Selected Answers

Chapter 1 The Language of Algebra

Page 5 Chapter 1 Getting Started

1. 64 **3.** 162 **5.** 19 **7.** 24 **9.** 16.6 m **11.** $5\frac{1}{2}$ ft **13.** 7.2 **15.** 1.8 **17.** 9 **19.** $\frac{5}{12}$

Pages 8–9 Lesson 1-1

1. Algebraic expressions include variables and numbers, while verbal expressions contain words. **3.** Sample answer: a^5 **5.** Sample answer: $3x - 24$ **7.** 256 **9.** one half of n cubed **11.** $35 + z$ **13.** $16p$ **15.** $49 + 2x$ **17.** $\frac{2}{3}x^2$ **19.** $s + 12d$ **21.** 36 **23.** 81 **25.** 243 **27.** 1,000,000 **29.** $8.5b + 3.99d$ **31.** 7 times p **33.** three cubed **35.** three times x squared plus four **37.** a to the fourth power times b squared **39.** Sample answer: one-fifth 12 times z squared **41.** 3 times x squared minus 2 times x **43.** $x + \frac{1}{11}x$ **45.** $3.5m$ **47.** You can use the expression $4s$ to find the perimeter of a baseball diamond. Answers should include the following.

- four times the length of the sides and the sum of the four sides
- $s + s + s + s$

49. B **51.** 6.76 **53.** 3.2 **55.** $\frac{7}{12}$ **57.** $\frac{7}{6}$ or $1\frac{1}{6}$

Pages 13–15 Lesson 1-2

1. Sample answer: First add the numbers in parentheses, $(2 + 5)$. Next square 6. Then multiply 7 by 3. Subtract inside the brackets. Multiply that by 8. Divide, then add 3. **3.** Chase; Laurie raised the incorrect quantity to the second power. **5.** 26 **7.** 51 **9.** $\frac{11}{100}$ **11.** 160 **13.** $20.00 + 2 \times 9.95$ **15.** 12 **17.** 21 **19.** 0 **21.** 4 **23.** 8 **25.** 6 **27.** $\frac{87}{2}$ or $43\frac{1}{2}$ **29.** 44 cm^2 **31.** \$1625 **33.** 1763 **35.** 24 **37.** 253 **39.** $\frac{37}{8}$ or $4\frac{5}{8}$ **41.** the sum of salary, commission, and 4 bonuses **43.** \$54,900 **45.** Use the order of operations to determine how many extra hours were used then how much the extra hours cost. Then find the total cost. Answers should include the following.

- $6[4.95 + 0.99(n)] - 25.00$
- You can use an expression to calculate a specific value without calculating all possible values.

47. B **49.** 2.074377092 **51.** $a^3 \cdot b^4$ **53.** $a + b + \frac{b}{a}$ **55.** $3(55 - w^3)$ **57.** 12 **59.** 256 **61.** 12 less than q squared **63.** x cubed divided by nine **65.** 7.212 **67.** 14.7775 **69.** $3\frac{11}{35}$ **71.** 36

Pages 18–20 Lesson 1-3

1. Sample answer: An open sentence contains an equals sign or inequality sign. **3.** Sample answer: An open sentence has at least one variable because it is neither true nor false until specific values are used for the variable. **5.** 15 **7.** 1.6 **9.** 3 **11.** {2, 2.5, 3} **13.** 1000 Calories **15.** 12 **17.** 3 **19.** 18 **21.** $1\frac{1}{2}$ **23.** 1.4 **25.** 5.3 **27.** \$22.50 **29.** 11.05 **31.** 5 **33.** 9 **35.** 36 **37.** {6, 7} **39.** {10, 15, 20, 25} **41.** {3.4, 3.6, 3.8, 4} **43.** $\left\{0, \frac{1}{3}, \frac{2}{3}, 1, 1\frac{1}{3}\right\}$ **45.** $g = 15{,}579 + 6220 + 18{,}995$ **47.** $39n + 10.95 \leq 102.50$ **49.** The solution set includes all numbers less than or equal to $\frac{1}{3}$. **51.** B **53.** $r^2 + 3s$; 19 **55.** $(r + s)t^2$; $\frac{7}{4}$ **57.** 173 **59.** 50,628 **61.** $\frac{4}{21}$ **63.** $\frac{2}{7}$ **65.** $\frac{16}{63}$ **67.** $\frac{16}{75}$

Page 21 Practice Quiz 1

1. twenty less than x **3.** a cubed **5.** 28 **7.** 29 **9.** 8

Pages 23–25 Lesson 1-4

1. no; $3 + 1 \neq 3$ **3.** Sample answer: You cannot divide by zero. **5.** Additive Identity; 17

7. $6(12 - 48 \div 4)$
$= 6(12 - 12)$ *Substitution*
$= 6(0)$ *Substitution*
$= 0$ *Multiplicative Property of Zero*

9. $4(20) + 7$ **11.** 87 yr **13.** Multiplicative Identity; 5 **15.** Reflexive; 0.25 **17.** Additive Identity; $\frac{1}{3}$ **19.** Multiplicative Inverse; 1 **21.** Substitution; 3 **23.** Multiplicative Identity; 2

25. $\frac{2}{3}[3 \div (2 \cdot 1)]$
$= \frac{2}{3}(3 \div 2)$ *Multiplicative Inverse*
$= \frac{2}{3} \cdot \frac{3}{2}$ *Substitution*
$= 1$ *Multiplicative Inverse*

27. $6 \cdot \frac{1}{6} + 5(12 \div 4 - 3)$
$= 6 \cdot \frac{1}{6} + 5(3 - 3)$ *Substitution*
$= 6 \cdot \frac{1}{6} + 5(0)$ *Substitution*
$= 6 \cdot \frac{1}{6} + 0$ *Mult. Property of Zero*
$= 1 + 0$ *Multiplicative Inverse*
$= 1$ *Substitution*

29. $7 - 8(9 - 3^2)$
$= 7 - 8(9 - 9)$ *Substitution*
$= 7 - 8(0)$ *Substitution*
$= 7 - 0$ *Mult. Property of Zero*
$= 7$ *Additive Identity*

31. $25(5 - 3) + 80(2.5 - 1) + 40(10 - 6)$
$= 25(2) + 80(2.5 - 1) + 40(10 - 6)$ *Substitution*
$= 25(2) + 80(1.5) + 40(10 - 6)$ *Substitution*
$= 25(2) + 80(1.5) + 40(4)$ *Substitution*
$= 50 + 120 + 160$ *Substitution*
$= 330$ *Substitution*

33. $1653y = 1653$, where $y = 1$ **35.** $8(100{,}000 + 50{,}000 + 400{,}000) + 3(50{,}000 + 50{,}000 + 400{,}000) + 4(50{,}000 + 50{,}000 + 400{,}000)$ **37.** Sometimes; Sample answer: true: $x = 2, y = 1, z = 4, w = 3$; $2 \cdot 4 > 1 \cdot 3$; false: $x = 1, y = -1, z = -2, w = -3$; $1(-2) < (-1)(-3)$ **39.** A **41.** False; $4 - 5 = -1$, which is not a whole number. **43.** False; $1 \div 2 = \frac{1}{2}$, which is not a whole number. **45.** {11, 12, 13} **47.** {3, 3.25, 3.5, 3.75, 4} **49.** $\left\{1\frac{1}{4}\right\}$ **51.** 20 **53.** 31 **55.** 29 **57.** 80 **59.** 28 **61.** 10

Pages 29–31 Lesson 1-5

1. Sample answer: The numbers inside the parentheses are each multiplied by the number outside the parentheses then the products are added. **3.** Courtney; Ben forgot that w^4 is really $1 \cdot w^4$. **5.** $8 + 2t$ **7.** 1632 **9.** $14m$

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11. simplified **13.** 12(19.95 + 2) **15.** 96 **17.** 48
19. $6x + 18$ **21.** $8 + 2x$ **23.** $28y - 4$ **25.** $ab - 6a$
27. $2a - 6b + 4c$ **29.** 4(110,000 + 17,500) **31.** 485 **33.** 102
35. 38 **37.** 12(5 + 12 + 18) **39.** 6(78 + 20 + 12)
41. $1956 **43.** $9b$ **45.** $17a^2$ **47.** $45x - 75$ **49.** $7y^3 + y^4$
51. $30m + 5n$ **53.** $\frac{8}{5}a$ **55.** You can use the Distributive Property to calculate quickly by expressing any number as a sum or difference of more convenient numbers. Answers should include the following.
- Both methods result in the correct method. In one method you multiply then add, and in the other you add then multiply.

57. C **59.** Substitution **61.** Multiplicative Inverse
63. Reflexive **65.** 2258 ft **67.** 11 **69.** 35 **71.** 168 cm^2

Pages 34–36 Lesson 1-6

1. Sample answer: The Associative Property says that the way you group numbers together when adding or multiplying does not change the result. **3.** Sample answer: $1 + 5 + 8 = 8 + 1 + 5$; $(1 \cdot 5)8 = 1(5 \cdot 8)$ **5.** 10 **7.** 130
9. $7a + 10b$ **11.** $14x + 6$ **13.** $15x + 10y$ **15.** 81.744 cm^2
17. 53 **19.** 20.5 **21.** $9\frac{3}{4}$ **23.** 540 **25.** 32 **27.** 420 **29.** $291
31. $77.38 **33.** $2x + 10y$ **35.** $7a^3 + 14a$ **37.** $17n + 36$
39. $9.5x + 5.5y$ **41.** $2.9f + 1.2g$ **43.** $\frac{2}{3} + \frac{23}{10}p + \frac{6}{5}q$
45. $5(xy) + 3xy$
$= 5(xy) + 3(xy)$ *Associative Property* (×)
$= xy(5 + 3)$ *Distributive Property*
$= xy(8)$ *Substitution*
$= 8xy$ *Commutative Property* (×)

47. $6(x + y^2) - 3\left(x + \frac{1}{2}y^2\right)$
$= 6x + 6y^2 - 3x - 3\left(\frac{1}{2}y^2\right)$ *Distributive Property*
$= 6x - 3x + 6y^2 - \frac{3}{2}y^2$ *Commutative Property* (+)
$= x(6 - 3) + y^2\left(6 - \frac{3}{2}\right)$ *Distributive Property*
$= x(3) + y^2\left(4\frac{1}{2}\right)$ *Substitution*
$= 3x + 4\frac{1}{2}y^2$ *Commutative Property* (×)

49. You can use the Commutative and Associative Properties to rearrange and group numbers for easier calculations. Answers should include the following.
- $d = (0.4 + 1.1) + (1.5 + 1.5) + (1.9 + 1.8 + 0.8)$

51. B **53.** $15 + 6p$ **55.** $13m + 6n$ **57.** $3t^2 + 4t$ **59.** 36
61. 18 **63.** 60 **65.** 13

Page 36 Practice Quiz 2

1. j **3.** i **5.** g **7.** b **9.** h

Pages 39–42 Lesson 1-7

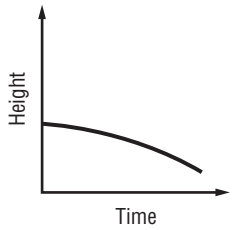
1. Sample answer: If it rains, then you get wet. H: it rains; C: you get wet **3.** Sample answer: You can use deductive reasoning to determine whether a hypothesis and its conclusion are both true or whether one or both are false.
5. H: you play tennis; C: you run fast **7.** H: Lance does not have homework; C: he watches television; If Lance does not have homework, then he watches television.
9. H: a quadrilateral with four right angles; C: it is a rectangle; If a quadrilateral has four right angles, then it is a rectangle.
11. No valid conclusion; the last digit could be any even number. **13.** Anna could have a schedule without science class. **15.** $x = 1$ **17.** A **19.** H: you are in Hawaii; C: you are in the tropics **21.** H: $4(b + 9) \leq 68$; C: $b \leq 8$
23. H: $a = b$ and $b = c$; C: $a = c$ **25.** H: it is after school; C: Greg will call; If it is after school, then Greg will call.
27. H: a number is divisible by 9; C: the sum of its digits is a multiple of 9; If a number is divisible by 9, then the sum of its digits is a multiple of 9. **29.** H: $s > 9$; C: $4s + 6 > 42$; If $s > 9$, then $4s + 6 > 42$ **31.** Ian will buy a VCR.
33. No valid conclusion; the hypothesis does not say Ian won't buy a VCR if it costs $150 or more. **35.** No valid conclusion; the conditional does not mention Ian buying 2 VCRs. **37.** There is a professional team in Canada.
39. Left-handed people can have right-handed parents.
41. $2(8.5) = 17$ **43.** $\frac{6}{3} \cdot \frac{1}{2} = 1$
45. Sample answer:

47. Numbers that end in 0, 2, 4, 6, or 8 are in the "divisible by 2" circle. Numbers whose digits have a sum divisible by 3 are in the "divisible by 3" circle. Numbers that end in 0 or 5 are in the "divisible by 5" circle. **49.** no counterexamples **51.** You can use if-then statements to help determine when food is finished cooking. Answers should include the following.
- Hypothesis: you have small, underpopped kernels
  Conclusion: you have not used enough oil in your pan
- If the gelatin is firm and rubbery, then it is ready to eat.
  If the water is boiling, lower the temperature.

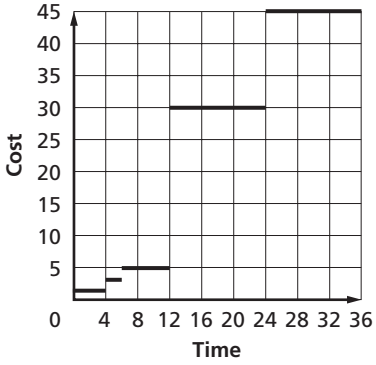
53. C **55.** $a + 15b$ **57.** $23mn + 24$ **59.** $12x^2 + 12x$
61. Multiplicative Identity; 64 **63.** Substitution; 5
65. Additive Identity; 0 **67.** 41 **69.** 2 **71.** $3n - 10$
73. 36 **75.** 171 **77.** 225.5

Pages 46–48 Lesson 1-8

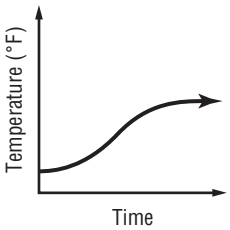
1. The numbers represent different values. The first number represents the number on the horizontal axis and the second represents the number on the vertical axis. **5.** Graph B
7. (0, 500), (0.2, 480), (0.4, 422), (0.6, 324), (0.8, 186), (1, 10)
9.



11. Rashaad's account is increasing as he makes deposits and earns interest. Then he pays some bills. He then makes some deposits and earns interest and so on.
13. Graph B
15.



17. The independent variable is the number of sides and the dependent variable is the sum of the angle measures.
19. 1080, 1260, 1440 **21.**



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23. Real-world data can be recorded and visualized in a graph and by expressing an event as a function of another event. Answers should include the following.
- A graph gives you a visual representation of the situation which is easier to analyze and evaluate.
- During the first 24 hours, blood flow to the brain decreases to 50% at the moment of the injury and gradually increases to about 60%.
- Significant improvement occurs during the first two days.

25. A **27.** H: a shopper has 9 or fewer items; C: the shopper can use the express lane **29.** Substitution; 3 **31.** Multiplicative Identity; 1

Pages 53–55 Lesson 1-9

1. Compare parts to the whole; compare different categories of data; show changes in data over time. **3.** Sample answer: The percentages of the data do not total 100. **5.** tennis **7.** 14,900 **9.** Bar graph; a bar graph is used to compare similar data in the same category. **11.** The vertical axis needs to begin at 0. **13.** Sample answer: about 250 time as great **15.** Sample answer: about 2250 **17.** Yes, the graph is misleading because the sum of the percentages is not 100. To fix the graph, each section must be drawn accurately and another section that represents "other" toppings should be added. **19.** Tables and graphs provide an organized and quick way to examine data. Answers should include the following.
- Examine the existing pattern and use it to continue a graph to the future.
- Make sure the scale begins at zero and is consistent. Circle graphs should have all percents total 100%. The right kind of graph should be used for the given data.

