Selected Answers

Section 1.1 Solving Simple Equations
(pages 7–9)

1. $+$ and $-$ are inverses. $\times$ and $\div$ are inverses.

3. $x - 3 = 6$; It is the only equation that does not have $x = 6$ as a solution.

5. $x = 57$ **7.** $x = -5$ **9.** $p = 21$ **11.** $x = 9\pi$ **13.** $d = \frac{1}{2}$ **15.** $n = -4.9$

17. **a.** $105 = x + 14$; $x = 91$

b. no; Because $82 + 9 = 91$, you did not knock down the last pin with the second ball of the frame.

19. $n = -5$ **21.** $m = 7.3\pi$ **23.** $k = 1\frac{2}{3}$ **25.** $p = -2\frac{1}{3}$

27. They should have added 1.5 to each side.

$$-1.5 + k = 8.2$$
$$k = 8.2 + 1.5$$
$$k = 9.7$$

29. $6.5x = 42.25$; \$6.50 per hour

31. $420 = \frac{7}{6}b$, $b = 360$; \$60

33. $h = -7$ **35.** $q = 3.2$ **37.** $x = -1\frac{4}{9}$

39. greater than; Because a negative number divided by a negative number is a positive number.

41. 3 mg **43.** 8 in. **45.** $7x - 4$ **47.** $\frac{25}{4}g - \frac{2}{3}$

Section 1.2 Solving Multi-Step Equations
(pages 14 and 15)

1. $2 + 3x = 17$; $x = 5$ **3.** $k = 45$; $45°, 45°, 90°$ **5.** $b = 90$; $90°, 135°, 90°, 90°, 135°$

7. $c = 0.5$ **9.** $h = -9$ **11.** $x = -\frac{2}{9}$ **13.** 20 watches

15. $4(b + 3) = 24$; 3 in. **17.** $\frac{2580 + 2920 + x}{3} = 3000$; 3500 people

19. $<$ **21.** $>$

Section 1.3 Solving Equations with Variables on Both Sides
(pages 20 and 21)

1. no; When 3 is substituted for x, the left side simplifies to 4 and the right side simplifies to 3.

3. $x = 13.2$ in. **5.** $x = 7.5$ in. **7.** $k = -0.75$

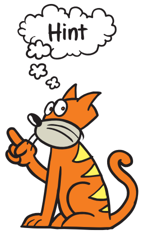
9. $p = -48$ **11.** $n = -3.5$ **13.** $x = -4$

15. The 4 should have been added to the right side.

$$\begin{aligned} 3x - 4 &= 2x + 1 \\ 3x - 2x - 4 &= 2x + 1 - 2x \\ x - 4 &= 1 \\ x - 4 + 4 &= 1 + 4 \\ x &= 5 \end{aligned}$$

17. $15 + 0.5m = 25 + 0.25m$; 40 mi

19. 7.5 units



21. Remember that the box is with priority mail and the envelope is with express mail.

23. 10 mL

25. square: 12 units; triangle: 10 units, 19 units, 19 units

27. 24 in.^{3}

29. C

Lesson 1.3b Solutions of Linear Equations
(pages 21A and 21B)

1. no solution

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

5. no solution

7. no; There is no solution to the equation stating the areas are equal, $x + 1 = x$.

9. no solution

11. infinitely many solutions

13. $x = 2$

15. no solution

17. infinitely many solutions

19. $x = \frac{15}{16}$

Section 1.4 Rewriting Equations and Formulas
(pages 28 and 29)

1. no; The equation only contains one variable.

3. **a.** $A = \frac{1}{2}bh$ **b.** $b = \frac{2A}{h}$ **c.** $b = 12$ mm

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

7. $y = \frac{2}{3} - \frac{4}{9}x$

9. $y = 3x - 1.5$

11. The y should have a negative sign in front of it.

$$\begin{aligned} 2x - y &= 5 \\ -y &= -2x + 5 \\ y &= 2x - 5 \end{aligned}$$

13. **a.** $t = \frac{I}{Pr}$
    b. $t = 3$ yr

15. $m = \frac{e}{c^2}$

17. $\ell = \dfrac{A - \frac{1}{2}\pi w^2}{2w}$

19. $w = 6g - 40$

21. **a.** $F = 32 + \frac{9}{5}(K - 273.15)$
    b. 32°F
    c. liquid nitrogen

23. $r^3 = \frac{3V}{4\pi}$; $r = 4.5$ in.

25. $6\frac{2}{5}$

27. $1\frac{1}{4}$

Section 1.5 Converting Units of Measure
(pages 35–37)

1. yes; Because 1 centimeter is equal to 10 millimeters, the conversion factor equals 1.

3. 6.25 ft; The other three represent the same length.

5. 11 yd, 33 ft **7.** 12.63 **9.** 1.22 **11.** 0.19 **13.** 37.78 **15.** 14.4

17. **a.** about 60.67 m
b. about 8.04 km

19. 1320 **21.** 112.5 **23.** 0.001

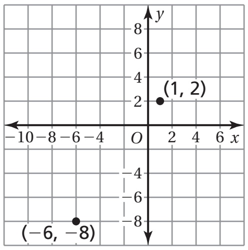
25. about 0.99 mL/sec **27.** 80

29. **a.** spine-tailed swift; mallard
b. yes, It is faster than all of the other birds in the table. Its dive speed is about 201.25 miles per hour.

31. 34,848 **33.** 3,000,000,000 **35.** 0.00042

37. **a.** 120 in.^{3}
b. 138 tissues

39. 113,000 mm^3

41–43.


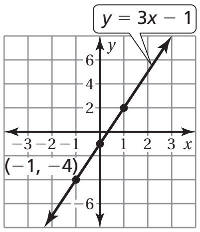
45. B

Section 2.1 Graphing Linear Equations
(pages 52 and 53)

1. a line

3. *Sample answer:*

x	0	1
$y = 3x - 1$	−1	2



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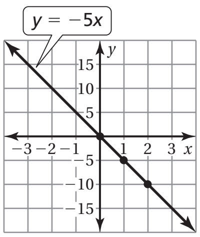

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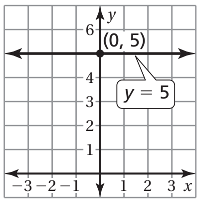

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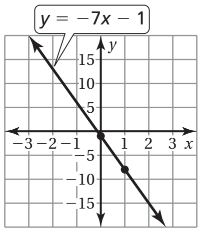

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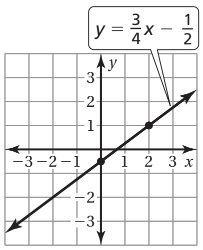

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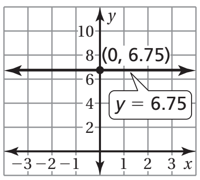
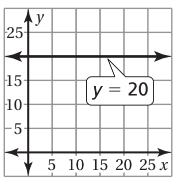
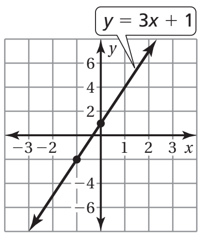
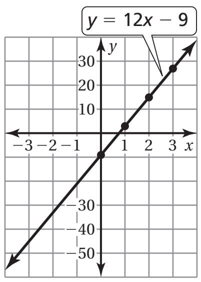


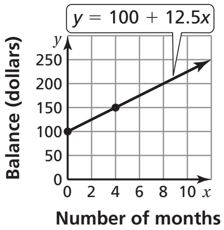
15.


