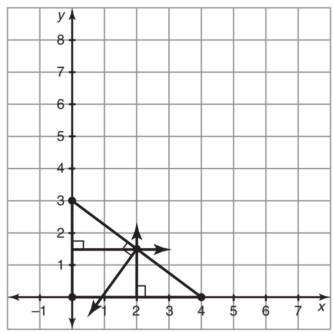

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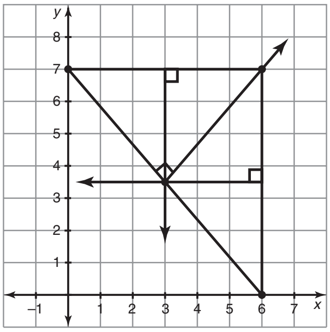

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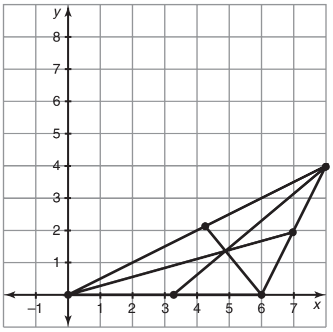

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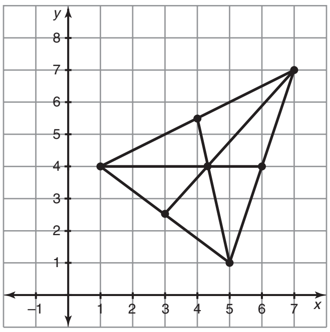

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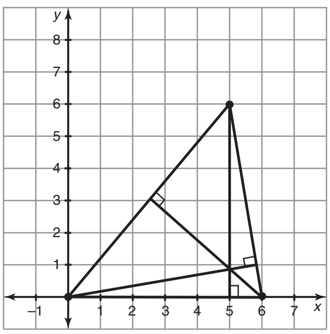

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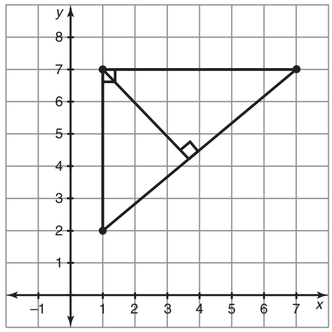

41. The centroid is located at the point $\left(\frac{8}{3}, 2\right)$.

43. The centroid is located at the point $\left(\frac{11}{3}, 5\right)$.

45. The circumcenter is located at the point $\left(\frac{38}{7}, \frac{44}{7}\right)$.

47. The circumcenter is located at the point $\left(\frac{7}{2}, \frac{17}{4}\right)$.

Lesson 11.5

1. Segments $\overline{AB}$, $\overline{BC}$, $\overline{CD}$, and $\overline{DA}$ are all congruent.

3. Segments $\overline{BC}$ and $\overline{CD}$ are congruent.

5. Segments $\overline{AB}$ and $\overline{CD}$ are parallel.

7. Segments $\overline{AB}$ and $\overline{CD}$ are parallel and segments $\overline{BC}$ and $\overline{DA}$ are parallel.

Segments $\overline{AB}$ and $\overline{CD}$ are perpendicular to segments $\overline{BC}$ and $\overline{DA}$.

9. It is a square.

11. It is a parallelogram.

13. It is a rectangle.

15. It is a rhombus.

17. It is a square.