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.** $\frac{129 + 147.7 + x}{3} = 150$; 173.3 million boxes

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

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

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.** 57.93 m

b. 8.85 km

19. 1320

21. 112.5

23. 0.001

25. 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

Selected Answers

Section 1.5

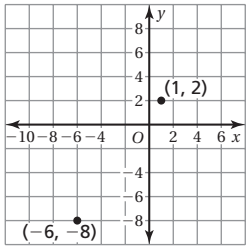
Converting Units of Measure *(continued)*

(pages 35–37)

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

39. 113,000 mm^3

41–43.



45. B

Section 2.1

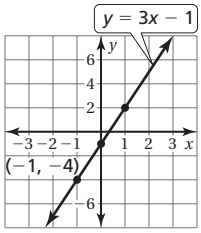
Graphing Linear Equations

(pages 52 and 53)

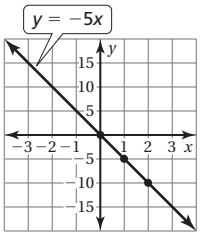
1. a line

3. *Sample answer:*

x	0	1
$y = 3x - 1$	−1	2



5.



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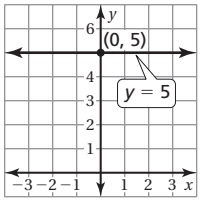

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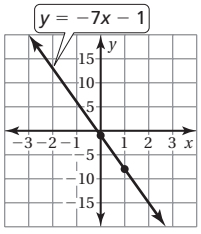
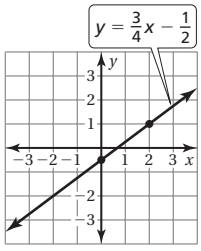
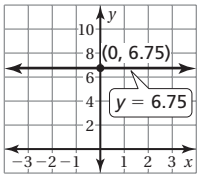


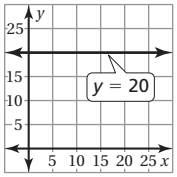
11.



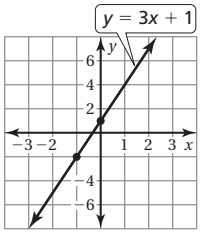
13.



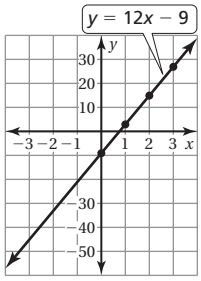
15.



17. $y = 3x + 1$

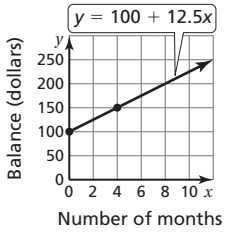


19. $y = 12x - 9$



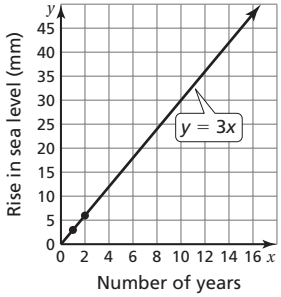
21. **a.** $y = 100 + 12.5x$

b. 6 mo



23. **a.** $y = 3x$

b. *Sample answer:* If you are 13 years old, the sea level has risen 39 millimeters since you were born.



25. (5, 3) **27.** (2, −2) **29.** B

Section 2.2 Slope of a Line *(pages 59–61)*

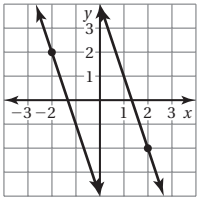
1. **a.** B and C

b. A

c. no; All of the slopes are different.

3. The line is horizontal.

5.



The lines are parallel.

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

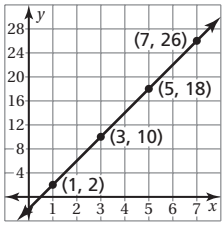
9. $-\frac{3}{5}$

11. 0

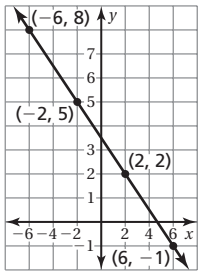
13. The 2 should be −2 because it goes down.