17. $y = 3x + 1$


19. $y = 12x - 9$


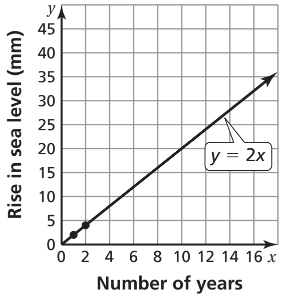
21. **a.** $y = 100 + 12.5x$

b. 6 mo



23. **a.** $y = 2x$

b. *Sample answer:* If you are 13 years old, the sea level has risen 26 millimeters since you were born.



25. (5, 3) **27.** (2, −2) **29.** B

Section 2.2 Slope of a Line

(pages 59–61)

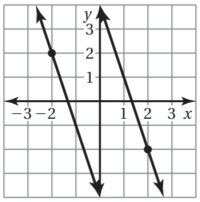
1. **a.** B and C

b. A

c. no; All of the slopes are different.

3. The line is horizontal.

5.



The lines are parallel.

7. $\frac{3}{4}$

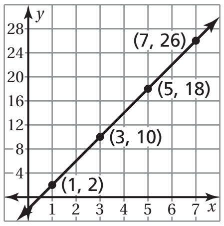
9. $-\frac{3}{5}$

11. 0

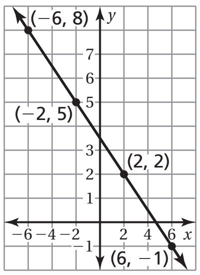
13. The 2 should be −2 because it goes down.

Slope $= -\frac{2}{3}$

15. 4



17. $-\frac{3}{4}$



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

21. red and green; They both have a slope of $\frac{4}{3}$.

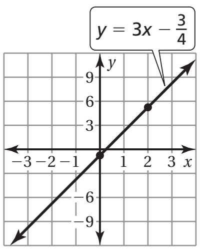
23. no; Opposite sides have different slopes.

25. **a.** $\frac{3}{40}$

b. The cost increases by \$3 for every 40 miles you drive, or the cost increases by \$0.075 for every mile you drive.

27. You can draw the slide in a coordinate plane and let the x-axis be the ground to find the slope.

29.



31. B

Selected Answers

Lesson 2.2b Triangles and Slope
(pages 61A and 61B)

1. similar; Corresponding leg lengths are proportional.

3. The ratios are equal; *Sample answer:* Using the similar triangles in the Key Idea:

$$\frac{AB}{DE} = \frac{AC}{DF}$$

$$AB \bullet DF = DE \bullet AC$$

$$\frac{AB}{AC} = \frac{DE}{DF}$$

5. yes; The ratios of the corresponding leg lengths in the right triangles are proportional.

Section 2.3 Graphing Linear Equations in Slope-Intercept Form *(pages 66 and 67)*

1. Find the x-coordinate of the point where the graph crosses the x-axis.

3. *Sample answer:* The amount of gasoline y (in gallons) left in your tank after you travel x miles is $y = -\frac{1}{20}x + 20$. The slope of $-\frac{1}{20}$ means the car uses 1 gallon of gas for every 20 miles driven. The y-intercept of 20 means there is originally 20 gallons of gas in the tank.

5. A; slope: $\frac{1}{3}$; y-intercept: -2

7. slope: 4; y-intercept: -5

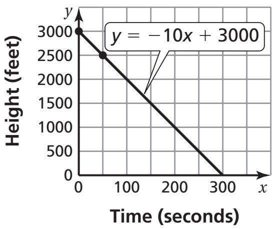
9. slope: $-\frac{4}{5}$; y-intercept: -2

11. slope: $\frac{4}{3}$; y-intercept: -1

13. slope: -2; y-intercept: 3.5

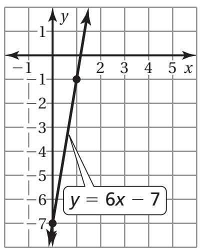
15. slope: 1.5; y-intercept: 11

17. a.



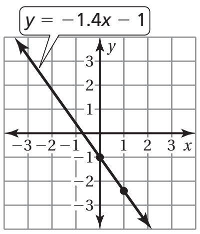
b. The x-intercept of 300 means the skydiver lands on the ground after 300 seconds. The slope of -10 means that the skydiver falls to the ground at a rate of 10 feet per second.

19.



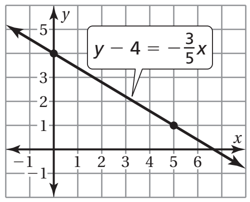
x-intercept: $\frac{7}{6}$

21.



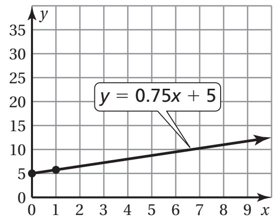
x-intercept: $-\frac{5}{7}$

23.

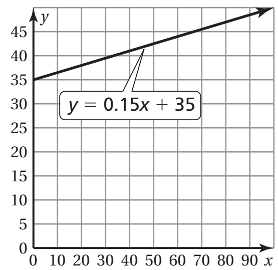


x-intercept: $\frac{20}{3}$

25. $y = 0.75x + 5$



27. $y = 0.15x + 35$



29. $y = 2x + 3$

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

33. B

Section 2.4 Graphing Linear Equations in Standard Form

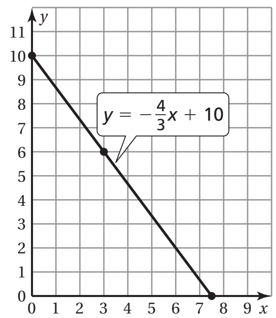
(pages 72 and 73)

1. no; The equation is in slope-intercept form.

3. x = pounds of peaches

y = pounds of apples

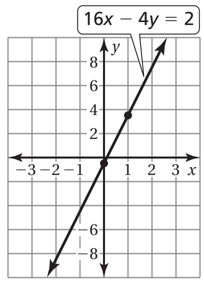
$y = -\frac{4}{3}x + 10$



5. $y = -2x + 17$

7. $y = \frac{1}{2}x + 10$

9.



11. x-intercept: -6

y-intercept: 3

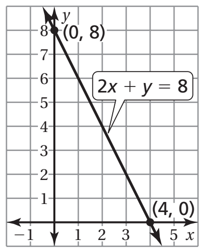
13. x-intercept: none

y-intercept: -3

15. **a.** $y - 25x = 65$

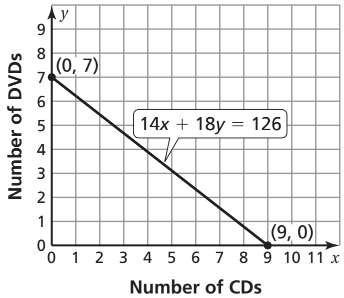
b. $390

17.



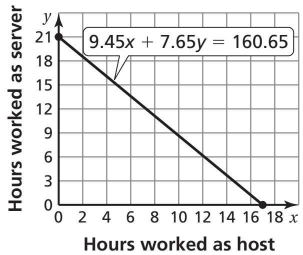
19. x-intercept: 9

y-intercept: 7



21. **a.** $9.45x + 7.65y = 160.65$

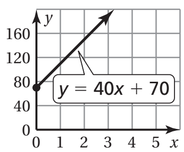
b.