21. C **23.** Sample answer: $x = 12$ **25.** $6 + 6 + 2 + 2 = 16$ **27.** $6x^2 + 10x$

Pages 57–62 Chapter 1 Study Guide and Review

1. a **3.** g **5.** h **7.** i **9.** b **11.** x^5 **13.** $x + 21$ **15.** 27 **17.** 625 **19.** the product of three and a number m to the fifth power **21.** 11 **23.** 9 **25.** 0 **27.** 20 **29.** 26 **31.** 96 **33.** 23 **35.** 16 **37.** 13 **39.** 2 **41.** 4 **43.** 9 **45.** {6, 7, 8} **47.** {5, 6, 7, 8}

49. $\frac{1}{2} \cdot 2 + 2[2 \cdot 3 - 1]$
$= \frac{1}{2} \cdot 2 + 2[6 - 1]$ *Substitution*
$= \frac{1}{2} \cdot 2 + 2 \cdot 5$ *Substitution*
$= 1 + 2 \cdot 5$ *Multiplicative Inverse*
$= 1 + 10$ *Substitution*
$= 11$ *Substitution*

51. $1.2 - 0.05 + 2^3$
$= 1.2 - 0.05 + 8$ *Substitution*
$= 1.15 + 8$ *Substitution*
$= 9.15$ *Substitution*

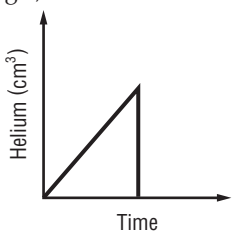
53. $3(4 \div 4)^2 - \frac{1}{4}(8)$
$= 3(1)^2 - \frac{1}{4}(8)$ *Substitution*
$= 3 \cdot 1 - \frac{1}{4}(8)$ *Substitution*
$= 3 - \frac{1}{4}(8)$ *Multiplicative Identity*
$= 3 - 2$ *Substitution*
$= 1$ *Substitution*

55. 72 **57.** $1 - 3p$ **59.** $24x - 56y$ **61.** simplified **63.** $8m + 8n$ **65.** $12y - 5x$ **67.** $9w^2 + w$ **69.** $6a + 13b + 2c$ **71.** $17n - 24$

73. $2pq + pq$
$= (2 + 1)pq$ *Distributive Property*
$= 3pq$ *Substitution*

75. $3x^2 + (x^2 + 7x)$
$= (3x^2 + x^2) + 7x$ *Associative Property*
$= 4x^2 + 7x$ *Substitution*

77. H: a figure is a triangle, C: it has three sides; If a figure is a triangle, then it has three sides. **79.** $a = 15$, $b = 1$, $c = 12$ **81.**



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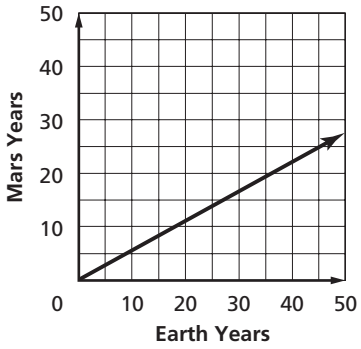


85. 36

Chapter 2 Real Numbers

Page 67 Getting Started

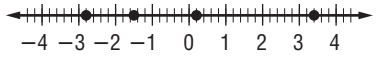
1. 2.36 **3.** 56.32 **5.** $\frac{11}{12}$ **7.** $\frac{3}{8}$ **9.** 4 **11.** 21.6 **13.** $1\frac{1}{2}$ **15.** 2.1 **17.** $8\frac{1}{6}$; 8; none **19.** 8; 7; 7 **21.** 0.81 **23.** $\frac{16}{25}$

Pages 70–72 Lesson 2-1

1. always **3.** Sample answer: Describing directions such as north versus south, or left versus right.

5. $\left\{\ldots, -\frac{11}{2}, -\frac{9}{2}, -\frac{7}{2}, -\frac{5}{2}, -\frac{3}{2}\right\}$

7.



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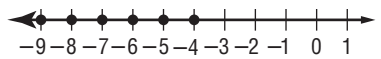
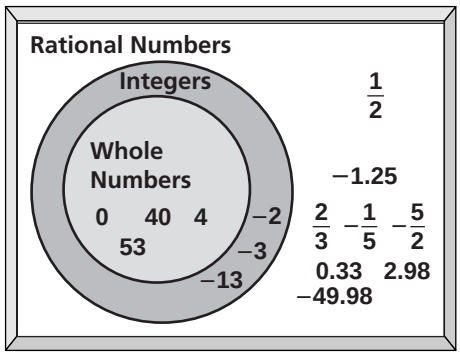


11. 18 **13.** $\frac{5}{6}$ **15.** 36

17.



19. {−7, −6, −5, −3, −2} **21.** {..., 0, 0.2, 0.4, 0.6, 0.8}

23. $\left\{\frac{1}{5}, \frac{4}{5}, \frac{7}{5}, \frac{8}{5}, 2\right\}$

25.

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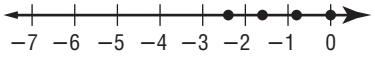
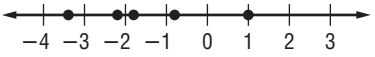
27. 

29. 

31. 

33. 

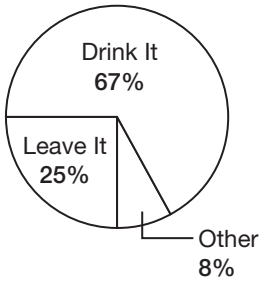
35. 10 **37.** 61 **39.** 6.8 **41.** $\frac{35}{80}$ **43.** Philadelphia, PA; Sample answer: It had the greatest absolute value. **45.** 55 **47.** 34 **49.** 14 **51.** 1.3 **53.** $\frac{1}{4}$ **55.** $\frac{13}{20}$ **57.** 0

59. Bismark, ND 11; Caribou, ME 5; Chicago, IL 4; Fairbanks, AK 9; International Falls, MN 13; Kansas City, MO 7; Sacramento, CA 34; Shreveport, LA 33 **61.** D **63.** December **65.** February, July, October **67.** $9x + 2y$ **69.** $4 + 80x + 32y$ **71.** $\frac{1}{3}$ **73.** $\frac{25}{24}$ or $1\frac{1}{24}$ **75.** $\frac{5}{12}$ **77.** $\frac{7}{18}$

Pages 76–78 Lesson 2-2

1. Sample answer: $\frac{1}{5} - \frac{3}{5}$ **3.** Gabriella; subtracting $-\frac{6}{9}$ is the same as adding $\frac{6}{9}$. **5.** −69 **7.** −17.43 **9.** $\frac{7}{60}$ **11.** 31.1 **13.** 10.25 **15.** $\frac{13}{60}$ **17.** 5 **19.** −22 **21.** −123 **23.** −5.4 **25.** −14.7 **27.** −14.7 **29.** $\frac{32}{21}$ or $1\frac{11}{21}$ **31.** $\frac{13}{55}$ **33.** $-\frac{199}{240}$ **35.** $2\frac{5}{8}$ **37.** 400 points **39.** −27 **41.** 33 **43.** −19 **45.** −16 **47.** 1.798 **49.** 105.3 **51.** $-\frac{5}{6}$ **53.** $-\frac{11}{16}$ **55.** $-\frac{49}{12}$ or $-4\frac{1}{12}$ **57.** −2, −6, −4, −4 **59.** Under; yes, it is better than par 72. **61.** week 7 **63.** Sometimes; the equation is false for positive values of x, but true for all other values of x. **65.** C **67.** 15.4 **69.** 15.9

71.

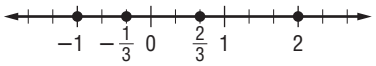


73. {5, 6} **75.** $q^2 - 8$ **77.** $\frac{1}{3}$ **79.** $\frac{5}{8}$ **81.** 5

Pages 81–83 Lesson 2-3

1. ab will be negative if one factor is negative and the other factor is positive. Let $a = -2$ and $b = 3$: $-2(3) = -6$. Let $a = 2$ and $b = -3$: $2(-3) = -6$. **3.** Since multiplication is repeated addition, multiplying a negative number by another negative number is the same as adding repeatedly in the opposite, or positive direction. **5.** −40 **7.** 90.48 **9.** $-\frac{28}{135}$ **11.** $-57xy$ **13.** $-\frac{15}{8}$ or $-1\frac{7}{8}$ **15.** $56\frac{1}{4}$ t **17.** 176 **19.** −192 **21.** 3888 **23.** $\frac{5}{27}$ **25.** $-\frac{12}{35}$ **27.** $4\frac{1}{2}$ **29.** 0.845 **31.** −0.48 **33.** 8 **35.** $-45n$ **37.** $-28d$ **39.** $-21mn - 12st$ **41.** −$134.50 **43.** −30.42 **45.** 4.5 **47.** −13.53 **49.** −208.377 **51.** $1205.35 **53.** 60 million **55.** Positive; the product of two negative numbers is positive and all even numbers can be divided into groups of two. **57.** B **59.** −12.1 **61.** 56

63. 

65. 

67. Sample answer: $x = 5$ **69.** $\frac{5}{16}$ **71.** $6\frac{2}{3}$ **73.** $1\frac{1}{3}$ **75.** $\frac{2}{3}$

Page 83 Practice Quiz 1

1. {−4, −1, 1, 6} **3.** −8 **5.** −8.15 **7.** 108 **9.** $16xy - 3yz$

Pages 86–87 Lesson 2-4

1. Sample answer: Dividing and multiplying numbers with the same signs both result in a positive answer while dividing or multiplying numbers with different signs results in a negative answer. However, when you divide rational numbers in fractional form, you must multiply by a reciprocal. **3.** To divide by a rational number, multiply by its reciprocal. **5.** −9 **7.** 25.76 **9.** $-\frac{5}{6}$ **11.** $-65a$ **13.** 1.2 **15.** 1.67 **17.** 8 **19.** 60 **21.** −7.05 **23.** −2.28 **25.** 12.9 **27.** $-\frac{1}{12}$ **29.** $-\frac{35}{3}$ or $-11\frac{2}{3}$ **31.** $\frac{10}{9}$ or $1\frac{1}{9}$ **33.** $-\frac{175}{192}$ **35.** $\frac{222}{5}$ or $44\frac{2}{5}$ **37.** $9c$ **39.** $-r - 3$ **41.** $20a - 25b$ **43.** $-f - 2g$ **45.** 2 **47.** −16.25 **49.** 2.08 **51.** −1.21 **53.** 1.76 **55.** $1998.75 **57.** 16-karat gold **59.** Sample answer: You use division to find the mean of a set of data. Answers should include the following.

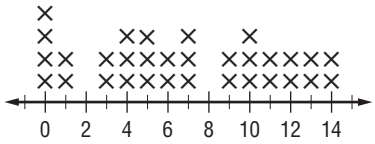
- You could track the mean number of turtles stranded each year and note if the value increases or decreases.
- Weather or pollution could affect the turtles.

61. B **63.** 3 **65.** 0.48 **67.** −6 **69.** $-\frac{11}{24}$ **71.** $20b + 24$ **73.** $3x + 4y$ **75.** 6.25; 5.5; 3 **77.** 79.25; 79.5; 84

Pages 91–94 Lesson 2-5

1. They describe the data as a whole. **3.** Sample answer: 13, 14, 14, 28

5.



7. The mean and the median both represent the data accurately as they are fairly central. **9.** 3.6

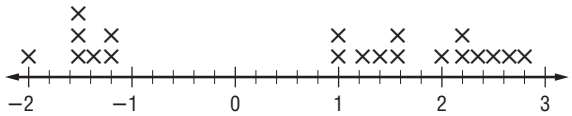
11.

Stem	Leaf
5	4 5 5 6
6	0 1 4 9
7	0 3 5 7 8
8	0 0 3 5 8 8 8
9	0
10	0 2 5
11	0

5 | 4 = 54

13. The mode is not the best measure as it is higher than most of the values.

15.



17. 23 **19.** Sample answer: Median; most of the data are near 2.

21.

Stem	Leaf
1	8 8
2	2 3 6 6 6 8 9
3	0 1 1 2 3 4
4	7

1 | 8 = 18

23. 118 **27.** Mean or median; both are centrally located and the mode is too high. **29.** 7 **31.** Sample answer: Yes; most of the data are near the median. **33.** 22

CONTENTS

35.

Stem	Leaf
3	0 4 7
4	
5	2 9
6	2 7
7	7
8	4 5

$3 \mid 0 = 30$

37. no mode **39.** High school: \$10,123; College: \$11,464; Bachelor's Degree: \$18,454; Doctoral Degree: \$21,608

41. Sample answer: Because the range in salaries is often very great with extreme values on both the high end and low end. **43.** C **45.** -4 **47.** -13.5 **49.** $-17x$ **51.** $-3t$ **53.** 1 **55.** 9 **57.** $\frac{2}{3}$ **59.** $\frac{7}{10}$ **61.** $\frac{1}{2}$ **63.** $\frac{4}{9}$

Pages 98–101 Lesson 2-6

1. Sample answers: impossible event: a number greater than 6; certain event: a number from 1 to 6; equally likely event: even number **3.** Doug; Mark determined the odds in favor of picking a red card. **5.** $\frac{1}{26}$ **7.** $\frac{1}{26}$ **9.** 3:7 **11.** 6:4 **13.** $\frac{3}{10}$ **15.** $\frac{1}{3} \approx 33\%$ **17.** $\frac{1}{2} = 50\%$ **19.** $\frac{13}{30} \approx 43\%$ **21.** $1 = 100\%$ **23.** $\frac{7}{12} \approx 58\%$ **25.** $1 = 100\%$ **27.** $\frac{25}{36} \approx 69\%$ **29.** $\frac{1}{6} \approx 17\%$ **31.** $\frac{2}{3} \approx 67\%$ **33.** $\frac{1}{2} = 50\%$ **35.** $\frac{15}{31} \approx 48\%$ **37.** 4:20 or 1:5 **39.** 13:11 **41.** 9:15 or 3:5 **43.** 12:20 or 3:5 **45.** 15:17 **47.** 13:19 **49.** 1:2 **51.** $\frac{19}{40} = 47.5\%$ **53.** 7:13 **55.** 42:4 or 21:2 **57.** $\frac{1}{1{,}000{,}001}$ **59.** $\frac{6}{7} \approx 86\%$ **61.** B

63.

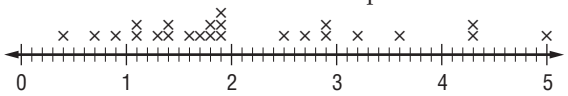
Stem	Leaf
5	8.3
6	4.3 5.1 5.5 6.7 7.0 8.7 9.3
7	0.0 2.8 3.2 5.8 7.4 7.4

$5 \mid 8.3 = 58.3$

65. $-\frac{5}{3}$ or $-1\frac{2}{3}$ **67.** -3.9 **69.** $-\frac{5}{8}$ **71.** 4.25 **73.** $\frac{2}{3}$ **75.** 36 **77.** 64 **79.** 2.56 **81.** $\frac{16}{81}$

Page 101 Practice Quiz 2

1. 17 **3.** -11.7 **5.** $x + 8$ **7.** Sample answer: scale 0–5.0

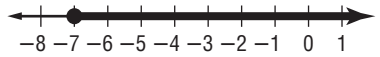


9. $\frac{13}{18}$

Pages 107–109 Lesson 2-7

1. Sometimes; the square root of a number can be negative, such as $\sqrt{16} = 4$ and $-\sqrt{16} = -4$. **3.** There is no real number that can be multiplied by itself to result in a negative product. **5.** 1.2 **7.** 5.66 **9.** rationals **11.** naturals, wholes, integers, rationals

13.



15. = **17.** $-15, \frac{1}{8}, 0.\overline{15}, \sqrt{\frac{1}{8}}$ **19.** C **21.** 9 **23.** 2.5 **25.** -9.70 **27.** $\pm\frac{5}{7}$ **29.** 0.77 **31.** ± 22.65 **33.** naturals, wholes, integers, rationals **35.** rationals **37.** irrationals **39.** rationals **41.** rationals **43.** rationals **45.** rationals **47.** irrationals **49.** irrational **51.** No; Jerome was traveling at about 32.4 mph.

53.

55.

57.

59. $<$ **61.** $<$ **63.** $>$ **65.** $0.\overline{24}, \sqrt{0.06}, \frac{\sqrt{9}}{12}$ **67.** $-4.\overline{83}, -\frac{3}{8}, 0.4, \sqrt{8}$ **69.** $7\frac{4}{9}, \sqrt{122}, \sqrt{200}$ **71.** about 3.4 mi **73.** They are true if q and r are positive and $q > r$. **75.** The length of the side is the square root of the area. **77.** Sample answer: By using the formula Surface Area $= \sqrt{\frac{\text{height} \times \text{weight}}{3600}}$, you need to use square roots to calculate the quantity. Answers should include the following.