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

15. 4



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



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

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

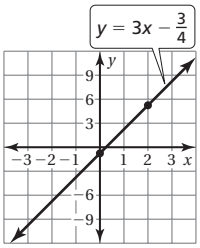
23. no; Opposite sides have different slopes.

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

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

1. Find the x-intercept 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

Selected Answers

Section 2.3

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

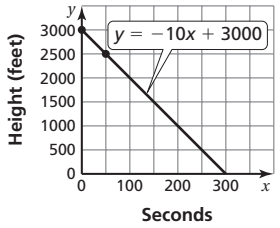
9. slope: $-\frac{4}{5}$; y-intercept: -2

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

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

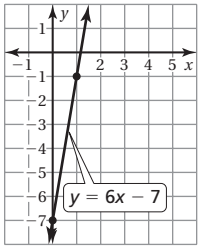
15. slope: 1.5; y-intercept: 11

17. a.



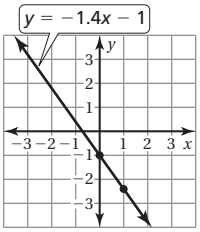
b. The x-intercept of 300 means the skydiver lands on the ground after 300 seconds. The slope of -10 means that the skydiver falls to the ground at a rate of 10 feet per second.

19.



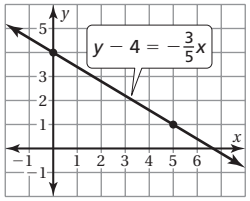
x-intercept: $\frac{7}{6}$

21.



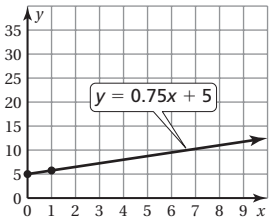
x-intercept: $-\frac{5}{7}$

23.

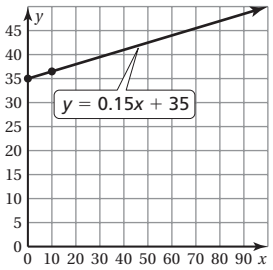


x-intercept: $\frac{20}{3}$

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

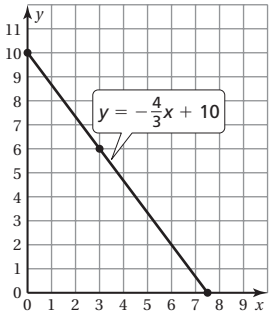
Graphing Linear Equations in Standard Form *(pages 72 and 73)*

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

3. x = pounds of peaches

y = pounds of apples

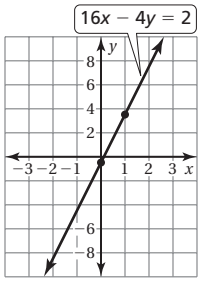
$y = -\frac{4}{3}x + 10$



5. $y = -2x + 17$

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

9.



11. x-intercept: -6

y-intercept: 3

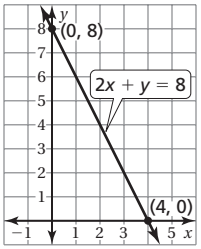
13. x-intercept: none

y-intercept: -3

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

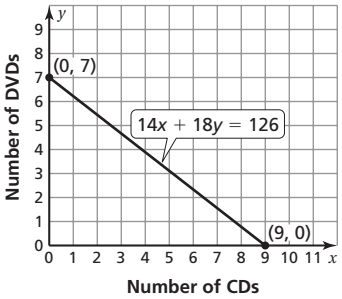
b. \$390

17.



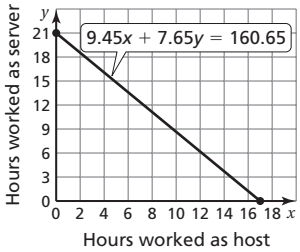
19. x-intercept: 9

y-intercept: 7



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

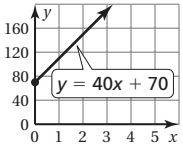
b.



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 set of 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	257

(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.

Selected Answers

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

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 to $3x + 2 = 4x$ 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 of the intercepts.