23. **a.** $y = 40x + 70$

b. x-intercept: $-\frac{7}{4}$; It will not be on the graph because you cannot have a negative time.

c.



25.

x	-2	-1	0	1	2
$-5 - 3x$	1	-2	-5	-8	-11

Section 2.5 Systems of Linear Equations
(pages 80 and 81)

1. yes; The equations are linear and in the same variables.

3.

x	0	1	2	3	4	5	6
C	150	165	180	195	210	225	240
R	0	45	90	135	180	225	270

(5, 225)

5. (2.5, 6.5)

7. (3, −1)

9. **a.** $R = 35x$ **b.** 100 rides

11. (−5, 1)

13. (12, 15)

15. (8, 1)

17. **a.** 6 h **b.** 49 mi

19. yes

21. no

Section 2.6 Special Systems of Linear Equations
(pages 86 and 87)

1. The graph of the system with no solution has two parallel lines, and the graph of a system with infinitely many solutions is one line.

3. one solution; because the lines are not parallel and will not be the same equation

5. no solution

7. infinitely many solutions; all points on the line $y = -\frac{1}{6}x + 5$

9. one solution; (2, −3)

11. no solution

13. no; because they are running at the same speed and your pig had a head start

15. no solution

17. **a.** 6 h
b. You both work the same number of hours.

19. **a.** *Sample answer:* $y = -7$
b. *Sample answer:* $y = 3x$
c. *Sample answer:* $2y - 6x = -2$

21. $x = -3$

23. B

Section 2.7 Solving Equations by Graphing
(pages 92 and 93)

1. algebraic method; Graphing fractions is harder than solving the equation.

3. $x = 6$

5. $x = 6$

7. $x = 3$

9. yes; Because a solution of $3x + 2 = 4x$ exists ($x = 2$).

11. $x = 2$

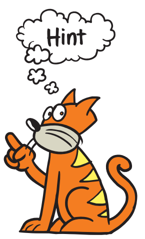
13. The two lines are parallel, which means there is no solution. Using an algebraic method, you obtain $-5 = 8$, which is not true and means that there is no solution.

15. Organize the home and away games for last year and this year in a table before solving.

17. 4

19. −3

21. A



Section 3.1 Writing Equations in Slope-Intercept Form

(pages 110 and 111)

1. *Sample answer:* Find the ratio of the rise to the run between the intercepts.

3. $y = 3x + 2$; $y = 3x - 10$; $y = 5$; $y = -1$

5. $y = x + 4$

7. $y = \frac{1}{4}x + 1$

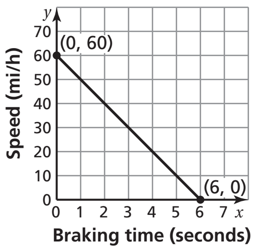
9. $y = \frac{1}{3}x - 3$

11. The x-intercept was used instead of the y-intercept. $y = \frac{1}{2}x - 2$

13. $y = 5$

15. $y = -2$

17. a–b.

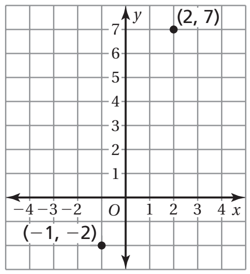


(0, 60) represents the speed of the automobile before braking. (6, 0) represents the amount of time it takes to stop. The line represents the speed y of the automobile after x seconds of braking.

c. $y = -10x + 60$

19. Be sure to check that your rate of growth will not lead to a 0-year-old tree with a negative height.

21–23.



Section 3.2 Writing Equations Using a Slope and a Point

(pages 116 and 117)

1. *Sample answer:* slope and a point

3. $y = \frac{1}{2}x + 1$

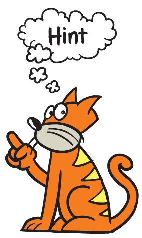
5. $y = -3x + 8$

7. $y = \frac{3}{4}x + 5$

9. $y = -\frac{1}{7}x - 4$

11. $y = -2x - 6$

13. $V = \frac{2}{25}T + 22$



15. The rate of change is 0.25 degree per chirp.

17. a. $y = -0.03x + 2.9$

b. $2\ \text{g/cm}^2$

c. *Sample answer:* Eventually $y = 0$, which means the astronaut's bones will be very weak.

19. B

Section 3.3 Writing Equations Using Two Points
(pages 122 and 123)

1. Plot both points and draw the line that passes through them. Use the graph to find the slope and y-intercept. Then write the equation in slope-intercept form.

3. slope $= -1$; y-intercept: 0; $y = -x$

5. slope $= \frac{1}{3}$; y-intercept: -2; $y = \frac{1}{3}x - 2$

7. $y = 2x$

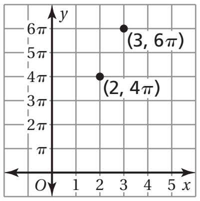
9. $y = \frac{1}{4}x$

11. $y = x + 1$

13. $y = \frac{3}{2}x - 10$

15. They switched the slope and y-intercept in the equation. $y = 2x - 4$

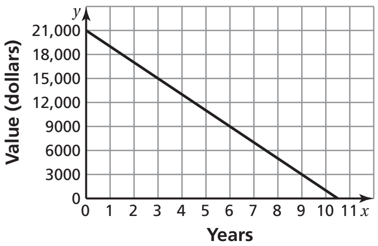
17. a.



b. $y = 2\pi x$

19. a. $y = -2000x + 21{,}000$

b.



c. \$21,000; the original price of the car

21. a. $y = 14x - 108.5$ **b.** 4 m

23. 175

25. D

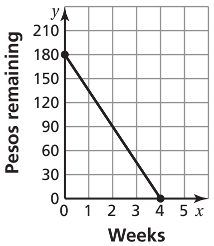
Section 3.4 Solving Real-Life Problems
(pages 130 and 131)

1. The y-intercept is -6 because the line crosses the y-axis at the point $(0, -6)$. The x-intercept is 2 because the line crosses the x-axis at the point $(2, 0)$. You can use these two points to find the slope.

$$\text{Slope} = \frac{\text{change in } y}{\text{change in } x} = \frac{6}{2} = 3$$

3. *Sample answer:* the rate at which something is happening

5. *Sample answer:* On a visit to Mexico, you spend 45 pesos every week. After 4 weeks, you have no pesos left.

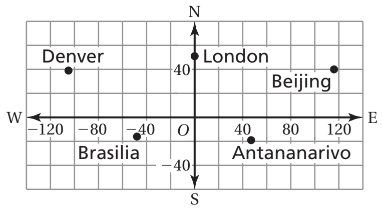


7. a. slope: -3.6; y-intercept: 59 **b.** $y = -3.6x + 59$

c. 59°F

9. a. Antananarivo: 19°S, 47°E; Denver: 39°N, 105°W;
Brasilia: 16°S, 48°W; London: 51°N, 0°W; Beijing: 40°N, 116°E

b. $y = \frac{1}{221}x + \frac{8724}{221}$



c. a place that is on the prime meridian

11. infinitely many solutions

13. no solution

Section 3.5 Writing Systems of Linear Equations
(pages 136 and 137)

1. because its graph is a line

3. You can use a table to see when the two equations are equal. You can use a graph to see whether or not the two lines intersect. You can use algebra and set the equations equal to each other to see when they have the same value.