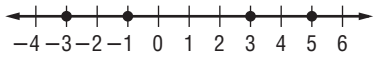
- You must multiply height by weight first. Divide that product by 3600. Then determine the square root of that result.
- Sample answers: exposure to radiation or chemicals; heat loss; scuba suits
- Sample answers: determining height, distance

79. B **81.** 5:8 **83.** 12:1 **85.** -61 **87.** $5.1x - 7.6y$

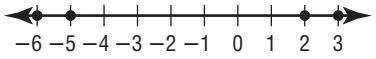
Pages 110–114 Chapter 2 Study Guide and Review

1. true **3.** true **5.** true **7.** false; sample answer: $0.\overline{6}$ or 0.666…

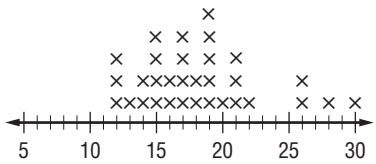
9.



11.



13. 5 **15.** 14 **17.** -5 **19.** -1.4 **21.** $\frac{1}{2}$ **23.** 16 **25.** -2.5 **27.** $\frac{13}{24}$ **29.** -36 **31.** 8.64 **33.** $\frac{3}{10}$ **35.** n **37.** -9 **39.** -10.9 **41.** -20 **43.** $-2 + 4x$ **45.** $-x + 6y$ **47.** -3.2 **49.**



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

$1 \mid 2 = 12$

51. Sample answer; Median; it is closest in value to most of the data **53.** $\frac{1}{4}$ **55.** $\frac{1}{4}$ **57.** 18:31 **59.** 25:24 **61.** ± 1.1 **63.** $\pm\frac{2}{15}$ **65.** naturals, wholes, integers, rationals **67.** $<$ **69.** $>$

Chapter 3 Solving Linear Equations

Page 119 Chapter 3 Getting Started

1. $\frac{1}{2}t + 5$ **3.** $3a + b^2$ **5.** $95 - 9y$ **7.** 15 **9.** 16 **11.** 7 **13.** 5 **15.** 25% **17.** 300% **19.** 160%

Pages 123–126 Lesson 3-1

1. Explore the problem, plan the solution, solve the problem, and examine the solution. **3.** Sample answer: After sixteen people joined the drama club, there were 30 members. How many members did the club have before the new members? **5.** $5(m + n) = 7n$ **7.** $C = 2\pi r$ **9.** $\frac{1}{3}$ of b minus $\frac{3}{4}$ equals 2 times a. **11.** $155 + g = 160$ **13.** $200 - 3x = 9$ **15.** $\frac{1}{3}q + 25 = 2q$ **17.** $2(v + w) = 2z$ **19.** $g \div h = 2(g + h) + 7$ **21.** $0.46E = P$ **23.** $A = bh$

25. $P = 2(a + b)$ **27.** $c^2 = a^2 + b^2$ **29.** d minus 14 equals 5. **31.** k squared plus 17 equals 53 minus j. **33.** $\frac{3}{4}$ of p plus $\frac{1}{2}$ equals p. **35.** 7 times the sum of m and n equals 10 times n plus 17. **37.** The area A of a trapezoid equals one-half times the product of the height h and the sum of the bases, a and b. **39.** Sample answer: Lindsey is 7 inches taller than Yolanda. If 2 times Yolanda's height plus Lindsey's height equals 193 inches, find Yolanda's height. **41.** $V = \frac{1}{3}\pi r^2 h$ **43.** $V = \frac{4}{3}\pi r^3$ **45.** $1912 + y$ **47.** 16 yr **49.** $a + (4a + 15) = 60$ **53.** Equations can be used to describe the relationships of the heights of various parts of a structure. Answers should include the following.

- The equation representing the Sears Tower is $1454 + a = 1707$.

55. D **57.** $-\frac{5}{6}$ **59.** -7.42 **61.** $\frac{1}{2}$ **63.** $8d + 3$ **65.** $8a + 6b$ **67.** 408 **69.** 9.37 **71.** 1.88 **73.** $\frac{13}{15}$ **75.** $\frac{1}{9}$

Pages 131–134 Lesson 3-2

1. Sample answers: $n = 13$, $n + 16 = 29$, $n + 12 = 25$ **3.** (1) Add -94 to each side. (2) Subtract 94 from each side. **5.** -13 **7.** 171 **9.** $\frac{5}{6}$ **11.** $n + (-37) = -91$; -54 **13.** 16.8 h **15.** 23 **17.** 28 **19.** 38 **21.** 43 **23.** -96 **25.** 73 **27.** 3.45 **29.** -2.58 **31.** 15.65 **33.** $1\frac{7}{12}$ **35.** $1\frac{1}{8}$ **37.** $-\frac{2}{15}$ **39.** 19 **41.** $x + 55 = 78$; 23 **43.** $n - 18 = 31$; 49 **45.** $n + (-16) = -21$; -5 **47.** $n - \frac{1}{2} = -\frac{3}{4}$; $-\frac{1}{4}$ **49.** Sometimes, if $x = 0$, $x + x = x$ is true. **51.** $\ell + 10 = 34$ **53.** 37 mi **55.** Sample answer: 29 mi; 29 is the average of 24 (for the 8-cylinder engine) and 34 (for the 4-cylinder engine). **57.** 31 ft **59.** $11.4 + x = 13.6$; 2.2 million volumes **61.** $24.0 + 13.6 + 11.4 = x$; 49.0 million volumes **63.** $1379 + 679 + 1707 + x = 1286 + 634 + 3714$; 1869 **65.** $a = b$, $x = 0$ **67.** C **69.** $A = \pi r^2$ **71.** < **73.** = **75.**

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

$0 \mid 5 = 0.5$

77. H: it is Friday; C: there will be a science quiz

79. $(2^5 - 5^2) + (4^2 - 2^4)$
$= (32 - 25) + (16 - 16)$ *Substitution*
$= 7 + 0$ *Substitution*
$= 7$ *Additive Identity*

81. {1, 3, 5} **83.** 10.545 **85.** 0.22 **87.** $\frac{1}{6}$ **89.** $3\frac{1}{3}$

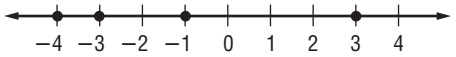
Pages 138–140 Lesson 3-3

1. Sample answer: $4x = -12$ **3.** Juanita; to find an equivalent equation with $1n$ on one side of the equation, you must divide each side by 8 or multiply each side by $\frac{1}{8}$. **5.** -35 **7.** $1\frac{1}{9}$ **9.** $\frac{10}{13}$ **11.** $\frac{2}{5}n = -24$; -60 **13.** -11 **15.** 35 **17.** -77 **19.** 21 **21.** 10 **23.** -6.2 **25.** -3.5 **27.** $8\frac{6}{13}$ **29.** $\frac{11}{15}$ **31.** 30 **33.** $7n = -84$; -12 **35.** $\frac{1}{5}n = 12$; 60 **37.** $2\frac{1}{2}n = 1\frac{1}{5}$; $\frac{12}{25}$ **39.** $\ell = \frac{1}{7}p$ **41.** 455 people **43.** 0.48 s **45.** about 0.02 s **47.** $x + 8x = 477$ **49.** 424 g **51.** You can use the distance formula and the speed of light to find the time it takes light from the stars to reach Earth. Answers should include the following.

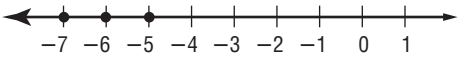
- Solve the equation by dividing each side of the equation by 5,870,000,000,000. The answer is 53 years.
- The equation $5{,}870{,}000{,}000{,}000t = 821{,}800{,}000{,}000{,}000$ describes the situation for the star in the Big Dipper farthest from Earth.

53. A **55.** 13 **57.** $10a = 5(b + c)$ **59.** 0.00879

61.



63.



65. Commutative Property of Addition **67.** 25 **69.** 9

Page 140 Practice Quiz 1

1. $S = 4\pi r^2$ **3.** -45 **5.** -24 **7.** 27 **9.** -9

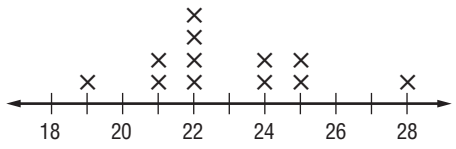
Pages 145–148 Lesson 3-4

1. Sample answers: $2x + 3 = -1$, $3x - 1 = -7$ **3.** $n - 2$ **5.** 6 **7.** -1 **9.** $12\frac{2}{3}$ **11.** 28 **13.** $12 - 2n = -34$; 23 **15.** 12 letters **17.** 24 **19.** 80 lb **21.** \$60 **23.** -6 **25.** -7 **27.** -15 **29.** -56 **31.** -125 **33.** $25\frac{1}{3}$ **35.** -42.72 **37.** -12.6 **39.** 7 **41.** 2 **43.** $29 = 13 + 4n$; 4 **45.** $n + (n + 2) + (n + 4) = -30$; -12, -10, -8 **47.** $n + (n + 2) + (n + 4) + (n + 6) = 8$; -1, 1, 3, 5 **49.** 16 cm, 18 cm, 20 cm **51.** 10 in. **53.** \$75,000 **55.** never **57.** B **59.** -3 **61.** -126 **63.** 5 **65.** -13 **67.** $2\frac{1}{4}$ **69.** 29 models **71.** 1:1 **73.** $-\frac{2}{7}$ **75.** $-\frac{3}{4}a + 4$ **77.** 153 **79.** 20 **81.** $5m + \frac{n}{2}$ **83.** $3a + b^2$ **85.** $6m$ **87.** $-8g$ **89.** $-10m$

Pages 151–154 Lesson 3-5

1a. Incorrect; the 2 must be distributed over both g and 5; 6. **1b.** correct **1c.** Incorrect; to eliminate $-6z$ on the left side of the equal sign, $6z$ must be added to each side of the equation; 1. **3.** Sample answer: $2x - 5 = 2x + 5$ **5.** 4 **7.** 3 **9.** 2.6 **11.** all numbers **13.** D **15a.** Subtract v from each side. **15b.** Simplify. **15c.** Subtract 9 from each side. **15d.** Simplify. **15e.** Divide each side by 6. **15f.** Simplify. **17.** 4 **19.** -3 **21.** $-1\frac{1}{2}$ **23.** 4 **25.** 8 **27.** no solution **29.** 2 **31.** 10 **33.** -4 **35.** 4 **37.** 0.925 **39.** all numbers **41.** -36 **43.** 26, 28, 30 **45.** 8-penny **47.** 2.5 by 0.5 and 1.5 by 1.5 **49.** Sample answer: $3(x + 1) = x - 1$ **51.** D **53.** 90 **55.** -2 **57.** $33\frac{1}{3}$ min

59.



61. -4 **63.** Sample answer: $1 + 3 = 4$ **65.** 5 **67.** 0 **69.** $\frac{4}{7}$ **71.** $\frac{1}{15}$ **73.** $\frac{2}{3}$ **75.** $\frac{1}{3}$

Page 158–159 Lesson 3-6

3. Find the cross products and divide by the value with the variable. **5.** no **7.** 8 **9.** 4.62 **11.** yes **13.** no **15.** no **17.** USA: $\frac{871}{2116}$; USSR/Russia: $\frac{498}{1278}$; Germany: $\frac{374}{1182}$; GB: $\frac{180}{638}$; France: $\frac{188}{598}$; Italy: $\frac{179}{479}$; Sweden: $\frac{136}{469}$ **19.** 20 **21.** 18 **23.** $9\frac{1}{3}$ **25.** 2.28 **27.** 1.23 **29.** $19\frac{1}{3}$ **31.** 14 days **33.** 3 in. **35.** 18 **37.** Sample answer: Ratios are used to determine how much of each ingredient to use for a given number of servings. Answers should include the following.

CONTENTS

- To determine how much honey is needed if you use 3 eggs, write and solve the proportion $2:\frac{3}{4} = 3:h$, where h is the amount of honey.
- To alter the recipe to get 5 servings, multiply each amount by $1\frac{1}{4}$.

39. C **41.** no solution **43.** -2 **45.** -8 **47.** -1
49. 0.4125 **51.** 77 **53.** 0.85 **55.** 30% **57.** 40%

Page 162–164 Lesson 3-7

1. Percent of increase and percent of decrease are both percents of change. If the new number is greater than the original number, the percent of change is a percent of increase. If the new number is less than the original number, the percent of change is a percent of decrease.
3. Laura; Cory used the new number as the base instead of the original number. **5.** increase; 11% **7.** decrease; 20%
9. \$16.91 **11.** \$13.37 **13.** about 77% **15.** decrease; 28%
17. increase; 162% **19.** decrease; 27% **21.** increase; 6%
23. increase; 23% **25.** decrease; 14% **27.** 30% **29.** 8 g
31. \$14.77 **33.** \$7.93 **35.** \$42.69 **37.** \$27.00 **39.** \$24.41
41. \$96.77 **43.** \$101.76 **45.** \$46.33 **47.** India
49. always; $x\%$ of $y \rightarrow \frac{x}{100} = \frac{P}{y}$ or $P = \frac{xy}{100}$; $y\%$ of $x \rightarrow \frac{y}{100} = \frac{P}{x}$ or $P = \frac{xy}{100}$ **51.** B **53.** 9 **55.** 18 **57.** -6 **59.** $\frac{1}{10}$
61. $\frac{4}{27}$ **63.** false **65.** true **67.** -3 **69.** -11 **71.** 3

Page 164 Practice Quiz 2

1. $-8\frac{1}{3}$ **3.** 1.5 **5.** all numbers **7.** 5 **9.** 5

Pages 168–170 Lesson 3-8

1. (1) Subtract az from each side. (2) Add y to each side. (3) Use the Distributive Property to write $ax - az$ as $a(x - z)$. (4) Divide each side by $x - z$. **3.** Sample answer for a triangle: $A = \frac{1}{2}bh$; $b = \frac{2A}{h}$ **5.** $a = \frac{54 + y}{5}$ **7.** $y = 3c - a$
9. $w = \frac{5 + t}{m - 2}$ **11.** $h = \frac{2A}{b}$ **13.** $g = -\frac{h}{4}$ **15.** $m = \frac{y - b}{x}$
17. $y = \frac{am - z}{7}$ **19.** $m = \frac{6y - 5x}{k}$ **21.** $x = \frac{n - 20}{3a}$
23. $y = \frac{3c - 2}{b}$ **25.** $y = \frac{4}{3}(c - b)$ **27.** $A = \frac{2S - nt}{n}$
29. $a = \frac{c + b}{r - t}$ **31.** $t - 5 = r + 6$; $t = r + 11$ **33.** $\frac{5}{8}x = \frac{1}{2}y + 3$; $y = \frac{5}{4}x - 6$ **35.** 6 m **37.** 3 errors **39.** 225 lb
41. about 17.4 cm
43. Equations from physics can be used to determine the height needed to produce the desired results. Answers should include the following.
- Use the following steps to solve for h. (1) Use the Distributive Property to write the equation in the form $195g - hg = \frac{1}{2}mv^2$. (2) Subtract $195g$ from each side. (3) Divide each side by $-g$.
- The second hill should be 157 ft.

45. C **47.** \$9.75 **49.** 22.5 **51.** 5 **53.** $\frac{2}{3}$, 1.1, $\sqrt{5}$, 3
55. $\frac{1}{4}$ **57.** Multiplicative Identity Property **59.** Reflexive Property **61.** $12 - 6t$ **63.** $-21a - 7b$ **65.** $-9 + 3t$

Pages 174–177 Lesson 3-9

1. Sample answer: grade point average
3.

	Number of Coins	Value of Each Coin	Total Value
Dimes	d	\$0.10	$0.10d$
Quarters	$d - 8$	\$0.25	$0.25(d - 8)$

5. $0.10(6 - p) + 1.00p = 0.40(6)$ **7.** 4 qt **9.** about 3.56
11.

	Number of Dozens	Price per Dozen	Total Price
Peanut Butter	p	\$6.50	$6.50p$
Chocolate Chip	$p - 85$	\$9.00	$9.00(p - 85)$

13. 311 doz
15.