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

5. $y = x + 4$

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

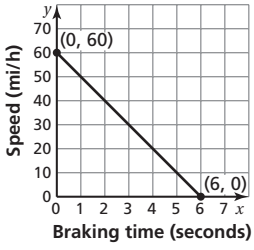
9. $y = \frac{1}{3}x - 3$

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.**

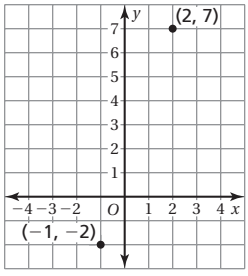


(0, 60) represents the speed of the automobile before braking. (6, 0) represents the amount of time it takes to stop. The line represents the speed y of the automobile after x seconds of braking.

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.

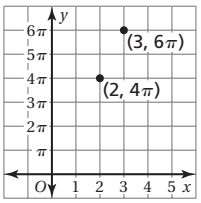
3. slope $= -1$; y-intercept: 0; $y = -x$

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. $y = 2x - 4$

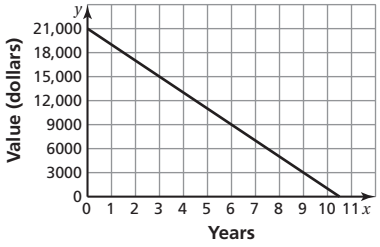
17. **a.**



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

Selected Answers

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.

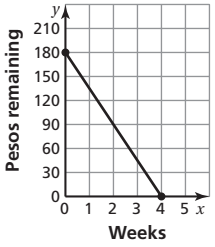
$$\text{Slope} = \frac{\text{change in } y}{\text{change in } x} = \frac{6}{2} = 3$$

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.** $y = -3.6x + 59$

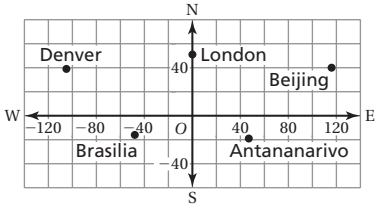
c. 59°F



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.** $x + y = 12$

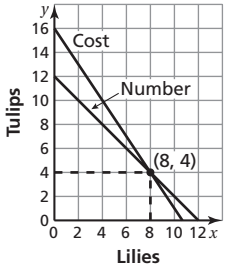
$3x + 2y = 32$

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. $12 - x = 16 - \frac{3}{2}x$; $x = 8$; 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.

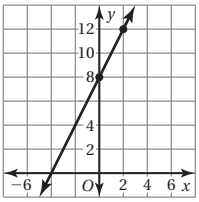
x	-1	0	1	2
y	1.5	3	4.5	6

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

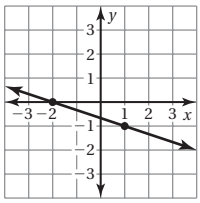
range: 1.5, 3, 4.5, 6

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)

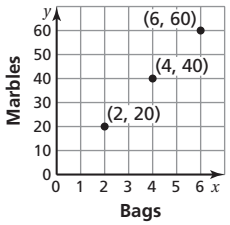
1. A discrete domain consists of only certain numbers in an interval, whereas a continuous domain consists of all numbers in an interval.

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

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

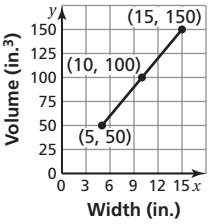
continuous

5.



discrete

7.

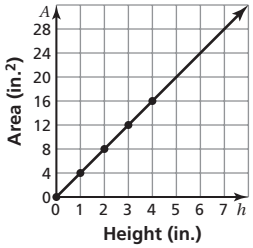


continuous

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

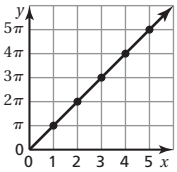
19. C

Selected Answers

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.