5. a. $x + y = 12$

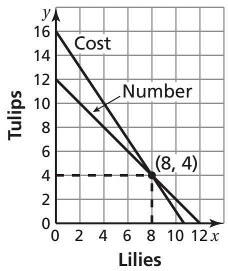
$3x + 2y = 32$

b.

x	0	1	2	3	4	5	6	7	8
$y = 12 - x$	12	11	10	9	8	7	6	5	4
$y = 16 - \frac{3}{2}x$	16	14.5	13	11.5	10	8.5	7	5.5	4

8 lilies and 4 tulips

c.



8 lilies and 4 tulips

d. $12 - x = 16 - \frac{3}{2}x$;

$x = 8,\ y = 4$;

8 lilies and 4 tulips

7. a. no; You need to know how many more dimes there are than nickels or how many coins there are total.

b. *Sample answer:* 9 dimes and 1 nickel

9. no; A linear system must have either one, none, or infinitely many solutions. Lines cannot intersect at exactly two points.

11. Each equation is the same. So, the graph of the system is the same line.

13. $(1, 0), (-2, 3), (-6, 1)$

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

17. B

Section 4.1 Domain and Range of a Function
(pages 152 and 153)

1. no; The equation is not solved for y.

3. a. $y = 6 - 2x$ **b.** domain: 0, 1, 2, 3; range: 6, 4, 2, 0

c. $x = 6$ is not in the domain because it would make y negative, and it is not possible to buy a negative number of headbands.

5. domain: $-2, -1, 0, 1, 2$; range: $-2, 0, 2$

7. The domain and range are switched. The domain is $-3, -1, 1$, and 3. The range is $-2, 0, 2$, and 4.

9.

x	−1	0	1	2
y	−4	2	8	14

domain: $-1, 0, 1, 2$

range: $-4, 2, 8, 14$

11.

x	−1	0	1	2
y	1.5	3	4.5	6

domain: $-1, 0, 1, 2$

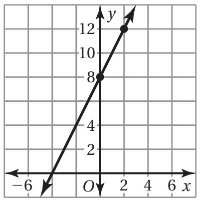
range: 1.5, 3, 4.5, 6

Section 4.1 Domain and Range of a Function *(continued)*

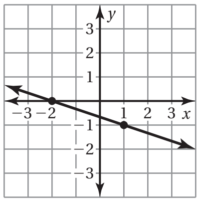
(pages 152 and 153)

13. Rewrite the percent as a fraction or decimal before writing an equation.

15.



17.



19. D

Section 4.2 Discrete and Continuous Domains

(pages 158 and 159)

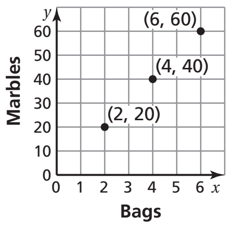
1. A discrete domain consists of only certain numbers in an interval, whereas a continuous domain consists of all numbers in an interval.

3. domain: $x \geq 0$ and $x \leq 6$

range: $y \geq 0$ and $y \leq 6$;

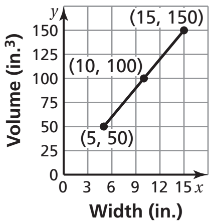
continuous

5.



discrete

7.

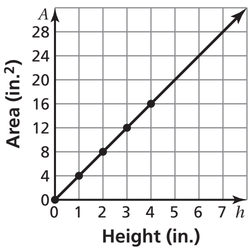


continuous

9. The domain is discrete because only certain numbers are inputs.

11. The function with an input of length has a continuous domain because you can use any length, but you cannot have half a shirt.

13.



continuous

15. Before writing a function, draw one possible arrangement to understand the problem.

17. $-\frac{5}{2}$

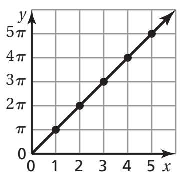
19. C

Section 4.3 Linear Function Patterns

(pages 166 and 167)

1. words, equation, table, graph

3. $y = \pi x$; x is the diameter; y is the circumference.

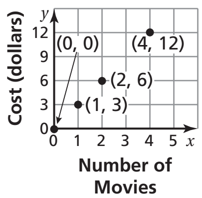


5. $y = \frac{4}{3}x + 2$

7. $y = 3$

9. $y = -\frac{1}{4}x$

11. a.



discrete

b. $y = 3x$

c. \$9

13. Substitute 8 for t in the equation.

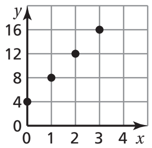
15. 5%

17. B

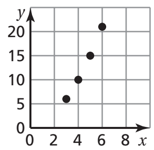
Section 4.4

Comparing Linear and Nonlinear Functions
(pages 172 and 173)

1. A linear function has a constant rate of change. A nonlinear function does not have a constant rate of change.

3.


linear

5.


nonlinear

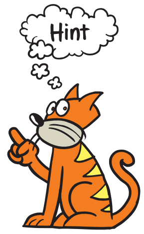
7. linear; The graph is a line.

9. linear; As x increases by 6, y increases by 4.

11. nonlinear; As x increases by 1, V increases by different amounts.

13. linear; The equation can be written in slope-intercept form.

15. Because you want the table to represent a linear function and 3 is half-way between 2 and 4, the missing value is half-way between 2.80 and 5.60.



17. nonlinear; The graph is not a line.

19. linear

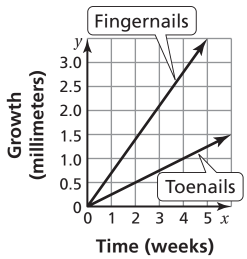
21. straight

23. right

Lesson 4.4b

Comparing Rates
(pages 173A and 173B)

1. **a.** fingernails

b.


The graph that represents fingernails is steeper than the graph that represents toenails. So, fingernails grow faster than toenails.

Section 5.1 Classifying Angles
(pages 188 and 189)

1. The sum of the measures of two complementary angles is 90°. The sum of the measures of two supplementary angles is 180°.

3. sometimes; Either x or y may be obtuse.

5. never; Because x and y must both be less than 90° and greater than 0°.

7. complementary **9.** supplementary **11.** neither **13.** 128

15. Vertical angles are congruent. The value of x is 35.

17. 37 **19.** 20

21. **a.** $\angle CBD$ and $\angle DBE$; $\angle ABF$ and $\angle FBE$

b. $\angle ABE$ and $\angle CBE$; $\angle ABD$ and $\angle CBD$; $\angle CBF$ and $\angle ABF$

23. 54° **25.** $7x + y + 90 = 180$; $5x + 2y = 90$; $x = 10$; $y = 20$

27. 29.3 **29.** B

Section 5.2 Angles and Sides of Triangles
(pages 194 and 195)

1. An equilateral triangle has three congruent sides. An isosceles triangle has at least two congruent sides. So, an equilateral triangle is a specific type of isosceles triangle.

3. right isosceles triangle **5.** obtuse isosceles triangle

7. 94; obtuse triangle **9.** 67.5; acute isosceles triangle

11. 24; obtuse isosceles triangle **13.** **a.** 70 **b.** acute isosceles triangle

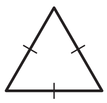
15. no; 39.5° **17.** yes

19. If two angle measures of a triangle were greater than or equal to 90°, the sum of those two angle measures would be greater than or equal to 180°. The sum of the three angle measures would be greater than 180°, which is not possible.