	Number of Ounces	Price per Ounce	Value
Gold	g	\$270	$270g$
Silver	$15 - g$	\$5	$5(15 - g)$
Alloy	15	\$164	$164(15)$

17. 9 oz
19.

	r	t	$d = rt$
Eastbound Train	40	t	$40t$
Westbound Train	30	t	$30t$

21. $3\frac{1}{2}h$ **23.** 15 lb **25.** 200 g of 25% alloy, 800 g of 50% alloy
27. 120 mL of 25% solution, 20 mL of 60% solution **29.** 87
31. 15 s **33.** 3.2 qt **35.** about 98.0
37. A weighted average is used to determine a skater's average. Answers should include the following.
- The score of the short program is added to twice the score of the long program. The sum is divided by 3.
- $\frac{4.9(1) + 5.2(2)}{1 + 2} = 5.1$

39. C **41.** $b = 4a + 25$ **43.** increase; 20% **45.** 2:1
47. $3xy$ **49.** {…, -2, -1, 0, 1, 2, 3}

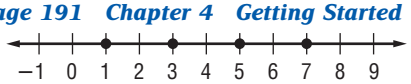
Pages 179–184 Chapter 3 Study Guide and Review

1. Addition **3.** different **5.** identity **7.** increase
9. weighted average **11.** $3n - 21 = 57$ **13.** $a^2 + b^3 = 16$
15. -16 **17.** 21 **19.** -8.5 **21.** -7 **23.** 40 **25.** -10
27. 3 **29.** -153 **31.** 11 **33.** 2 **35.** 1 **37.** -3 **39.** 18
41. 9 **43.** 1 **45.** decrease; 20% **47.** increase; 6%
49. \$10.39 **51.** $y = \frac{b + c}{a}$ **53.** $y = \frac{7a + 9b}{8}$ **55.** 450 mph, 530 mph

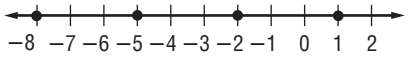
Chapter 4 Graphing Relations and Functions

Page 191 Chapter 4 Getting Started

1.



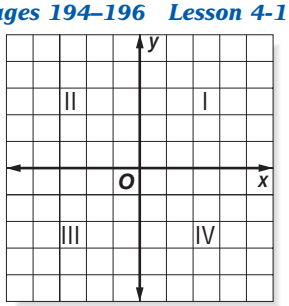
3.



5. $21 - 3t$ **7.** $-15b + 10$ **9.** $y = 1 - 2x$ **11.** $y = 2x - 4$
13. $y = 18 - 8x$ **15.** 6 **17.** 0 **19.** 3

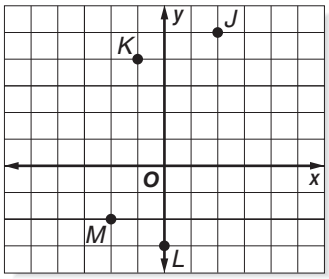
Pages 194–196 Lesson 4-1

1.



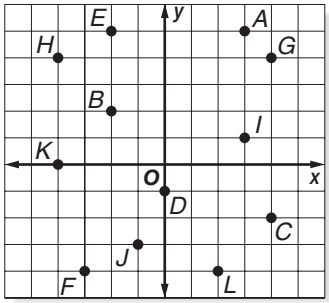
3. Sample answer: I(3, 3), II(-3, 3), III(-3, -3), IV(3, -3) **5.** (-1, 1); II
7. (-4, -2); III

8–11.



13. (−4, 5); II
15. (−1, −3); III
17. (−3, 3); II
19. (2, −1); IV
21. (0, 4); none
23. (7, −12)

25–36.



37. Sample answer: Louisville and Richmond **39.** coins, (3, 5); plate, (7, 2); goblet, (8, 4); vase, (5, 9) **41.** C4
43. B5, C2, D4, E1

45. Archaeologists used coordinate systems as a mapping guide and as a system to record locations of artifacts. Answers should include the following.

- The grid gives archaeologists a point of reference so they can identify and explain to others the location of artifacts in a site they are excavating. You can divide the space so more people can work at the same time in different areas.
- Knowing the exact location of artifacts helps archaeologists reconstruct historical events.

47. B **49.** (7, −5) **51.** 320 mph **53.** $d = c$ **55.** $t = \frac{3a}{11}$
57. 7.94 **59.** −16 **61.** 51 **63.** 30 **65.** 48 **67.** $-x - 3$
69. $-6x + 15$ **71.** $\frac{5}{4}x - \frac{1}{2}y$

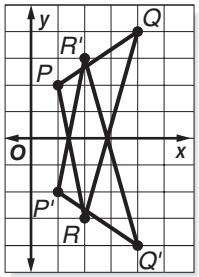
Pages 200–203 Lesson 4-2

1.

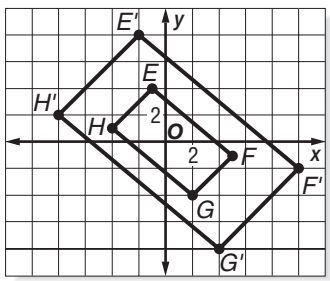
Transformation	Size	Shape	Orientation
Reflection	same	same	changes
Rotation	same	same	changes
Translation	same	same	same
Dilation	changes	same	same

3. translation

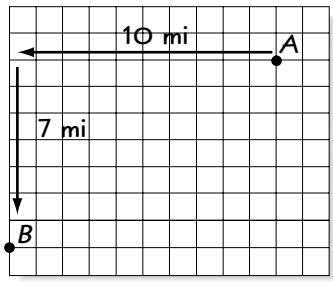
5. $P'(1, -2)$, $Q'(4, -4)$, $R'(2, 3)$



7. $E'(-2, 8)$, $F'(10, -2)$, $G'(4, -8)$, $H'(-8, 2)$

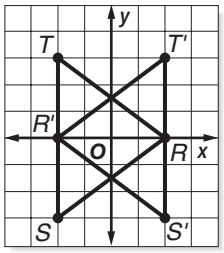


9.

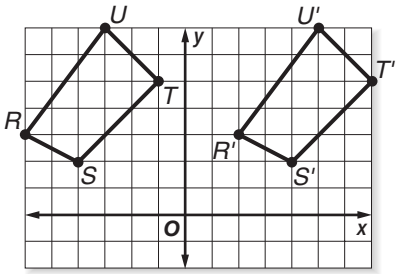


11. translation
13. reflection
15. reflection

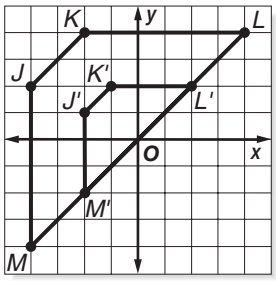
17. $R'(-2, 0)$, $S'(2, -3)$, $T'(2, 3)$



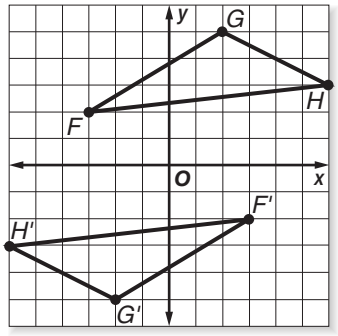
19. $R'(2, 3)$, $S'(4, 2)$, $T'(7, 5)$, $U'(5, 7)$



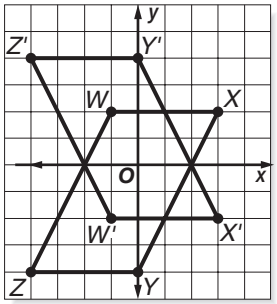
21. $J'(-2, 1)$, $K'(-1, 2)$, $L'(2, 2)$, $M'(-2, -2)$



23. $F'(3, -2)$, $G'(-2, -5)$, $H'(-6, -3)$



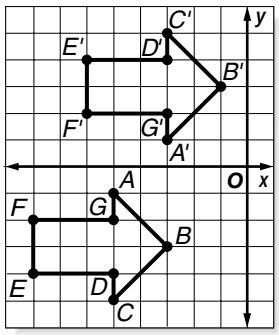
25. $W'(-1, -2)$, $X'(3, -2)$, $Y'(0, 4)$, $Z'(-4, 4)$



27. $A(-5, -1)$, $B(-3, -3)$, $C(-5, -5)$, $D(-5, -4)$, $E(-8, -4)$, $F(-8, -2)$, $G(-5, -2)$

CONTENTS

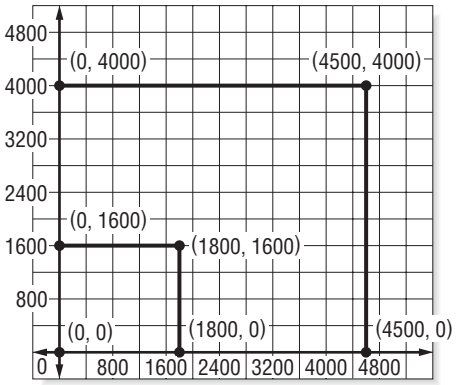
29.



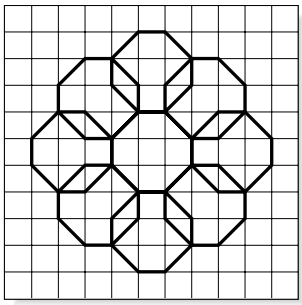
31. $\frac{1}{2}$

33. 90° counterclockwise rotation

35. (0, 0), (1800, 0), (1800, 1600), (0, 1600)



37. The pattern resembles a snowflake.

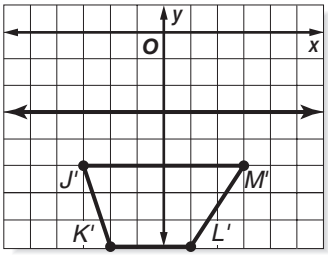


39. $(y, -x)$ **41.** Artists use computer graphics to simulate movement, change the size of objects, and create designs. Answers should include the following.

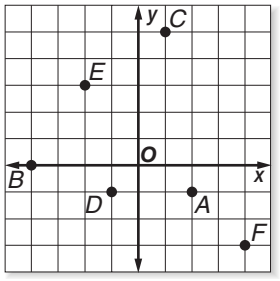
- Objects can appear to move by using a series of translations. Moving forward can be simulated by enlarging objects using dilations so they appear to be getting closer.
- Computer graphics are used in special effects in movies, animated cartoons, and web design.

43. C

45. $J'(-3, -5)$, $K'(-2, -8)$, $L'(1, -8)$, $M'(3, -5)$



47–52.



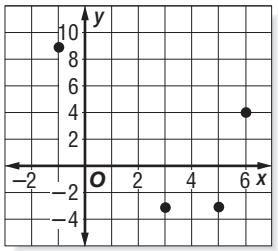
53. 10 mL **55.** $\frac{1}{12} \approx 8\%$ **57.** $\frac{5}{6} \approx 83\%$ **59.** {(0, 100), (5, 90) (10, 81), (15, 73), (20, 66), (25, 60), (30, 55)}

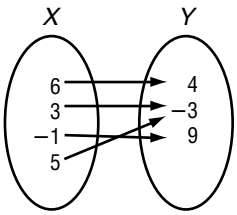
Pages 208–211 Lesson 4-3

1. A relation can be represented as a set of ordered pairs, a table, a graph, or a mapping. **3.** The domain of a relation is the range of the inverse, and the range of a relation is the domain of the inverse.

5. D = {−1, 3, 5, 6}; R = {−3, 4, 9}

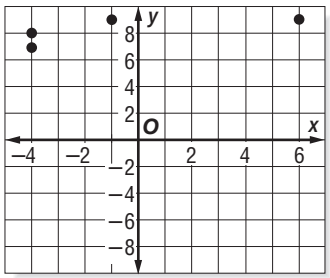
x	y
6	4
3	−3
−1	9
5	−3

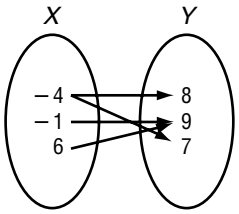




7. D = {−4, −1, 6}; R = {7, 8, 9}

x	y
−4	8
−1	9
−4	7
6	9



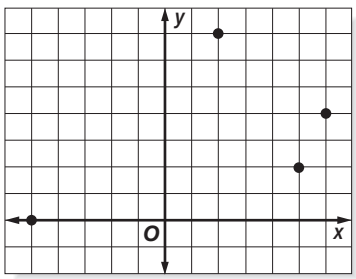


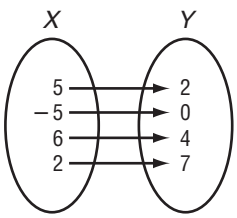
9. {(−4, 9), (2, 5), (−2, −2), (11, 12)}; {(9, −4), (5, 2), (−2, −2), (12, 11)} **11.** {(2, 8), (3, 7), (4, 6), (5, 7)}; {(8, 2), (7, 3), (6, 4), (7, 5)} **13.** {(−4, −4), (−3, 0), (0, −3), (2, 1), (2, −1)}; {(−4, −4), (0, −3), (−3, 0), (1, 2), (−1, 2)} **15.** {1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999}

17. There are fewer students per computer in more recent years. So the number of computers in schools has increased.

19. D = {−5, 2, 5, 6}; R = {0, 2, 4, 7}

x	y
5	2
−5	0
6	4
2	7



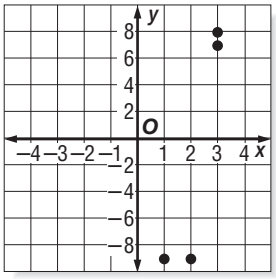


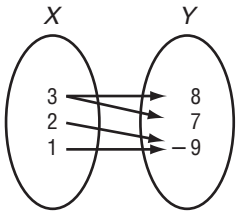
Selected Answers

CONTENTS

21. D = {1, 2, 3}; R = {−9, 7, 8}

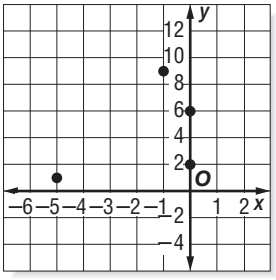
x	y
3	8
3	7
2	−9
1	−9

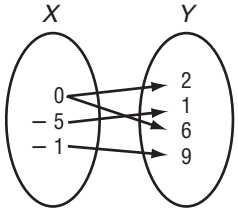




23. D = {−5, −1, 0}; R = {1, 2, 6, 9}

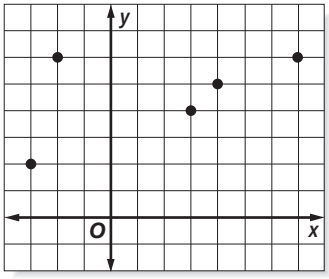
x	y
0	2
−5	1
0	6
−1	9

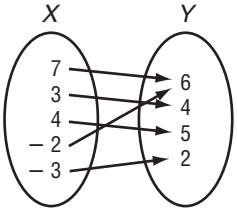




25. D = {−3, −2, 3, 4, 7}; R = {2, 4, 5, 6}

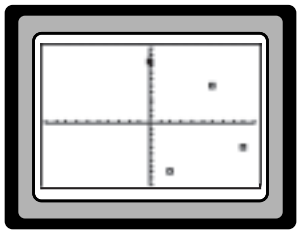
x	y
7	6
3	4
4	5
−2	6
−3	2





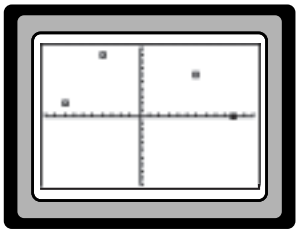
27. {(0, 3), (−5, 2), (4, 7), (−3, 2)}; {(3, 0), (2, −5), (7, 4), (2, −3)} **29.** {(−8, 4), (−1, 1), (0, 6), (5, 4)}; {(4, −8), (1, −1), (6, 0), (4, 5)} **31.** {(−3, 3), (1, 3), (4, 2), (−1, −5)}; {(3, −3), (3, 1), (2, 4), (−5, −1)} **33.** {(1, 16.50), (1.75, 28.30), (2.5, 49.10), (3.25, 87.60), (4, 103.40)}; {(16.50, 1), (28.30, 1.75), (49.10, 2.5), (87.60, 3.25), (103.40, 4)} **35.** {(2, 0), (2, 4), (3, 7), (5, 0), (5, 8), (−7, 7)}; {(0, 2), (4, 2), (7, 3), (0, 5), (8, 5), (7, −7)} **37.** {(−3, −1), (−3, −3), (−3, −5), (0, 3), (2, 3), (4, 3)}; {(−1, −3), (−3, −3), (−5, −3), (3, 0), (3, 2), (3, 4)} **39.** {(212.0, 0), (210.2, 1000), (208.4, 2000), (206.5, 3000), (201.9, 5000), (193.7, 10,000)} **41.** D = {1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000}; R = {6.3, 7.5, 9.2, 9.5, 9.8, 10, 10.4} **43.** The production seems to go up and down every other year, however from 1995 through 1998, farmers have produced more corn each year. **45.** D = {100, 105, 110, 115, 120, 125, 130}; R = {40, 42, 44, 46, 48, 50, 52} **47.** D = {40, 42, 44, 46, 48, 50, 52}; R = {100, 105, 110, 115, 120, 125, 130} **49.** Sample answer: $F = \{(-1, 1), (-2, 2), (-3, 3)\}$, $G = \{(1, -2), (2, -3), (3, -1)\}$; The elements in the domain and range of F should be paired differently in G. **51.** B

53a.