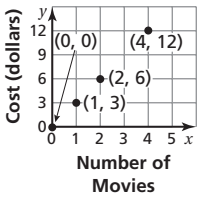


5. $y = \frac{4}{3}x + 2$

7. $y = 3$

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

11. **a.**



b. $y = 3x$

c. $9

discrete

13. Substitute 8 for t in the equation.

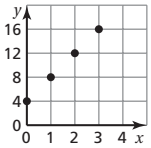
15. 5%

17. B

Section 4.4 Comparing Linear and Nonlinear Functions
(pages 172 and 173)

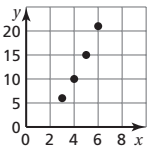
1. A linear function has a constant rate of change. A nonlinear function does not have a constant rate of change.

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

Section 5.1 Classifying Angles
(pages 188 and 189)

1. The sum of two complementary angles is 90°. The sum 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 angles of a triangle are greater than or equal to 90°, the sum of those two angles will be greater than or equal to 180°. The sum of the three angles will 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 angles given add up to 535°, but the sum of the angles 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

Selected Answers

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%, which is a factor of $\frac{3}{2}$. The area is $\frac{3}{2}\left(\frac{3}{2}\right) = \frac{9}{4}$ or 225% of the area of the original, which is a 125% increase.

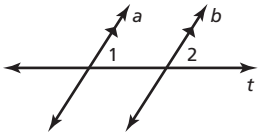
15. When two triangles are similar, the ratios of corresponding sides are equal.

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.

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.

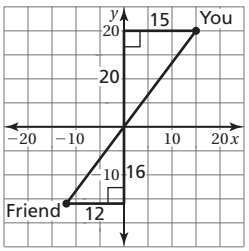
$$a^2 + b^2 = c^2$$
$$7^2 + b^2 = 25^2$$
$$49 + b^2 = 625$$
$$b^2 = 576$$
$$b = 24$$

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

Selected Answers

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. $40k - 9$

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.** $38.8\sqrt{7}$ mi **b.** 638.4 mi^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 larger than the mean, removing it will lower the mean. If the outlier is smaller 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; mode: $1\frac{2}{3}$ h and 2 h

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

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

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.

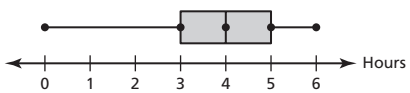
19. $-8, -5, -3, 1, 4, 7$ **21.** B

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

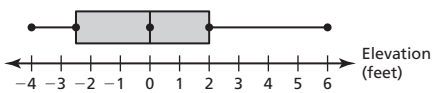
1. 25%; 50%

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

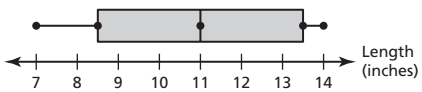
5.



7.



9.



range = 7

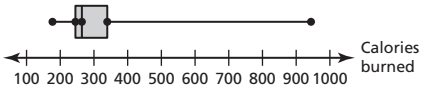
Selected Answers

Section 7.2

Box-and-Whisker Plots *(continued)*

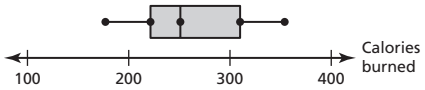
(pages 284 and 285)

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

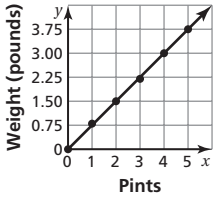
Section 7.3

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

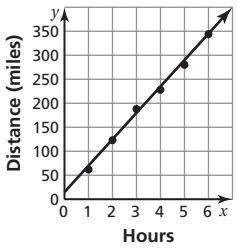
5. a. 3.5 h **b.** $85

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.

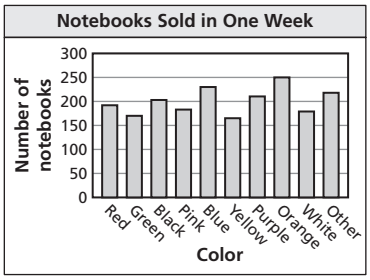
17. 2

19. -4

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. $y + 5.2 < 23$

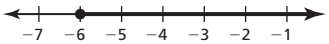
9. $k - 8.3 > 48$

11. yes

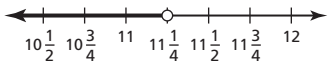
13. yes

15. no

17.