21. $x + 2x + 2x + 8 + 5 = 48$; 7 **23.** $4x - 4 + 3\pi = 25.42$ or $2x - 4 = 6$; 5

Section 5.3 Angles of Polygons
(pages 201–203)

1.



3. What is the measure of an angle of a regular pentagon?; 108°; 540°

5. 1260° **7.** 720° **9.** 1080°

11. no; The angle measures given add up to 535°, but the sum of the angle measures of a pentagon is 540°.

13. 135 **15.** 140° **17.** 140°

19. The sum of the angle measures should have been divided by the number of angles, 20. $3240° \div 20 = 162°$; The measure of each angle is 162°.

21. 24 sides

23. convex; No line segment connecting two vertices lies outside the polygon.

25. no; All of the angles would not be congruent.

27. 135° **29.** 120°

31. You can determine if it is a linear function by writing an equation or by graphing the points.

33. 9 **35.** 3 **37.** D

Section 5.4 Using Similar Triangles
(pages 210 and 211)

1. Write a proportion that uses the missing measurement because the ratios of corresponding side lengths are equal.

3. Student should draw a triangle with the same angle measures as the textbook. The ratio of the corresponding side lengths, $\frac{\text{student's triangle length}}{\text{book's triangle length}}$, should be greater than one.

5. yes; The triangles have the same angle measures, 107°, 39°, and 34°.

7. no; The triangles do not have the same angle measures.

9. The numerators of the fractions should be from the same triangle.

$$\frac{18}{16} = \frac{x}{8}$$
$$16x = 144$$
$$x = 9$$

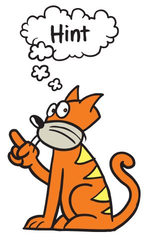
11. 65

13. no; Each side increases by 50%, so each side is multiplied by a factor of $\frac{3}{2}$. The area is $\frac{3}{2}\left(\frac{3}{2}\right) = \frac{9}{4}$ or 225% of the original area, which is a 125% increase.

15. When two triangles are similar, the ratios of corresponding sides are equal.

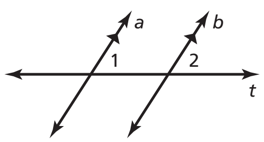
17. linear; The equation can be rewritten in slope-intercept form.

19. nonlinear; The equation cannot be rewritten in slope-intercept form.



Section 5.5 Parallel Lines and Transversals
(pages 217–219)

1. *Sample answer:*



3. m and n

5. 8

7. $\angle 1 = 107°$, $\angle 2 = 73°$

9. $\angle 5 = 49°$, $\angle 6 = 131°$

11. 60°; Corresponding angles are congruent.

Parallel Lines and Transversals *(continued)* *(pages 217–219)*

13. $\angle 1$, $\angle 3$, $\angle 5$, and $\angle 7$ are congruent. $\angle 2$, $\angle 4$, $\angle 6$, and $\angle 8$ are congruent.

15. $\angle 6 = 61°$; $\angle 6$ and the given angle are vertical angles.
$\angle 5 = 119°$ and $\angle 7 = 119°$; $\angle 5$ and $\angle 7$ are supplementary to the given angle.
$\angle 1 = 61°$; $\angle 1$ and the given angle are corresponding angles.
$\angle 3 = 61°$; $\angle 1$ and $\angle 3$ are vertical angles.
$\angle 2 = 119°$ and $\angle 4 = 119°$; $\angle 2$ and $\angle 4$ are supplementary to $\angle 1$.

17. $\angle 2 = 90°$; $\angle 2$ and the given angle are vertical angles.
$\angle 1 = 90°$ and $\angle 3 = 90°$; $\angle 1$ and $\angle 3$ are supplementary to the given angle.
$\angle 4 = 90°$; $\angle 4$ and the given angle are corresponding angles.
$\angle 6 = 90°$; $\angle 4$ and $\angle 6$ are vertical angles.
$\angle 5 = 90°$ and $\angle 7 = 90°$; $\angle 5$ and $\angle 7$ are supplementary to $\angle 4$.

19. 132°; *Sample answer:* $\angle 2$ and $\angle 4$ are alternate interior angles and $\angle 4$ and $\angle 3$ are supplementary.

21. 120°; *Sample answer:* $\angle 6$ and $\angle 8$ are alternate exterior angles.

23. 61.3°; *Sample answer:* $\angle 3$ and $\angle 1$ are alternate interior angles and $\angle 1$ and $\angle 2$ are supplementary.

25. They are all right angles because perpendicular lines form 90° angles.

27. 130

29. **a.** no; They look like they are spreading apart. **b.** Check students' work.

31. 13

33. 51

35. B

Section 6.1 Finding Square Roots *(pages 234 and 235)*

1. no; There is no integer whose square is 26.

3. $\sqrt{256}$ represents the positive square root because there is not a − or a ± in front.

5. 1.3 km

7. 3 and −3

9. 2 and −2

11. 25

13. $\frac{1}{31}$ and $-\frac{1}{31}$

15. 2.2 and −2.2

17. The positive and negative square roots should have been given.
$\pm\sqrt{\frac{1}{4}} = \frac{1}{2}$ and $-\frac{1}{2}$

19. 9

21. 25

23. 40

25. because a negative radius does not make sense

27. =

29. 9 ft

31. 8 m/sec

33. 2.5 ft

35. 25

37. 144

39. B

Section 6.2 The Pythagorean Theorem
(pages 240 and 241)

1. The hypotenuse is the longest side and the legs are the other two sides.

3. 24 cm

5. 9 in.

7. 12 ft

9. The length of the hypotenuse was substituted for the wrong variable.

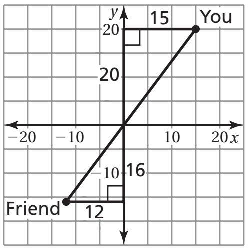
$$\begin{aligned} a^2 + b^2 &= c^2 \\ 7^2 + b^2 &= 25^2 \\ 49 + b^2 &= 625 \\ b^2 &= 576 \\ b &= 24 \end{aligned}$$

11. 16 cm

13. 10 ft

15. 8.4 cm

17. **a.** *Sample answer:*



b. 45 ft

19. 6 and −6

21. 13

23. C

Section 6.3 Approximating Square Roots
(pages 249–251)

1. A rational number can be written as the ratio of two integers. An irrational number cannot be written as the ratio of two integers.

3. all rational and irrational numbers; *Sample answer:* $-2, \frac{1}{8}, \sqrt{7}$

5. yes

7. no

9. rational; $3.\overline{6}$ is a repeating decimal.

11. irrational; 7 is not a perfect square.

13. rational; $-3\frac{8}{9}$ can be written as the ratio of two integers.

15. 144 is a perfect square. So, $\sqrt{144}$ is rational.

17. **a.** natural number **b.** irrational number **c.** irrational number

19. 26

21. −10

23. −13

25. 10; 10 is to the right of $\sqrt{20}$.

27. $\sqrt{133}$; $\sqrt{133}$ is to the right of $10\frac{3}{4}$.

29. −0.25; −0.25 is to the right of $-\sqrt{0.25}$.