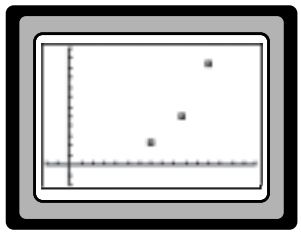
53b. [−10, 10] scl: 1 by [−10, 12] scl: 1

53c. {(10, 0), (−8, 2), (6, 6), (−4, 9)}



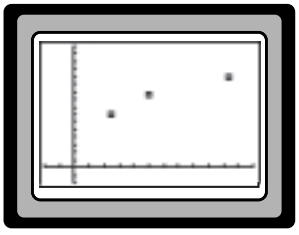
53d. (0, 10), none; (10, 0), none; (2, −8), IV; (−8, 2), II; (6, 6), I; (6, 6), I; (9, −4), IV; (−4, 9), II

55a.



55b. [−10, 80] scl: 5 by [−10, 60] scl: 5

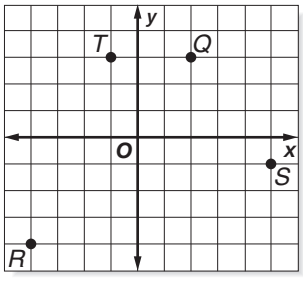
55c. {(12, 35), (25, 48), (52, 60)}



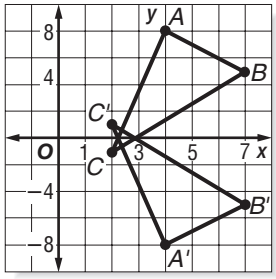
55d. (35, 12), (48, 25), and (60, 52) are all in I. (12, 35), (25, 48), and (52, 60) are all in I. **57.** rotation **59.** translation **61.** (3, 2); I **63.** (1, −1); IV **65.** (−4, −2); III **67.** (−2, 5); II **69.** 8 **71.** 9 **73.** $9n + 13$ **75.** {5} **77.** {3} **79.** {6}

Page 211 Practice Quiz 1

1–4.



5. $A'(4, -8)$, $B'(7, -5)$, $C'(2, 1)$



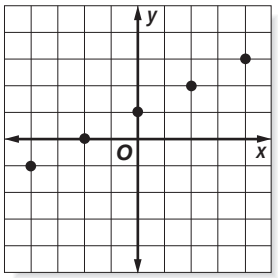
7. D = {1, 2, 4}; R = {3, 5, 6}; I = {(3, 1), (6, 4), (3, 2), (5, 1)}
9. D = {−8, 11, 15}; R = {3, 5, 22, 31}; I = {(5, 11), (3, 15), (22, −8), (31, 11)}

Pages 214–217 Lesson 4-4

1. Substitute the values for y and solve for x. **3.** Bryan; x represents the domain and y represents the range. So, replace x with 5 and y with 1. **5.** {(−7, −3), (−2, −1)} **7.** {(−3, 7), (−1, 5), (0, 4), (2, 2)} **9.** {(−3, 11), (−1, 8), (0, 6.5), (2, 3.5)}

CONTENTS

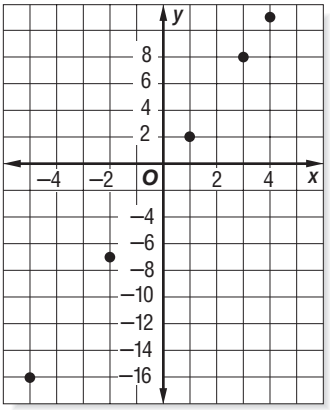
11. {(−4, −1), (−2, 0), (0, 1), (2, 2), (4, 3)}



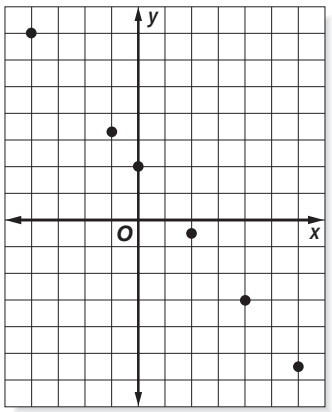
13. 12 karats **15.** {(4, −4), (2, 2)} **17.** {(3, 0), (2, 1), (4, −1)} **19.** {(0.25, 3.5), (1, 2)} **21.** {(−2, −1), (−1, 1), (1, 5), (3, 9), (4, 11)} **23.** {(−2, 9), (−1, 8), (1, 6), (3, 4), (4, 3)} **25.** {(−2, −9), (−1, −3), (1, 9), (3, 21), (4, 27)}

27. {(−2, −2), (−1, −1), (1, 1), (3, 3), (4, 4)} **29.** {(−2, 10), (−1, 8.5), (1, 5.5), (3, 2.5), (4, 1)} **31.** {(−2, −24), (−1, −18), (1, −6), (3, 6), (4, 12)}

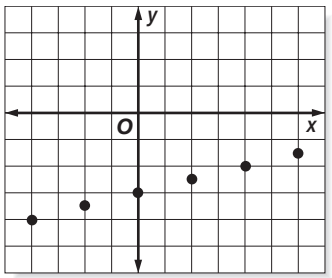
33. {(−5, −16), (−2, −7), (1, 2), (3, 8), (4, 11)}



35. {(−4, 7), (−1, 3.25), (0, 2), (2, −0.5), (4, −3), (6, −5.5)}



37. {(−4, −4), (−2, −3.5), (0, −3), (2, −2.5), (4, −2), (6, −1.5)}

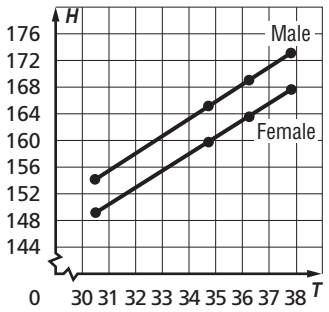


39. {−14, −12, −4, 6, 8} **41.** New York: 1.1°C, Chicago: −5°C, San Francisco: 12.8°C, Miami: 22.2°C, Washington, D.C.: 4.4°C **43.** w is independent; ℓ is dependent.

45.

Male		
Length of Tibia (cm)	Height (cm)	(*T*, *H*)
30.5	154.9	(30.5, 154.9)
34.8	165.2	(34.8, 165.2)
36.3	168.8	(36.3, 168.8)
37.9	172.7	(37.9, 172.7)

Female		
Length of Tibia (cm)	Height (cm)	(*T*, *H*)
30.5	148.9	(30.5, 148.9)
34.8	159.6	(34.8, 159.6)
36.3	163.4	(36.3, 163.4)
37.9	167.4	(37.9, 167.4)

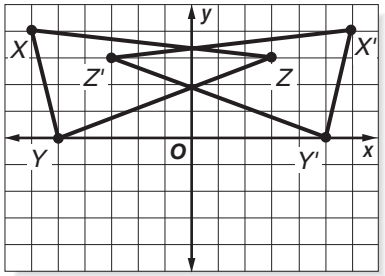


47a. {−6, −4, 0, 4, 6} **47b.** {−13, −8, −4, 4, 8, 13} **47c.** {−5, 0, 4, 8, 13} **49.** When traveling to other countries, currency and measurement systems are often different. You need to convert these systems to the system with which you are familiar. Answers should include the following.

- At the current exchange rate, 15 pounds is roughly 10 dollars and 10 pounds is roughly 7 dollars. Keeping track of every 15 pounds you spend would be relatively easy.
- If the exchange rate is 0.90 compared to the dollar, then items will cost less in dollars. For example, an item that is 10 in local currency is equivalent to $9.00. If the exchange rate is 1.04, then items will cost more in dollars. For example, an item that costs 10 in local currency is equivalent to $10.40.

51. C **53.** {(−8, 94), (−5, 74.5), (0, 42), (3, 22.5), (7, −3.5), (12, −36)} **55.** {(−2.5, −4.26), (−1.75, −3.21), (0, −0.76), (1.25, 0.99), (3.33, 3.90)} **57.** {(2, 7), (6, −4), (6, −1), (11, 8)}; {(7, 2), (−4, 6), (−1, 6), (8, 11)}

59. $X'(6, 4)$, $Y'(5, 0)$, $Z'(-3, 3)$



61. yes **63.** yes **65.** no **67.** H: it is hot; C: we will go swimming **69.** H: $3n - 7 = 17$; C: $n = 8$ **71.** 5 **73.** −2 **75.** 12

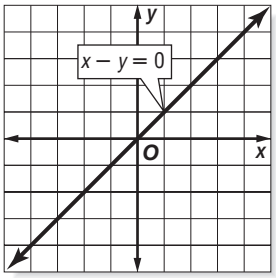
Pages 221–223 Lesson 4-5

1. The former will be a graph of four points, and the latter will be a graph of a line. **3.** Determine the point at which the graph intersects the x-axis by letting $y = 0$ and solving for x. Likewise, determine the point at which the graph intersects the y-axis by letting $x = 0$ and solving for y.

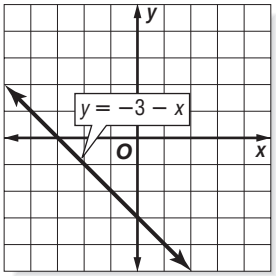
CONTENTS

Draw a line through the two points. **5.** yes; $3y = -2$ **7.** no

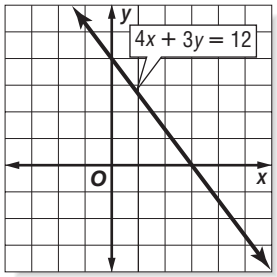
9.



11.

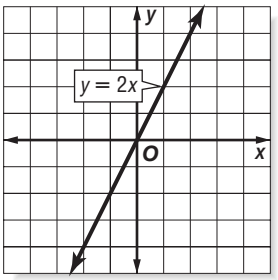


13.

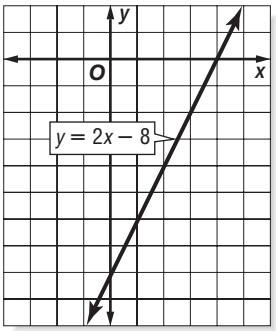


15. $15.75
17. yes; $2x + y = 6$
19. yes; $y = -5$ **21.** no
23. yes; $3x - 4y = 60$
25. yes; $3a = 2$

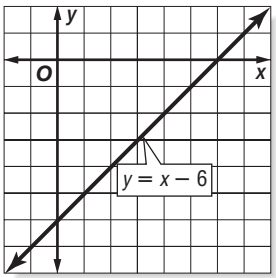
27.



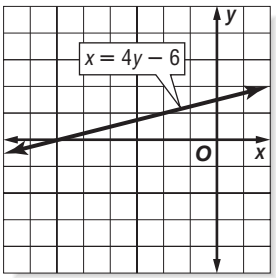
29.



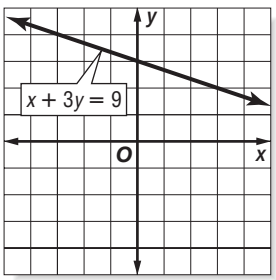
31.



33.



35.



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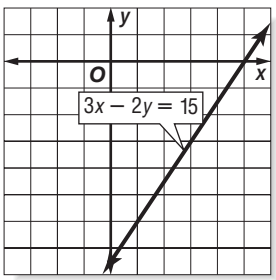
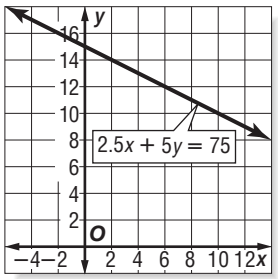


39.



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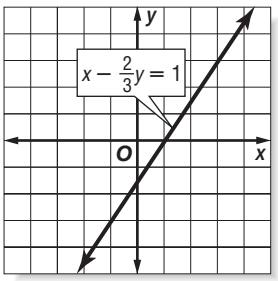
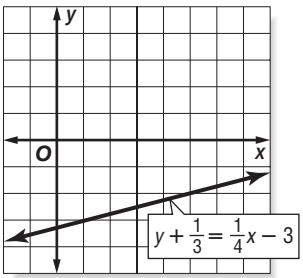


43.



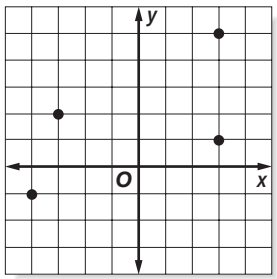
45. $5x + 3y = 15$
47. 7.5, 15

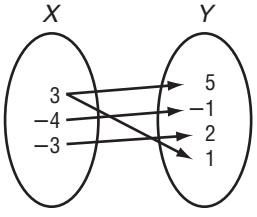
49.

t	d
0	0
2	0.42
4	0.84
6	1.26
8	1.68
10	2.1
12	2.52
14	2.94
16	3.36

51. about 14 s **53.** about 171 lb
55. 186.7 psi **57.** Substitute the values for x and y into the equation $2x - y = 8$. If the value of $2x - y$ is less than 8, then the point lies *above* the line. If the value of $2x - y$ is greater than 8, then the point lies *below* the line. If the value of $2x - y$ equals 8, then the point lies *on* the line. Sample answers: (1, 5) lies above the line, (5, 1) lies below the line, (6, 4) lies on the line. **59.** A **61.** {(−3, −8), (−1, −6), (2, −3), (5, 0), (8, 3)} **63.** {(−3, 21), (−1, 15), (2, 6), (5, −3), (8, −12)} **65.** {(−3, −30), (−1, −18), (2, 0), (5, 18), (8, 36)}
67. D = {−4, −3, 3}; R = {−1, 1, 2, 5}

x	y
3	5
−4	−1
−3	2
3	1

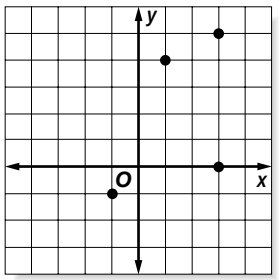


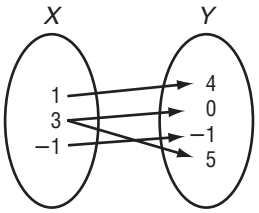


CONTENTS

69. D = {−1, 1, 3}; R = {−1, 0, 4, 5}

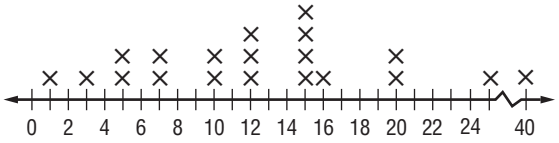
x	y
1	4
3	0
−1	−1
3	5





71. 3 **73.** 4

75.

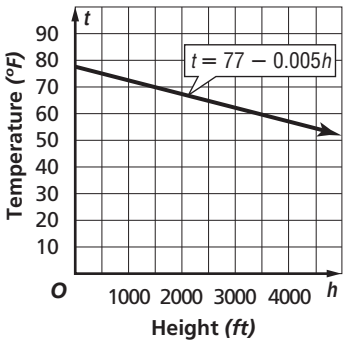


77. 15 yr **79.** 39 **81.** 48 **83.** 408

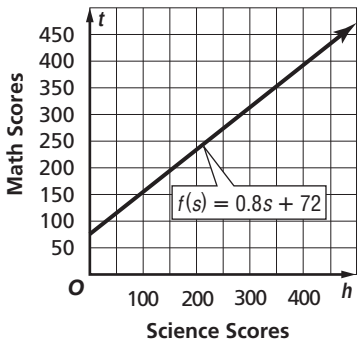
Pages 228–231 Lesson 4-6

1. y is not a function of x since 3 in the domain is paired with 2 and −3 in the range. x is not a function of y since −3 in the domain of the inverse is paired with 4 and 3 in the range. **3.** $x = c$, where c is any constant **5.** no **7.** yes **9.** yes **11.** 2 **13.** $t^2 - 3$ **15.** $4x + 15$ **17.** no **19.** yes **21.** yes **23.** yes **25.** yes **27.** yes **29.** no **31.** yes **33.** 1 **35.** 0 **37.** 26 **39.** $3a^2 + 7$ **41.** $6m - 8$ **43.** $6x^2 + 4$ **45.** $f(h) = 77 - 0.005h$

47.