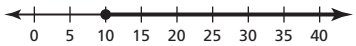
19.



21. $x \geq 21$

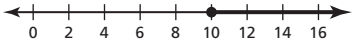
23. yes

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

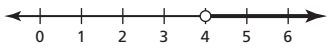
Section 8.2

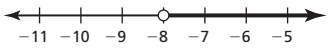
Solving Inequalities Using Addition or Subtraction *(pages 322 and 323)*

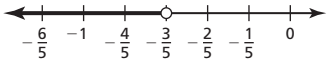
1. no; The solution of $r - 5 \leq 8$ is $r \leq 13$ and the solution of $8 \leq r - 5$ is $r \geq 13$.

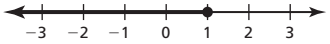
3. *Sample answer:* $A = 350$, $C = 275$, $Y = 3105$, $T = 50$, $N = 2$

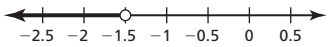
5. *Sample answer:* $A = 400$, $C = 380$, $Y = 6510$, $T = 83$, $N = 0$

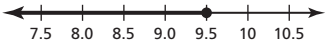
7. $t > 4$; 

9. $a > -8$; 

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

13. $m \leq 1$; 

15. $h < -1.5$; 

17. $9.5 \geq u$; 

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

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

23. 5

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

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

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

29. 10

31. 12

Section 8.3

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

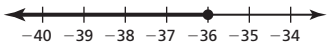
1. Multiply each side of the inequality by 6.

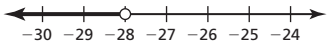
3. *Sample answer:* $-3x < 6$

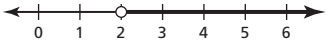
5. $x \geq -1$

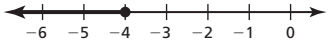
7. $x \leq -3$

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

11. $c \leq -36$; 

13. $x < -28$; 

15. $k > 2$; 

17. $y \leq -4$; 

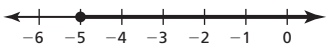
19. The inequality sign should not have been reversed.

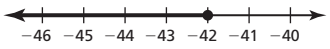
$$\frac{x}{2} < -5$$
$$2 \cdot \frac{x}{2} < 2 \cdot (-5)$$
$$x < -10$$

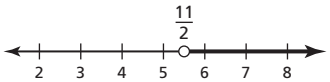
21. $\frac{x}{8} < -2$; $x < -16$

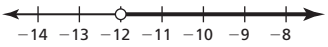
23. $5x > 20$; $x > 4$

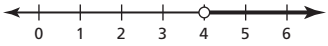
25. $0.25x \leq 3.65$; $x \leq 14.6$; You can make **at** most 14 copies.

27. $n \geq -5$; 

29. $h \leq -42$; 

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

33. $m > -12$; 

35. $b > 4$; 

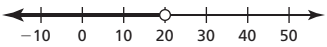
37. no; You need to solve the inequality for x. The solution is $x < 0$. Therefore numbers greater than 0 are not solutions.

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:* Make sure students use 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. $m < 20$; 

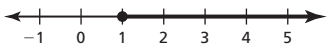
49. $8\frac{1}{4}$

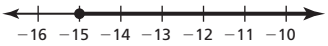
51. 84

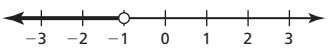
Section 8.4 Solving Multi-Step Inequalities *(pages 338 and 339)*

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

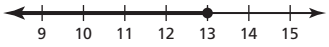
5. $b \geq 1$; 

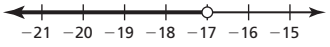
7. $m \geq -15$; 

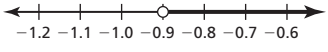
9. $p < -1$; 

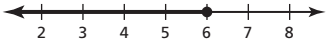
11. They did not perform the operations in proper order.

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

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

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

Section B.1

Simple and Compound Interest

(pages A14 and A15)

1. simple interest

3. a.