31. 8 ft

33. *Sample answer:* $a = 82, b = 97$

35. 1.1

37. 30.1 m/sec

39. Falling objects do not fall at a linear rate. Their speed increases with each second they are falling.

41. $-3x + 3y$

43. $40k - 9$

Lesson 6.3b

Real Numbers
(pages 251A and 251B)

1. 1 **3.** -5 **5.** 6 **7.** $\frac{1}{10}$

9. 384 cm^2 **11.** -3.6 **13.** 10.5

15. Create a table of integers whose cubes are close to the radicand. Determine which two integers the cube root is between. Then create another table of numbers between those two integers whose cubes are close to the radicand. Determine which cube is closest to the radicand; 2.4

17. $\sqrt{6} < \sqrt{20}$ **19.** $-\sqrt{21} < \sqrt[3]{-81}$

Section 6.4

Simplifying Square Roots
(pages 256 and 257)

1. *Sample answer:* The square root is like a variable. So, you add or subtract the number in front to simplify.

3. about 1.62; yes **5.** about 1.11; no **7.** $\frac{\sqrt{7}+1}{3}$

9. $6\sqrt{3}$ **11.** $2\sqrt{5}$ **13.** $-7.7\sqrt{15}$

15. You do not add the radicands. $4\sqrt{5} + 3\sqrt{5} = 7\sqrt{5}$

17. $10\sqrt{2}$ **19.** $4\sqrt{3}$ **21.** $\frac{\sqrt{23}}{8}$ **23.** $\frac{\sqrt{17}}{7}$

25. $10\sqrt{2}$ in. **27.** $6\sqrt{6}$ **29.** 210 ft^3

31. **a.** $88\sqrt{2}$ ft **b.** 680 ft^2

33. Remember to take the square root of each side when solving for r.

35. 24 in.

37. C

Section 6.5

Using the Pythagorean Theorem
(pages 262 and 263)

1. *Sample answer:* You can plot a point at the origin and then draw lengths that represent the legs. Then, you can use the Pythagorean Theorem to find the hypotenuse of the triangle.

3. 27.7 m **5.** 11.3 yd **7.** 7.2 units **9.** 27.5 ft **11.** 15.1 m

13. yes **15.** no **17.** yes **19.** 12.8 ft

21. **a.** *Sample answer:* 5 in., 7 in., 3 in.

b. *Sample answer:* $BC \approx 8.6$ in.; $AB \approx 9.1$ in.

c. Check students' work.

23. mean: 13; median: 12.5; mode: 12 **25.** mean: 58; median: 59; mode: 59

Section 7.1 Measures of Central Tendency
(pages 278 and 279)

1. no; The definition of an outlier means that it is not in the center of the data.

3. If the outlier is greater than the mean, removing it will decrease the mean. If the outlier is less than the mean, removing it will increase the mean.

5. mean: 1; median: 1; mode: -1

7. mean: $1\frac{29}{30}$ h; median: 2 h; modes: $1\frac{2}{3}$ h and 2 h

9. They calculated the mean, not the median. Test scores: 80, 80, 90, 90, 90, 98

Median $= \frac{90 + 90}{2} = \frac{180}{2} = 90$

11. 4

13. 16

15. **a.** 105°F **b.** mean

17. The mean and median both decrease by \$0.05. There is still no mode.

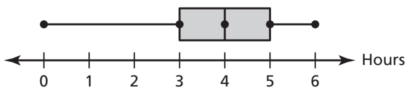
19. $-8, -5, -3, 1, 4, 7$

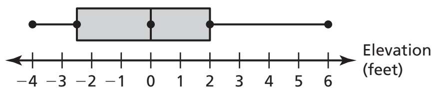
21. B

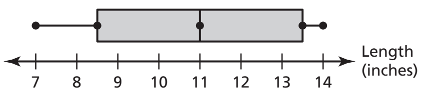
Section 7.2 Box-and-Whisker Plots
(pages 284 and 285)

1. 25%; 50%

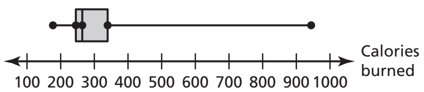
3. The length gives the range of the data set. This tells how much the data vary.

5.


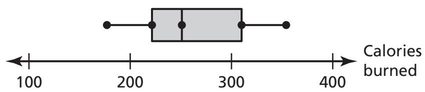
7.


9.


range $= 7$

11. **a.**


b. 944 calories

c.


d. The outlier makes the right whisker longer, increases the length of the box, increases the third quartile, and increases the median. In this case, the first quartile and the left whisker were not affected.

13. *Sample answer:* 0, 5, 10, 10, 10, 15, 20

15. *Sample answer:* 1, 7, 9, 10, 11, 11, 12

17. $y = 3x + 2$

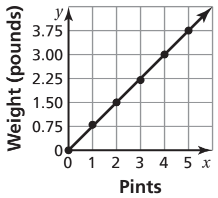
19. $y = -\frac{1}{4}x$

21. B

Section 7.3 Scatter Plots and Lines of Best Fit
(pages 293–295)

1. They must be ordered pairs so there are equal amounts of x- and y-values.

3. a–b.



c. *Sample answer:* $y = 0.75x$

d. *Sample answer:* 7.5 lb

e. *Sample answer:* \$16.88

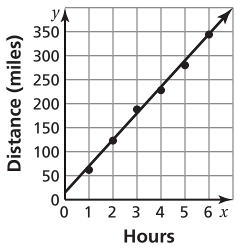
5. a. 3.5 h **b.** \$85

c. There is a positive relationship between hours worked and earnings.

7. positive relationship

9. negative relationship

11. a–b.



c. *Sample answer:* $y = 55x + 15$

d. *Sample answer:* 400 mi

13. a. positive relationship

b. The more time spent studying, the better the test score.

15. The slope of the line of best fit should be close to 1.

17. 2

19. -4

Lesson 7.3b Two-Way Tables
(pages 295A–295B)

1. a. 5

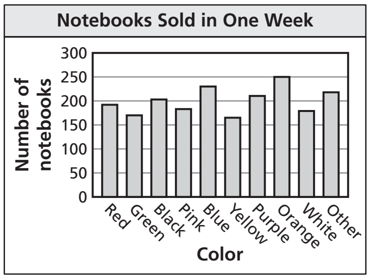
b. 40 students are attending the dance;
36 students are not attending the dance;
51 students are attending the football game;
25 students are not attending the football game;
76 students were surveyed

c. about 26%

Section 7.4 Choosing a Data Display
(pages 300 and 301)

1. yes; Different displays may show different aspects of the data.

3. *Sample answer:*



A bar graph shows the data in different color categories.

5. *Sample answer:* Line graph: shows changes over time.

7. *Sample answer:* Line graph: shows changes changes over time.

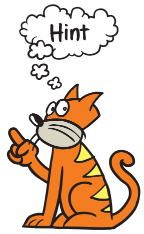
9. The pictures of the bikes are larger on Monday, which makes it seem like the distance is the same each day.

11. The intervals are not the same size.

13. *Sample answer:* bar graph; Each bar can represent a different vegetable.

15. *Sample answer:* line plot

17. Does one display better show the differences in digits?



19. $8x = 24$

Section 8.1 Writing and Graphing Inequalities
(pages 316 and 317)

1. An open circle would be used because 250 is not a solution.

3. no; $x \geq -9$ is all values of x greater than or equal to -9. $-9 \geq x$ is all values of x less than or equal to -9.