49.



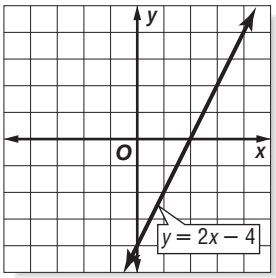
51. Krista's math score is above the average because the point at (260, 320) lies above the graph of the line for $f(s)$.

53. Functions can be used in meteorology to determine if there is a relationship between certain weather conditions. This can help to predict future weather patterns. Answers should include the following.

- As barometric pressure decreases, temperature increases. As barometric pressure increases, temperature decreases.
- The relation is not a function since there is more than one temperature for a given barometric pressure. However, there is still a pattern in the data and the two variables are related.

55. A

57.

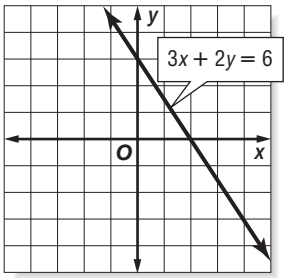


59. {(3, 12), (−1, −8)} **61.** approximately 3 h 9 min **63.** Reflexive; 3.5 **65.** −4 **67.** 20 **69.** $\frac{5}{8}$

Page 231 Practice Quiz 2

1. {(−3, 2), (−1, 4), (0, 5), (2, 7), (4, 9)} **3.** {(−3, 5.5), (−1, 4.5), (0, 4), (2, 3), (4, 2)}

5.

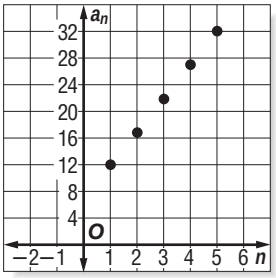


7. no **9.** $6a + 5$

Pages 236–238 Lesson 4-7

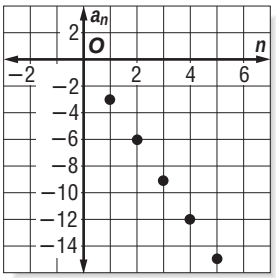
1. Sample answer: 2, −8, −18, −28, … **3.** Marisela; to find the common difference, subtract the first term from the second term. **5.** no **7.** 14, 9, 4 **9.** −90 **11.** 101

13. $a_n = 5n + 7$

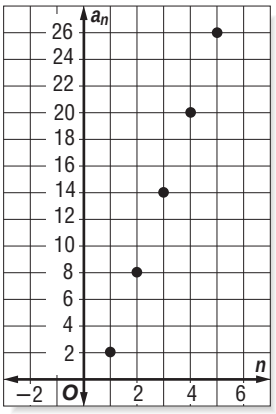


15. yes; −1 **17.** no **19.** yes; 0.5 **21.** 16, 19, 22 **23.** −82, −86, −90 **25.** $3\frac{2}{3}$, 4, $4\frac{1}{3}$ **27.** 125 **29.** 1264 **31.** $3\frac{1}{4}$ **33.** 25 **35.** 25 **37.** 17

39. $a_n = -3n$



41. $a_n = 6n - 4$



Selected Answers

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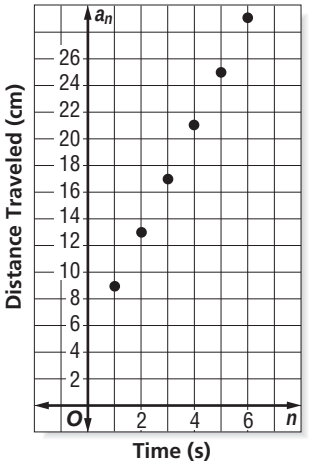
43. 4 **45.** $P(n) = 3n + 2$ **47.** $a_n = 8n + 20$ **49.** Yes, the section was oversold by 4 seats. **51.** $a_n = 4n + 5$

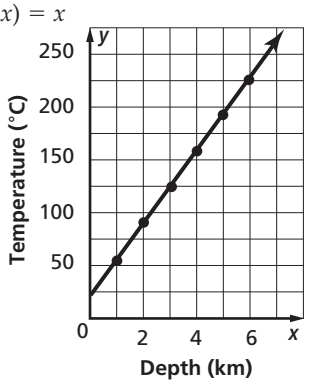
53.



55. $92,500
57. 45 **59.** C
61. 10 **63.** 32
65. yes; $x + y = 18$
67. $200 - 3x = 9$
69. −21 **71.** 12
73. $-\frac{5}{14}$
75. (−2, 2)
77. (−4, −2)
79. (3, 5)

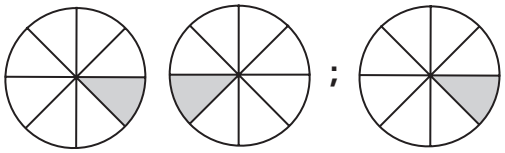
Pages 243–245 Lesson 4-8

1. Once you recognize a pattern, you can find a general rule that can be written as an algebraic expression. **3.** Test the values of the domain in the equation. If the resulting values match the range, the equation is correct. **5.** 16, 22, 29
7. $f(x) = x$
9.



11. 370°

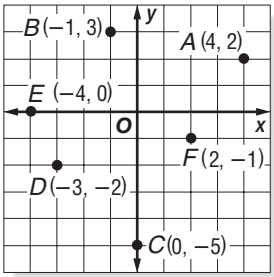
13.



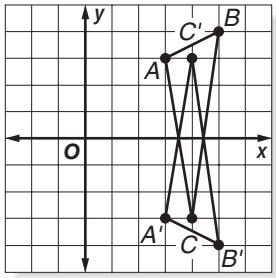
15. 10, 13, 11 **17.** 27, 35, 44 **19.** $4x + 1, 5x + 1, 6x + 1$
21. $f(x) = \frac{1}{2}x$ **23.** $f(x) = 6 - x$ **25.** $f(x) = 12 - 3x$
27. 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144 **29.** $f(a) = -0.9a + 193$
31. 5, 8, 11, 14 cm **33.** 74 cm **35.** B **37.** 13, 16, 19
39. −1, 5, 11 **41.** no

Pages 246–250 Chapter 4 Study Guide and Review

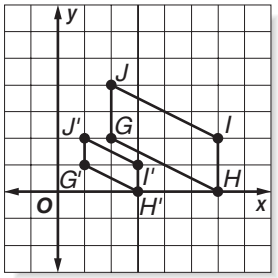
1. e **3.** d **5.** k **7.** c **9.** b
11–16.



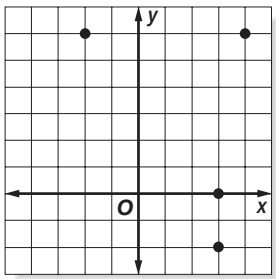
17. $A'(3, -3), B'(5, -4), C'(4, 3)$

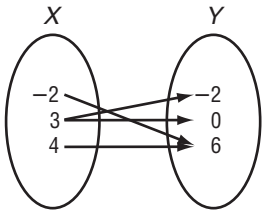


19. $G'(1, 1), H'(3, 0), I'(3, 1), J'(1, 2)$

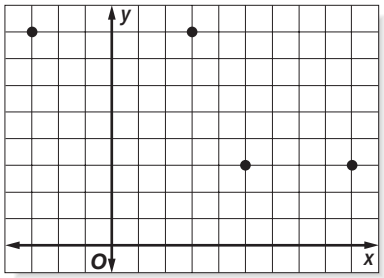


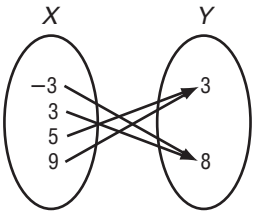
21. D = {−2, 3, 4}, R = {−2, 0, 6}



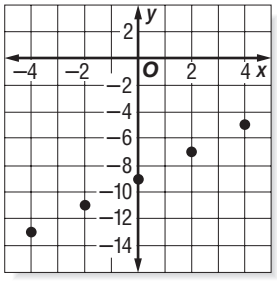


23. D = {−3, 3, 5, 9}, R = {3, 8}

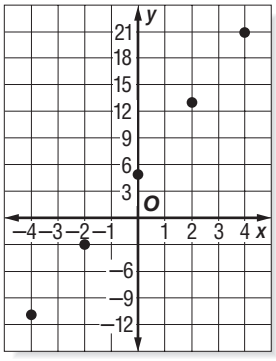




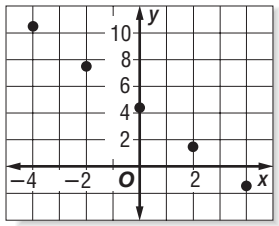
25. {(−4, −13), (−2, −11), (0, −9), (2, −7), (4, −5)}



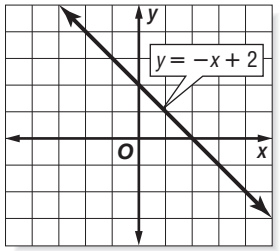
27. {(−4, −11), (−2, −3), (0, 5), (2, 13), (4, 21)}



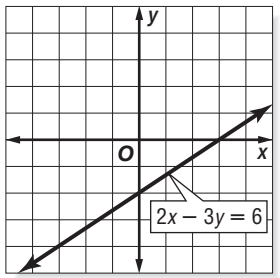
29. $\{(-4, 10\frac{1}{2}), (-2, 7\frac{1}{2}), (0, 4\frac{1}{2}), (2, 1\frac{1}{2}), (4, -1\frac{1}{2})\}$



31.



33.



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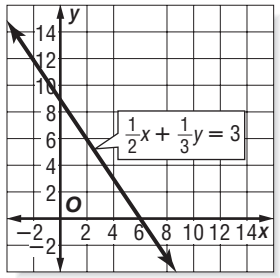


37. yes **39.** yes **41.** 3 **43.** 18 **45.** $4a^2 + 2a + 1$
47. 26, 31, 36 **49.** 6, 4, 2 **51.** −11, −5, 1 **53.** $f(x) = -x - 1$

Chapter 5 Analyzing Linear Equations

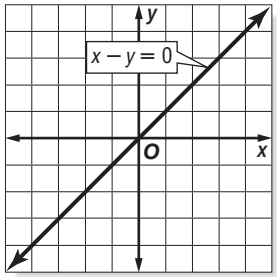
Page 255 Chapter 5 Getting Started

1. $\frac{1}{5}$ **3.** $-\frac{1}{4}$ **5.** $\frac{1}{3}$ **7.** 3 **9.** $\frac{1}{4}$ **11.** $-\frac{3}{4}$ **13.** 0 **15.** (1, 2)
17. (2, −3) **19.** (−2, 2)

Pages 259–262 Lesson 5-1

1. Sample answer: Use (−1, −3) as (x_1, y_1) and (3, −5) as (x_2, y_2) in the slope formula. **3.** The difference in the x values is always the 0, and division by 0 is undefined.
5. $\frac{3}{2}$ **7.** −4 **9.** 0 **11.** 5 **13.** 1.5 million subscribers per year
15. $\frac{3}{4}$ **17.** −2 **19.** undefined **21.** $\frac{10}{7}$ **23.** $\frac{3}{8}$
25. undefined **27.** 0 **29.** $-\frac{1}{2}$ **31.** $\frac{15}{4}$ **33.** $-\frac{2}{3}$
35. Sample answer: $\frac{8}{11}$ **37.** $\frac{s}{r}$, if $r \neq 0$ **39.** 4 **41.** −1 **43.** 1
45. $\frac{1}{4}$ **47.** 7 **49.** (−4, −5) is in Quadrant III and (4, 5) is in Quadrant I. The segment connecting them goes from lower left to upper right, which is a positive slope. **51.** 12–14; steepest part of the graph **53.** '90–'95; '80–'85 **55.** a decline in enrollment **57.** 13 ft 9 in. **59.** D **61.** $\frac{1}{3}$; The slope is the same regardless of points chosen. **63.** $f(x) = 5x$
65. yes **67.** no

69.

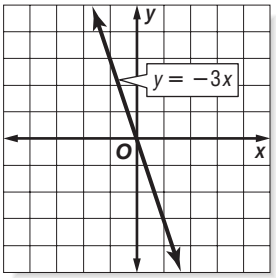


71. −21 **73.** −36
75. $-\frac{7}{24}$ **77.** 9
79. $26\frac{2}{3}$ **81.** $4\frac{1}{2}$
83. $20\frac{4}{7}$ **85.** $10\frac{2}{3}$

Pages 267–270 Lesson 5-2

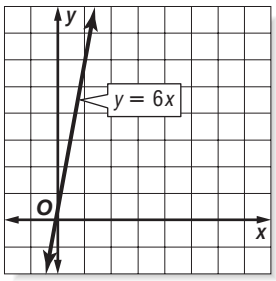
1. $y = kx$ **3.** They are equal. **5.** 1; 1

7.



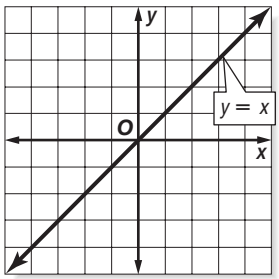
9. $y = \frac{9}{2}x$; 10
11. $y = \frac{1}{2}x$; 10

13.



15. 2; 2
17. $-\frac{1}{2}$; $-\frac{1}{2}$
19. $\frac{3}{2}$; $\frac{3}{2}$

21.



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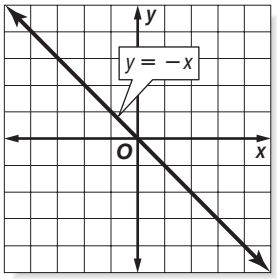

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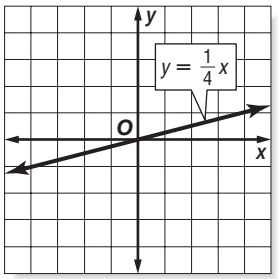

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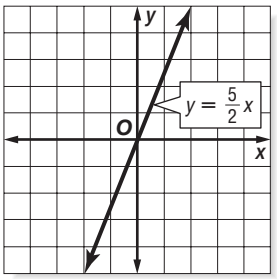

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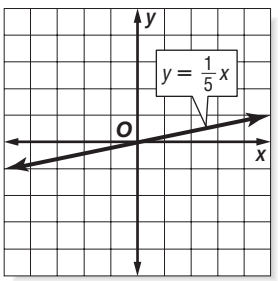
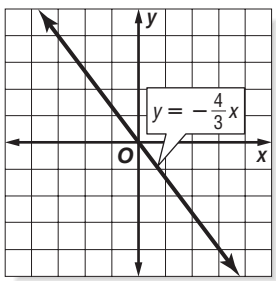


31.



33. $y = 2x$; 10 **35.** $y = -4x$; −5 **37.** $y = \frac{1}{3}x$; −8
39. $y = 5x$; 100 **41.** $y = \frac{32}{3}x$; 12

Selected Answers

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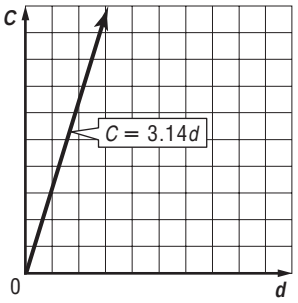
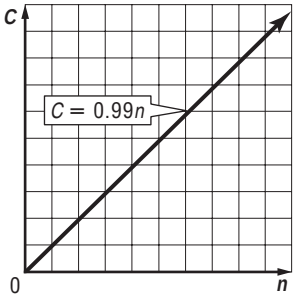
43. $C = 3.14d$



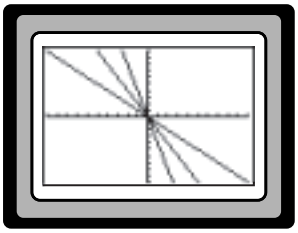
45. $C = 0.99n$



47. It also doubles. If $\frac{y}{x} = k$, and x is multiplied by 2, y must also be multiplied by 2 to maintain the value of k.