Simple Interest			
t	Principal	Annual Interest	Balance at End of Year
3	$500	$15	$545
4	$500	$15	$560
5	$500	$15	$575

Compound Interest			
t	Principal and Interest	Annual Interest	Balance at End of Year
3	$530.45	$15.91	$546.36
4	$546.36	$16.39	$562.75
5	$562.75	$16.88	$579.63

b. compound interest

5. $1405.09

7. The table shows compound interest.

t	Principal	Annual Interest	Balance at End of Year
1	$700.00	$21	$721.00
2	$700.00	$21	$742.00

9. a. $300 **b.** $13

11. One account will not always be greater than the other account.

13. $3.375x^6$

15. $29.16d^{18}$

Section B.2

Formula for Compound Interest

(pages A20 and A21)

1. Compound interest earns more than simple interest for a given interest rate because it is interest earned on the principal and on the previously earned interest.

3.

Annual Interest Rate	Balance after 5 Years
3.0%	$579.64
3.5%	$593.84
4.0%	$608.33
4.5%	$623.09

5. a. $688.51

b. $88.51

7. The interest rate should be in decimal form.

$$B = P(1 + r)^t$$
$$= 2000(1 + 0.04)^2$$
$$= 2000(1.04)^2$$
$$= \$2163.20$$

9. Account B; Its balance is greater after 8 years.

11. Compounding interest four times a year is compounding it quarterly.

13. 27,915

15. 0.4

17. D

Section B.3 Installment Loans
(pages A26 and A27)

1. The principal of a loan is less than the total amount due because interest is included in the amount due.

3.

Balance Before Payment	Monthly Payment	Monthly Interest	Balance After Payment
$1135.00	$233.86	$11.35	$912.49
$912.49	$233.86	$9.12	$687.75
$687.75	$233.86	$6.88	$460.77
$460.77	$233.86	$4.61	$231.52
$231.52	$233.84	$2.32	$0.00

$34.28

5. $28.74

7. $60.88

9.

Term \ Annual Interest Rate	5%	7%
20	$70,068.00	$103,286.40
25	$90,453.00	$134,442.00
30	$111,908.40	$167,409.60

11. about 24.9%

13. For Loan A, you will use the amount of money in your savings account after 3 years to pay off the loan.

15. −28.06

Section B.4 Checking Accounts
(pages A32 and A33)

1. date, check number (if one is written), transaction description, credit or debit amount

3. a.

Date	Check #	Transaction	Credit	Debit	Balance
		Balance Forward			300.00
3/4/12	506	Dinner		45.32	254.68
3/7/12		ATM Withdrawal		80.00	174.68
3/8/12	507	Electric Company		39.76	134.92
3/14/12		Deposit	150.00		284.92
3/18/12	508	Credit Card Payment		129.50	155.42

b. yes

5. more than 20 withdrawals each month

7. You should balance your checkbook after every transaction so that you do not write any bad checks.

9. 7.9×10^{-8} **11.** 3.6×10^{11}

13. C

Section B.5 Credit Cards

(pages A40 and A41)

1. *Sample answer:* You can use both cards to make a purchase, instead of using cash or a check.
Sample answer: A credit card is similar to a loan in that payment is postponed and interest is charged.

3. $2.70

5. $2.42

7. **a.** $3.33 **b.** $107.76 **c.** $102.47

9. **a.** $3.94 **b.** $74.81 **c.** $71.06

11. To find the percent the store keeps, divide the amount the store keeps by the total amount with the sales tax.

13. $740.98; $240.00; $59.02; The amount you paid is more than four times the decrease in the amount due. You end up decreasing your balance by about $5 each month because of the interest. You should pay more than the minimum so that more money goes toward decreasing the balance, rather than paying mostly interest.

15. 12

17. $6\sqrt{19}$

Section B.6 Payroll Deductions

(pages A46 and A47)

1. never; At most, net pay can equal gross pay if there are no deductions, but it will never be greater than gross pay.

3. $1173.75

5. $612.08

7. every 2 weeks

9. $17,468.10

11. $228.15

13–15. Make sure to look back at page A45 and divide by the correct amounts.

17. *Sample answer:* Colorado: 4.63%; Florida: none; Massachusetts: 5.3%; Florida has the lowest income tax and Massachusetts has the highest income tax.

19. 3

21. 343

23. D