5. $x < -3$; all values of x less than -3

7. $y + 5.2 < 23$

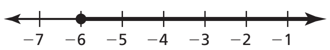
9. $k - 8.3 > 48$

11. yes

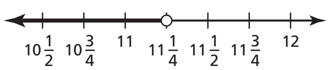
13. yes

15. no

17.



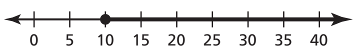
19.



21. $x \geq 21$

23. yes

25. a. $a \geq 10$;



$s \geq 200$;

$t \geq 10$;

b. yes; You satisfy the swimming requirement of the course because $10(25) = 250$ and $250 \geq 200$.

27. a. $m < n$; $n \leq p$ **b.** $m < p$

c. no; Because n is no more than p and m is less than n, m cannot be equal to p.

29. -1.7

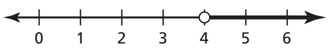
31. D

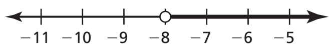
Section 8.2 Solving Inequalities Using Addition or Subtraction *(pages 322 and 323)*

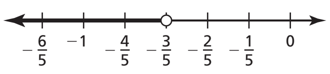
1. no; The solution of $r - 5 \le 8$ is $r \le 13$ and the solution of $8 \le r - 5$ is $r \ge 13$.

3. *Sample answer:* $A = 350$, $C = 275$, $Y = 3105$, $T = 50$, $N = 2$

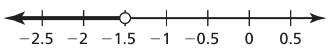
5. *Sample answer:* $A = 400$, $C = 380$, $Y = 6510$, $T = 83$, $N = 0$

7. $t > 4$; 

9. $a > -8$; 

11. $-\frac{3}{5} > d$; 

13. $m \le 1$; 

15. $h < -1.5$; 

17. $9.5 \ge u$; 

19. **a.** $100 + V \le 700$; $V \le 600$ in.^{3} **b.** $V \le \frac{700}{3}$ in.^{3}

21. $x + 2 > 10$; $x > 8$

23. 5

25. **a.** $4500 + x \ge 12{,}000$; $x \ge 7500$ points

b. This changes the number added to x by 60%, so the inequality becomes $7200 + x \ge 12{,}000$. So, you need less points to advance to the next level.

27. $2\pi h + 2\pi \le 15\pi$; $h \le 6.5$ mm

29. 10

31. 12

Section 8.3 Solving Inequalities Using Multiplication or Division *(pages 331–333)*

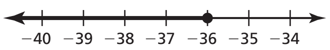
1. Multiply each side of the inequality by 6.

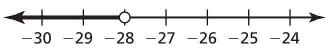
3. *Sample answer:* $-3x < 6$

5. $x \ge -1$

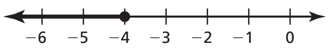
7. $x \le -3$

9. $x \le \frac{3}{2}$

11. $c \le -36$; 

13. $x < -28$; 

15. $k > 2$; 

17. $y \le -4$; 

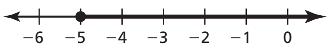
19. The inequality sign should not have been reversed.

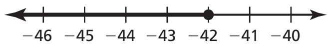
$$\frac{x}{2} < -5$$
$$2 \cdot \frac{x}{2} < 2 \cdot (-5)$$
$$x < -10$$

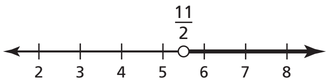
21. $\frac{x}{8} < -2$; $x < -16$

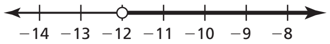
23. $5x > 20$; $x > 4$

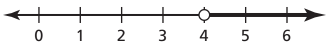
25. $0.25x \le 3.65$; $x \le 14.6$; You can make at most 14 copies.

27. $n \geq -5$; 

29. $h \leq -42$; 

31. $y > \frac{11}{2}$; 

33. $m > -12$; 

35. $b > 4$; 

37. no; You need to solve the inequality for x. The solution is $x < 0$. Therefore, numbers greater than 0 are not solutions.

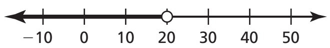
39. $12x \geq 102$; $x \geq 8.5$ cm

41. $\frac{x}{4} < 80$; $x < \$320$

43. *Answer should include, but is not limited to:* Using the correct number of months that the CD has been out. In part (d), an acceptable answer could be never because the top selling CD could have a higher monthly average.

45. $n \geq -6$ and $n \leq -4$;

47. $m < 20$;



49. $8\frac{1}{4}$

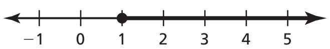
51. 84

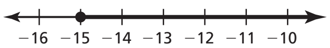
Section 8.4 Solving Multi-Step Inequalities

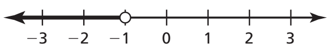
(pages 338 and 339)

1. *Sample answer:* They use the same techniques, but when solving an inequality, you must be careful to reverse the inequality symbol when you multiply or divide by a negative number.

3. $k > 0$ and $k \leq 16$ units

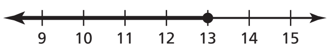
5. $b \geq 1$; 

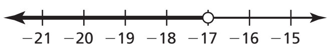
7. $m \geq -15$; 

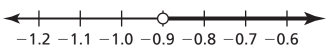
9. $p < -1$; 

11. They did not perform the operations in proper order.

$$\frac{x}{4} + 6 \geq 3$$
$$\frac{x}{4} \geq -3$$
$$x \geq -12$$

13. $y \leq 13$; 

15. $u < -17$; 

17. $z > -0.9$; 

19. $x \leq 6$; 

21. $\frac{3}{16}x + 2 \leq 11$; $x > 0$ and $x \leq 48$ lines

23. Remember to add the height of the truck to find the height the ladder can reach.

25. $r \geq 3$ units

27. 625π in.^{2}

29. A

Selected Answers

Section 9.1 Exponents
(pages 354 and 355)

1. An exponent describes the number of times the base is used as a factor. A power is the entire expression (base and exponent). A power tells you the value of the factor and the number of factors. No, the two cannot be used interchangeably.

3. 3^4

5. $\left(-\frac{1}{2}\right)^3$

7. $\pi^3 x^4$

9. $8^4 b^3$

11. 25

13. 1

15. $\frac{1}{144}$

17. The exponent 3 describes how many times the base 6 should be used as a factor. Three should not appear as a factor in the product. $6^3 = 6 \cdot 6 \cdot 6 = 216$

19. $-\left(\frac{1}{4}\right)^4$

21. 29

23. 5

25. 66

27.

h	1	2	3	4	5
$2^h - 1$	1	3	7	15	31
2^{h-1}	1	2	4	8	16

$2^h - 1$; The option $2^h - 1$ pays you more money when $h > 1$.