49. 2 **51.** 3 **53.** 23 lb **55.** 5 yrs 4 mos **57.** D

59.



61. Sample answer: $y = -5x$ **63.** -3 **65.** 2

67.

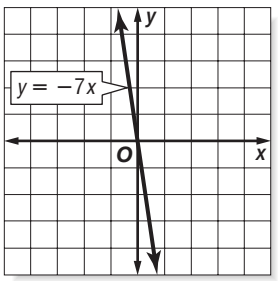
x	0	1	2	3	4	5
y	1	5	9	13	17	21

69. 3 **71.** -15 **73.** $y = 3x + 8$ **75.** $y = 4x - 3$
77. $y = -3x + 4$

Page 270 Practice Quiz 1

1. -2 **3.** $\frac{1}{9}$ **5.** 4

7.

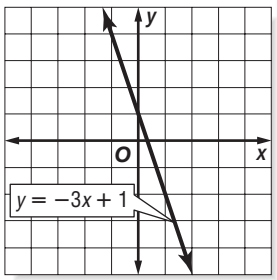


9. $y = 3x$; -9

Pages 275–277 Lesson 5-3

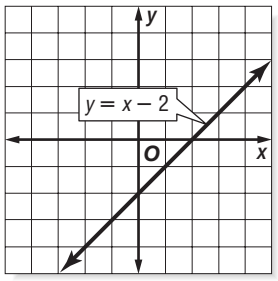
1. Sample answer: $y = 7x + 2$ **3.** slope **5.** $y = 4x - 2$
7. $y = -\frac{3}{2}x + 2$

9.



11. $T = 50 + 5w$ **13.** \$85
15. $y = 3x - 5$
17. $y = -\frac{3}{5}x$
19. $y = 0.5x + 7.5$
21. $y = \frac{3}{2}x - 4$
23. $y = -\frac{2}{3}x + 1$
25. $y = 2$ **27.** $y = 3x$

29.



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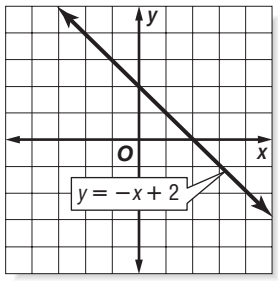

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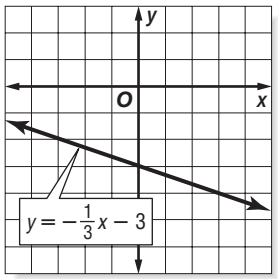

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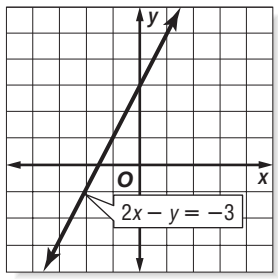

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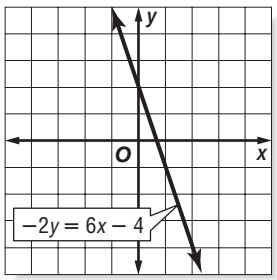

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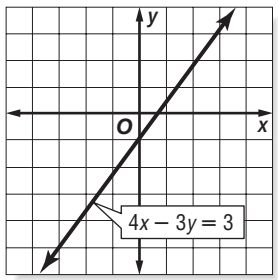


41. $C = 50 + 25h$ **43.** $T = 15 - 2h$ **45.** $S = 16 + t$
47. $R = 5.5 - 0.12t$ **49.** 1.54 **51.** D **53.** $y = -\frac{A}{B}x + \frac{C}{B}$, where $B \neq 0$ **55a.** $m = -2, b = -4$ **55b.** $m = -\frac{3}{4}, b = 3$
55c. $m = \frac{2}{3}, b = -3$ **57.** $y = \frac{15}{4}x$, $37\frac{1}{2}$ **59.** undefined
61. $-0.5, \frac{3}{4}, \frac{7}{8}, 2.5$ **63.** 23 **65.** -2 **67.** $-\frac{4}{3}$

Pages 283–285 Lesson 5-4

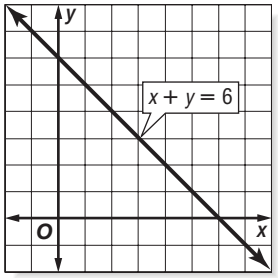
1. When you have the slope and one point, you can substitute these values in for x, y, and m to find b. When you are given two points, you must first find the slope and then use the first procedure. **3.** Sometimes; if the x- and y-intercepts are both zero, you cannot write the equation of the graph. **5.** $y = -3x + 16$ **7.** $y = -x + 6$ **9.** $y = \frac{1}{2}x - \frac{1}{2}$
11. $y = 3x - 1$ **13.** $y = 3x - 17$ **15.** $y = -2x + 6$
17. $y = -\frac{2}{3}x - 3$ **19.** $y = x - 3$ **21.** $y = x - 2$ **23.** $y = -2x + 1$ **25.** $y = -2$ **27.** $y = \frac{1}{2}x + \frac{1}{2}$ **29.** $y = -\frac{1}{4}x + \frac{11}{16}$
31. $y = -\frac{4}{3}x + 4$ **33.** $y = x - 2$ **35.** about 27.6 years
37. about 26.05 years **39.** 205,000 **41.** $y = \frac{2}{7}x - 2$
43. (7, 0); (0, -2)
45. Answers should include the following.

- Linear extrapolation is when you use a linear equation to predict values that are outside of the given points on the graph.
- You can use the slope-intercept form of the equation to find the y-value for any requested x-value.

47. B

CONTENTS

49.



51. $V = 2.5b$
53. $\{-2, 0, 5\}$ **55.** $<$
57. -3 **59.** 5 **61.** -15

Pages 289–291 Lesson 5-5

1. They are the coordinates of any point on the graph of the equation. **3.** Sample answer: $y - 2 = 4(x + 1)$; $y = 4x + 6$
5. $y + 2 = 3(x + 1)$ **7.** $4x - y = -13$ **9.** $5x - 2y = 11$
11. $y = -\frac{2}{3}x + 1$ **13.** $y - 3 = 2(x + 1)$ or $y + 1 = 2(x + 3)$
15. $y - 8 = 2(x - 3)$ **17.** $y - 4 = -3(x + 2)$ **19.** $y - 6 = 0$
21. $y + 3 = \frac{3}{4}(x - 8)$ **23.** $y + 3 = -\frac{5}{8}(x - 1)$
25. $y - 8 = \frac{7}{2}(x + 4)$ **27.** $y + 9 = 0$ **29.** $4x - y = -5$
31. $2x + y = -7$ **33.** $x - 2y = 12$ **35.** $2x + 5y = 26$
37. $5x - 3y = -24$ **39.** $13x - 10y = -151$ **41.** $y = 3x - 1$
43. $y = -2x + 8$ **45.** $y = \frac{1}{2}x - 1$ **47.** $y = -\frac{1}{4}x - \frac{7}{2}$
49. $y = x - 1$ **51.** $y = -3x - \frac{7}{4}$ **53.** $y + 3 = 10(x - 5)$; $y = 10x - 53$; $10x - y = 53$ **55.** $y - 210 = 5(x - 12)$
57. \$150 **59.** $y = 1500x - 2{,}964{,}310$ **61.** $\overline{RQ}$: $y + 3 = \frac{1}{2}(x + 1)$ or $y + 1 = \frac{1}{2}(x - 3)$; $\overline{QP}$: $y + 1 = -2(x - 3)$ or $y - 3 = -2(x - 1)$; $\overline{PS}$: $y - 3 = \frac{1}{2}(x - 1)$ or $y - 1 = \frac{1}{2}(x + 3)$; $\overline{RS}$: $y + 3 = -2(x + 1)$ or $y - 1 = -2(x + 3)$ **63.** $\overline{RQ}$: $x - 2y = 5$; $\overline{QP}$: $2x + y = 5$; $\overline{PS}$: $x - 2y = -5$; $\overline{RS}$: $2x + y = -5$
65. Answers should include the following.
- Write the definition of the slope using (x, y) as one point and (x_1, y_1) as the other. Then solve the equation so that the ys are on one side and the slope and xs are on the other.

67. $y = mx - 2m - 5$ **69.** All of the equations are the same. **71.** Regardless of which two points on a line you select, the slope-intercept form of the equation will always be the same. **73.** $y = 3x + 10$ **75.** $y = -1$ **77.** -6 **79.** 7
81. $\frac{1}{10}$ **83.** -1 **85.** -9 **87.** $-\frac{3}{2}$

Pages 295–297 Lesson 5-6

1. The slope is $\frac{3}{2}$, so the slope of a line perpendicular to the given line is $-\frac{2}{3}$. **3.** Parallel lines lie in the same plane and never intersect. Perpendicular lines intersect at right angles.
5. $y = x + 1$ **7.** $y = 3x + 8$ **9.** $y = -3x - 8$ **11.** $y = \frac{1}{2}x - 3$
13. $y = x - 9$ **15.** $y = x + 5$ **17.** $y = \frac{1}{2}x - \frac{3}{2}$
19. $y = -\frac{1}{3}x - \frac{13}{3}$ **21.** $y = \frac{1}{2}x + \frac{3}{2}$ **23.** $y = -6x - 9$
25. The lines for $x = 3$ and $x = -1$ are parallel because all vertical lines are parallel. The lines for $y = \frac{2}{3}x + 2$ and $y = \frac{2}{3}x - 3$ are parallel because they have the same slope. Thus, both pairs of opposite sides are parallel and the figure is a parallelogram. **27.** $y = \frac{1}{3}x - 6$ **29.** $y = -\frac{1}{4}x + \frac{5}{4}$
31. $y = \frac{1}{8}x + 5$ **33.** $y = -\frac{3}{2}x + 13$ **35.** $y = -\frac{5}{2}x + 2$
37. $y = -\frac{1}{5}x - 1$ **39.** $y = -3$ **41.** $y = -\frac{1}{2}x + 2$
43. parallel **45.** They are perpendicular, because the slopes are 3 and $-\frac{1}{3}$.
47. If two equations have the same slope, then the lines are parallel. Answers should include the following.
- Sample answer: $y = -5x + 1$; The graphs have the same slope.
- Sample answer: $y = \frac{1}{5}x$; The slopes are negative reciprocals of each other.

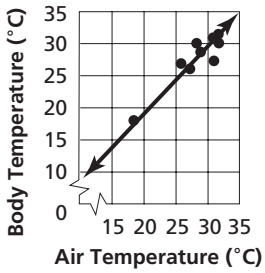
49. C **51.** $y - 7 = 5(x + 4)$ **53.** $C = 0.22m + 0.99$
55. $y = -\frac{1}{2}x + \frac{3}{2}$ **57.** $y = -5x + 11$ **59.** $y = 9$

Page 297 Practice Quiz 2

1. $y = 4x - 3$ **3.** $y = \frac{5}{2}x + \frac{1}{2}$ **5.** $x - 2y = -11$, $y = \frac{1}{2}x + \frac{11}{2}$

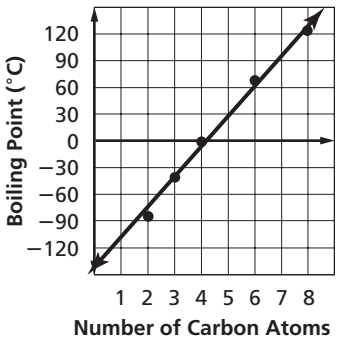
Pages 301–305 Lesson 5-7

1. If the data points form a linear pattern such that y increases as x increases, there is a positive correlation. If the linear pattern shows that y decreases as x increases, there is a negative correlation. **3.** Linear extrapolation predicts values outside the range of the data set. Linear interpolation predicts values inside the range of the data.
5. Negative; the more TV you watch, the less you exercise.
7. positive correlation

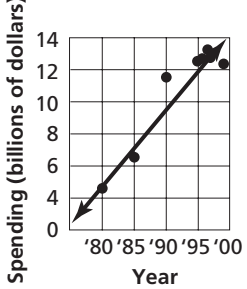


9. 40.1°F
11. no correlation
13. Positive; the higher the sugar content, the more Calories.
15. 18.85 million
17. \$3600

19.

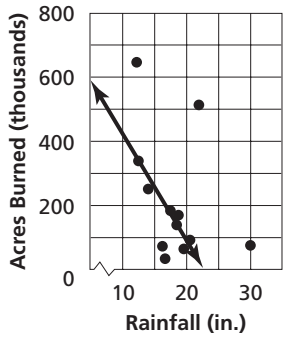


21. Sample answer: -116°C
23. Sample answer: 7
25.



27. Sample answer: about \$17.3 billion

29.



31. using (12.7, 340) and (17.5, 194) and rounding, $y = -30.4x + 726.3$ **33.** The data point lies beyond the main grouping of data points. It can be ignored as an extreme value.

37. You can visualize a line to determine whether the data has a positive or negative correlation. Answers should include the following.

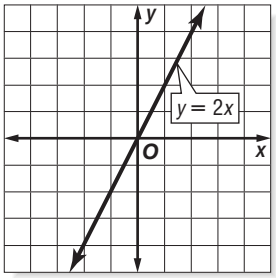
- Write a linear equation for the line of fit. Then substitute the person's height and solve for the corresponding age.

39. B **45.** $y = -4x - 3$ **47.** $y - 3 = -2(x + 2)$ **49.** $y + 3 = x + 3$ **51.** 4, −1.6 **53.** −5 **55.** 3

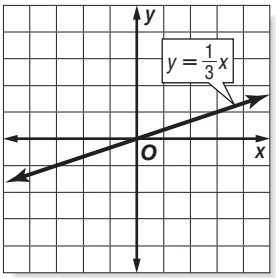
Pages 308–312 Chapter 5 Study Guide and Review

1. direct variation **3.** parallel **5.** slope-intercept **7.** 3 **9.** undefined **11.** 1.5

13.



15.



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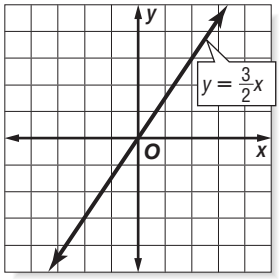
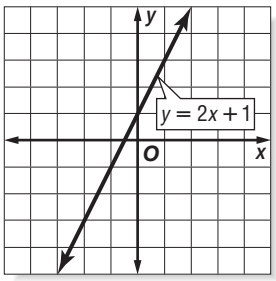
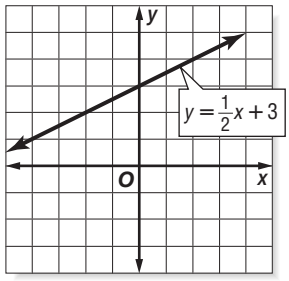


19. $y = -\frac{2}{3}x$
21. $y = -x$
23. $y = -2x$
25. $y = 3x + 2$
27. $y = 4$
29. $y = 0.5x - 0.3$

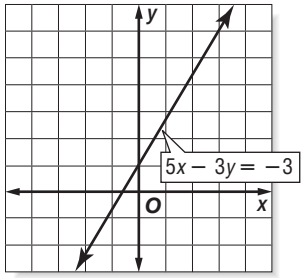
31.



33.



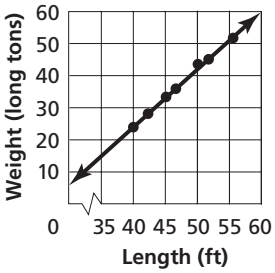
35.



37. $y = x + 6$
39. $y = \frac{1}{2}x + \frac{11}{2}$
41. $y = 2x + 10$
43. $y = -1$
45. $y - 6 = 5(x - 4)$
47. $y + 3 = \frac{1}{2}(x - 5)$
49. $y + 2 = 3\left(x - \frac{1}{4}\right)$
51. $2x - y = -3$
53. $3x - 2y = 20$

55. $y = -2x + 6$ **57.** $y = \frac{5}{12}x + 4$ **59.** $y = -\frac{1}{3}x + 1$ **61.** $y = \frac{1}{2}x - 3$ **63.** $y = -\frac{7}{2}x - 14$ **65.** $y = 5x - 15$

67.