29. Remember to add the black keys when finding how many notes you travel.

31. Associative Property of Multiplication

33. B

Section 9.2 Product of Powers Property
(pages 360 and 361)

1. When multiplying powers with the same base

3. 3^4

5. $(-4)^{12}$

7. h^7

9. $\left(-\frac{5}{7}\right)^{17}$

11. 5^{12}

13. 3.8^{12}

15. The bases should not be multiplied. $5^2 \cdot 5^9 = 5^{2+9} = 5^{11}$

17. $216g^3$

19. $\frac{1}{25}k^2$

21. $r^{12} t^{12}$

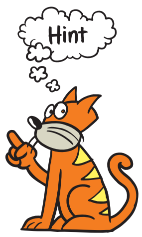
23. no; $3^2 + 3^3 = 9 + 27 = 36$ and $3^5 = 243$

25. 496

27. 78,125

29. **a.** $16\pi \approx 50.24$ in.^{3}

    b. $192\pi \approx 602.88$ in.^{3} Squaring each of the dimensions causes the volume to be 12 times larger.



31. Use the Commutative and Associative Properties of Multiplication to group the powers.

33. 4

35. 3

37. B

Section 9.3 Quotient of Powers Property
(pages 366 and 367)

1. To divide powers means to divide out the common factors of the numerator and denominator. To divide powers with the same base, write the power with the common base and an exponent found by subtracting the exponent in the denominator from the exponent in the numerator.

3. 6^6

5. $(-3)^3$

7. 5^6

9. $(-17)^3$

11. $(-6.4)^2$

13. b^{13}

15. You should subtract the exponents instead of dividing them. $\frac{6^{15}}{6^5} = 6^{15-5} = 6^{10}$

17. 2^9

19. π^8

21. k^{14}

23. $64x$

25. $125a^3b^2$

27. x^7y^6

29. You are checking to see if there is a constant rate of change in the prices, not if it is a linear function.

31. 10^{13} galaxies

33. -9

35. 61

37. B

Section 9.4 Zero and Negative Exponents
(pages 374 and 375)

1. no; Any nonzero base raised to the zero power is always 1.

3. $5^{-5}, 5^0, 5^4$

5.

n	4	3	2	1
$\frac{5^n}{5^2}$	$5^2 = 25$	$5^1 = 5$	$5^0 = 1$	$5^{-1} = \frac{1}{5}$

7. One-fifth of 5^1; $5^0 = \frac{1}{5}(5^1) = 1$

9. $\frac{1}{36}$

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

13. 1

15. $\frac{1}{125}$

17. The negative sign goes with the exponent, not the base. $(4)^{-3} = \frac{1}{4^3} = \frac{1}{64}$

19. 2^0; 10^0

21. $\frac{a^7}{64}$

23. $5b$

25. 12

27. $\frac{w^6}{9}$

29. 10,000 micrometers

31. 1,000,000 micrometers

33. Convert the blood donation to cubic millimeters before answering the parts.

35. If $a = 0$, then $0^n = 0$. Because you can not divide by 0, the expression $\frac{1}{0}$ is undefined.

37. 10^3

39. D

Section 9.5 Reading Scientific Notation
(pages 380 and 381)

1. Scientific notation uses a factor of at least one but less than 10 multiplied by a power of 10. A number in standard form is written out with all the zeros and place values included.

3. 0.00015 m | **5.** 20,000 mm^3

7. yes; The factor is at least 1 and less than 10. The power of 10 has an integer exponent.

9. no; The factor is greater than 10.

11. yes; The factor is at least 1 and less than 10. The power of 10 has an integer exponent.

13. no; The factor is less than 1. | **15.** 70,000,000

17. 500 | **19.** 0.000044 | **21.** 1,660,000,000 | **23.** 9,725,000

25. **a.** 810,000,000 platelets
b. 1,350,000,000,000 platelets

27. **a.** Bellatrix
b. Betelgeuse

29. 5×10^{12} km^2

31. Be sure to convert some of the speeds so that they all have the same units.

33. 10^7 | **35.** $\frac{1}{10^{16}}$

Section 9.6 Writing Scientific Notation
(pages 386 and 387)

1. If the number is greater than or equal to 10, the exponent will be positive. If the number is less than 1 and greater than 0, the exponent will be negative.

3. 2.1×10^{-3} | **5.** 3.21×10^8 | **7.** 4×10^{-5} | **9.** 4.56×10^{10} | **11.** 8.4×10^5

13. 72.5 is not less than 10. The decimal point needs to move one more place to the left.
7.25×10^7

15. 9×10^{-10} | **17.** 1.6×10^8 | **19.** 2.88×10^{-7}

21. 4.01×10^7 m | **23.** 5.612×10^{14} cm^2 | **25.** 9.75×10^9 N•m per sec

27. *Answer should include, but is not limited to:* Make sure calculations using scientific notation are done correctly.

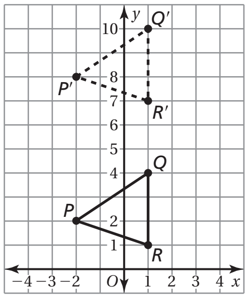
29. **a.** 2.65×10^8 **b.** 2.2×10^{-4} | **31.** 200

Lesson 9.6b Scientific Notation
(pages 387A and 387B)

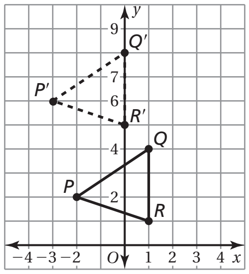
1. 5.4×10^7 | **3.** 5.2×10^8 | **5.** 1.037×10^7 | **7.** 6.7×10^4

9. 2×10^0 | **11.** 2×10^{-6} | **13.** about 12 times greater

Topic 1 Transformations
(pages 398–401)

1. 

$P'(-2, 8)$, $Q'(1, 10)$, $R'(1, 7)$

3. 

$P'(-3, 6)$, $Q'(0, 8)$, $R'(0, 5)$

5. a. side AB and side CD, side AD and side BC

b. Check students' work.

c. yes; *Sample answer:* A translation creates a congruent figure, so the sides remain parallel.

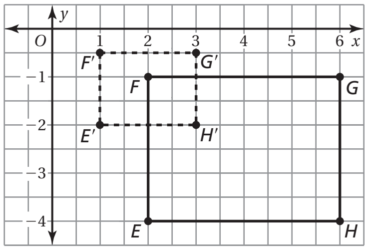
7. $L'(3, -1)$, $M'(3, -4)$, $N'(7, -4)$, $P'(7, -1)$

9. $H'(6, -7)$, $I'(6, -2)$, $J'(3, -3)$, $K'(3, -8)$

11. a. yes; *Sample answer:* The image is also a rectangle, so each angle measure is 90°.

b. yes; *Sample answer:* The image is congruent to the original, so side CD is the same length as side $C'D'$.

13. $L'(-1, -1)$, $M'(-2, -4)$, $N'(-4, -4)$, $P'(-5, -1)$

15. 

$E'(1, -2)$, $F'\left(1, -\frac{1}{2}\right)$, $G'\left(3, -\frac{1}{2}\right)$, $H'(3, -2)$; reduction

17. a. yes; Triangle JKL is a 90° counterclockwise rotation about the origin of triangle XYZ.

b. yes; *Sample answer:* You can create triangle PQR by rotating triangle XYZ 90° counterclockwise about the origin and then dilating the image using a scale factor of 2.

Topic 2 Volume
(pages 402–403)

1. $63\pi \approx 197.8 \text{ m}^3$ **3.** $\frac{20\pi}{3} \approx 20.9 \text{ in.}^3$ **5.** $\frac{256\pi}{3} \approx 267.9 \text{ cm}^3$ **7.** $54\pi \approx 170 \text{ cm}^3$