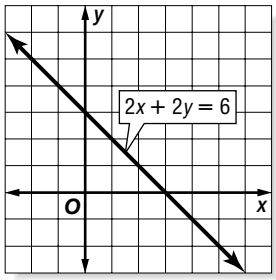
69. $38\frac{1}{3}$ long tons

Chapter 6 Solving Linear Inequalities

Page 317 Chapter 6 Getting Started

1. 53 **3.** −9 **5.** −45 **7.** 4 **9.** 22 **11.** 4 **13.** 8 **15.** 30 **17.** 7 **19.** 1

21.



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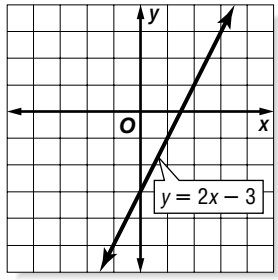

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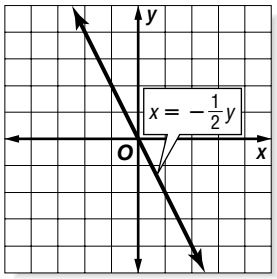
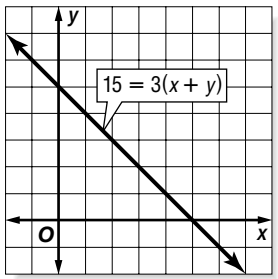
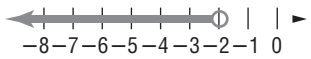


27.



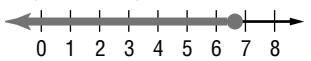
Pages 321–323 Lesson 6-1

1. Sample answers: $y + 1 < -2$, $y - 1 < -4$, $y + 3 < 0$
3. The set of all numbers b such that b is greater than or equal to -5.
5. $\{a \mid a < -2\}$

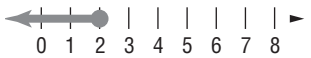


7. $\{t \mid t \geq 12\}$

9. $\{r \mid r \leq 6.7\}$

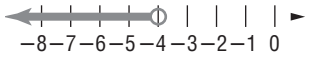


11. Sample answer: Let n = the number; $n - 8 \leq 14$; $\{n \mid n \leq 22\}$. **13.** no more than 33 g **15.** f **17.** c **19.** b
21. $\{d \mid d \leq 2\}$



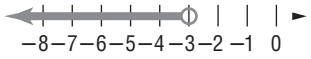
23. $\{s \mid s > 4\}$

25. $\{r \mid r < -4\}$



27. $\{m \mid m \geq 3\}$

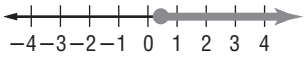
29. $\{f \mid f < -3\}$



31. $\{w \mid w \geq 1\}$

33. $\{a \mid a \leq -5\}$

35. $\{x \mid x \geq 0.6\}$

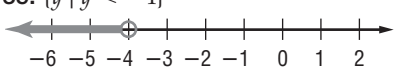


37. $\left\{p \mid p \leq 1\frac{1}{9}\right\}$

39a. 12 **39b.** 7 **39c.** 16 **41.** Sample answer: Let n = the number; $n - 5 < 33$; $\{n \mid n < 38\}$. **43.** Sample answer: Let n = the number; $2n > n + 14$; $\{n \mid n > 14\}$. **45.** Sample answer: Let n = the number; $4n \leq 3n + (-2)$; $\{n \mid n \leq -2\}$. **47.** at least 199,999,998,900 stars **49.** at least \$3747 **51.** no more than \$33 **53a.** always **53b.** never **53c.** sometimes **55.** $\{p \mid p > 25\}$ **57.** C **59.** no **61.** $y = -x + 4$ **63.** 31, 37 **65.** 48, 96 **67.** $\{(-1, 8), (3, 4), (5, 2)\}$ **69.** 7 **71.** 21 **73.** 49 **75.** 24.5

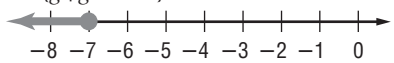
Pages 328–331 Lesson 6-2

1. You could solve the inequality by multiplying each side by $-\frac{1}{7}$ or by dividing each side by -7. In either case, you must reverse the direction of the inequality symbol.
3. Ilonia; when you divide each side of an inequality by a negative number, you must reverse the direction of the inequality symbol. **5.** c **7.** $\{t \mid t < -108\}$
9. $\{f \mid f \geq 0.36\}$ **11.** Sample answer: Let n = the number; $\frac{1}{2}n \geq 26$; $\{n \mid n \geq 52\}$. **13.** d **15.** e **17.** b **19.** $\{g \mid g \leq 24\}$
21. $\{d \mid d \leq -6\}$ **23.** $\{m \mid m \geq 35\}$ **25.** $\{r \mid r > 49\}$
27. $\{y \mid y \geq -24\}$ **29.** $\{q \mid q \geq 44\}$ **31.** $\{w \mid w > -2.72\}$
33. $\left\{c \mid c < -\frac{1}{10}\right\}$
35. $\{y \mid y < -4\}$

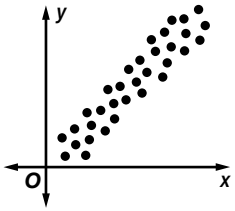


37a. 3.5 **37b.** −14 **37c.** −6 **39.** Sample answer: Let n = the number; $7n > 28$; $\{n \mid n > 4\}$. **41.** Sample answer: Let n = the number; $24 \leq \frac{1}{3}n$; $\{n \mid n \geq 72\}$. **43.** Sample answer: Let n = the number; $0.25n \geq 90$; $\{n \mid n \geq 360\}$. **45.** less than $4\frac{1}{4}$ ft
47. no more than 27 min **49.** up to about 6 ft **51.** at least 3 times **53.** at least 175 spaces
55. Inequalities can be used to compare the heights of walls. Answers should include the following.
- If x represents the number of bricks and the wall must be no higher than 4 ft or 48 in., then $3x \leq 48$.
- To solve this inequality, divide each side by 3 and do not change the direction of the inequality. The wall must be 16 bricks high or fewer.

57. C
59. $\{g \mid g \leq -7\}$



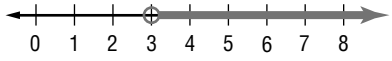
61. Sample answer:



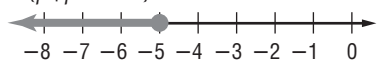
63. $y = -2$ **65.** -10 **67.** $3w + 2$ **69.** 6 **71.** 5 **73.** 7 **75.** 12 **77.** -8

Page 331 Practice Quiz 1

1. $\{h \mid h > 3\}$



3. $\{p \mid p \leq -5\}$



5. $\{g \mid g \leq -1\}$

7. $\{v \mid v < 35\}$ **9.** $\{r \mid r > -13\}$

Pages 334–337 Lesson 6-3

1. To solve both the equation and the inequality, you first subtract 6 from each side and then divide each side by -5. In the equation, the equal sign does not change. In the inequality, the inequality sign is reversed because you divided by a negative number. **3a.** Distributive Property **3b.** Add 12 to each side. **3c.** Divide each side by 3.
5. $\{r \mid r \geq -18\}$ **7.** $\{g \mid g < -1\}$ **9.** Sample answer: Let n = the number; $7 - 2n < 3n + 32$; $\{n \mid n > -5\}$. **11a.** Subtract 7 from each side. **11b.** Multiply each side by $\frac{5}{2}$.

13. $4(t - 7) \leq 2(t + 9)$	*Original inequality*
$4t - 28 \leq 2t + 18$	*Distributive Property*
$4t - 28 - 2t \leq 2t + 18 - 2t$	*Subtract 2t from each side.*
$2t - 28 \leq 18$	*Simplify.*
$2t - 28 + 28 \leq 18 + 28$	*Add 28 to each side.*
$2t \leq 46$	*Simplify.*
$\frac{2t}{2} \leq \frac{46}{2}$	*Divide each side by 2.*
$t \leq 23$	*Simplify.*

$\{t \mid t \leq 23\}$
15. $\{t \mid t \geq 3\}$ **17.** $\{d \mid d > -125\}$ **19.** $\left\{q \mid q \leq 3\frac{1}{3}\right\}$
21. $\{r \mid r \geq -9\}$ **23.** $\{v \mid v \geq 19\}$ **25.** $\{w \mid w \leq 1\}$

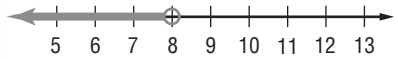
CONTENTS

27. $\{t \mid t \geq -1\}$ **29.** $\varnothing$ **31.** $\{v \mid v \geq 4.5\}$
33. $\{y \mid y \leq 11\}$

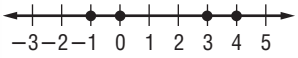
35. Sample answer: Let n = the number; $\frac{1}{8}n - 5 \geq 30$; $\{n \mid n \geq 280\}$. **37.** Sample answer: Let n = the number; $-4n + 9 \leq n - 21$; $\{n \mid n \geq 6\}$. **39.** $3a - 15 < 90$
41. $\frac{91 + 95 + 88 + s}{4} \geq 92$ **43.** $\frac{5(F - 32)}{9} < -38$ **45.** more than $12\frac{1}{2}$ weeks **47.** 3 or fewer toppings **49.** no change
51. 7, 9; 5, 7; 3, 5; 1, 3
53. Inequalities can be used to describe the temperatures for which an element is a gas or a solid. Answers should include the following.

- The inequality for temperatures in degrees Celsius for which bromine is a gas is $\frac{9}{5}C + 32 > 138$.
- Sample answer: Scientists may use inequalities to describe the temperatures for which an element is a solid.

55. C **57.** $\{x \mid x \leq 8\}$ **59.** up to 416 mi
61. $\{t \mid t < 8\}$



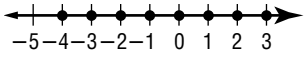
63. $y + 3 = 2(x - 1)$ **65.** $y - 6 = 0$ **67.** $\frac{7}{3}$
69. yes; $4x - 2y = 7$ **71.** yes; $x + 0y = 12$ **73.** 2.5
75.



77.

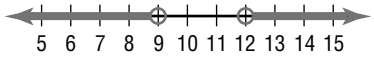
79.

81.

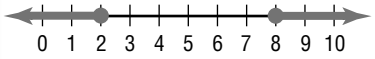


Pages 341–344 Lesson 6-4

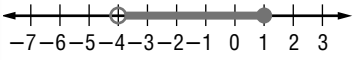
1. A compound inequality containing *and* is true if and only if both inequalities are true. A compound inequality containing *or* is true if and only if at least one of the inequalities is true. **3.** Sample answer: $x < -2$ and $x > 3$
5.



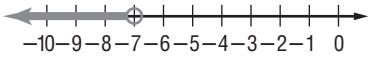
7. $x \leq -1$ or $x \geq 5$
9. $\{n \mid n \leq 2 \text{ or } n \geq 8\}$



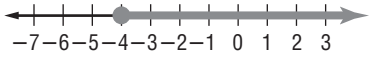
11. $\{x \mid -4 < x \leq 1\}$



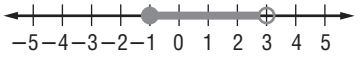
13. about $4.44 \leq x \leq 6.67$
15.



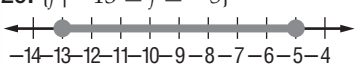
17.



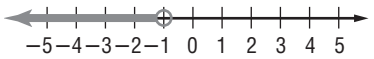
19.



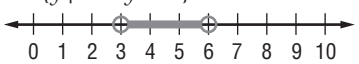
21. $-7 < x < -3$ **23.** $x \leq -7$ or $x \geq -6$ **25.** $x = 2$ or $x > 5$ **27.** $t \leq 18$ or $t \geq 22$
29. $\{f \mid -13 \leq f \leq -5\}$



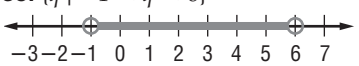
31. $\{h \mid h < -1\}$



33. $\{y \mid 3 < y < 6\}$



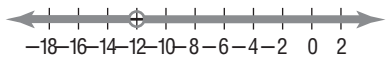
35. $\{q \mid -1 < q < 6\}$



37. $\{n \mid n \leq 4\}$

39. $\varnothing$

41. $\{b \mid b < -12 \text{ or } b > -12\}$

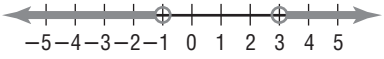


43. Sample answer: Let n = the number; $-8 < 3n + 4 < 10$; $\{n \mid -4 < n < 2\}$. **45.** Sample answer: Let n = the number; $0 < \frac{1}{2}n \leq 1$; $\{n \mid 0 < n \leq 2\}$. **47.** between \$145 and \$230 inclusive **49a.** $x \geq 5$ and $x \leq 8$ **49b.** $x > 6$ or $x < 1$
51. $\{h \mid 15 \leq h \leq 50{,}000\}$; $\{h \mid 20 \leq h \leq 20{,}000\}$ **53.** Sample answer: troposphere: $a \leq 10$; stratosphere: $10 < a \leq 30$; mesosphere: $30 < a \leq 50$; thermosphere: $50 < a \leq 400$; exosphere: $a > 400$ **55.** A **57a.** $\{x \mid x < -6 \text{ or } x > -1\}$
57b. $\{x \mid -2 \leq x \leq 8\}$ **59.** $\{d \mid d \geq 5\}$ **61.** $\{t \mid t < 169\}$
63. 2.25 **65.** {(6, 0), (−3, 5), (2, −2), (−3, 3)}; {−3, 2, 6}; {−2, 0, 3, 5}; {(0, 6), (5, −3), (−2, 2), (3, −3)} **67.** {(3, 4), (3, 2), (2, 9), (5, 4), (5, 8), (−7, 2)}; {−7, 2, 3, 5}; {2, 4, 8, 9}; {(4, 3), (2, 3), (9, 2), (4, 5), (8, 5), (2, −7)} **69.** 5:1 **71.** −470
73. 7 **75.** 1 **77.** 6 **79.** 1

Page 344 Practice Quiz 2

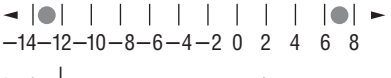
1. $\{b \mid b < 7\}$ **3.** $\{t \mid t < -3\}$ **5.** $\{m \mid m \geq 3\}$
7. $\{x \mid 3 < x < 9\}$

9. $\{m \mid m > 3 \text{ or } m < -1\}$

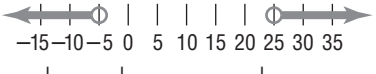


Pages 348–351 Lesson 6-5

1. The solution of $|x - 2| > 6$ includes all values that are less than −4 or greater than 8. The solution of $|x - 2| < 6$ includes all values that are greater than −4 and less than 8.
3. Leslie; you need to consider the case when the value inside the absolute value symbols is positive and the case when the value inside the absolute value symbols is negative. So $x + 3 = 2$ or $x + 3 = -2$. **5.** c
7. $\{-13, 7\}$



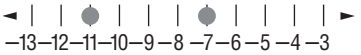
9. $\{w \mid w < -5 \text{ or } w > 25\}$



11. $|x - 1| = 3$ **13.** $\{d \mid 1.499 \leq d \leq 1.501\}$ **15.** f **17.** b
19. d **21.** $|t - 38| \leq 1.5$ **23.** $|s - 55| \leq 3$

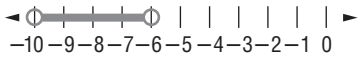
CONTENTS

25. $\{-11, -7\}$



27. $\{-0.8, 4\}$

29. $\{t \mid -10 < t < -6\}$



31. $\{w \mid w \leq 3 \text{ or } w \geq 9\}$

33. $\left\{k \mid k \leq -4 \text{ or } k \geq 1\frac{1}{3}\right\}$

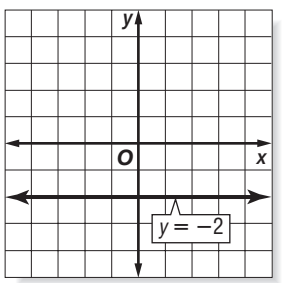
35. $\varnothing$

37. $\{w \mid 0 \leq w \leq 18\}$

39. $\left\{x \mid x \leq -2\frac{2}{3} \text{ or } x \geq 4\right\}$

41. $|x - 3| = 5$ **43.** $|x + 3| < 4$ **45.** $|x + 10| \geq 2$ **47.** $\{d \mid 266 \leq d \leq 294\}$ **49.** $\{t \mid 65 \leq t \leq 71\}$ **51.** $\{p \mid 28 \leq p \leq 32\}$ **53.** $\{a \mid 2.5 \leq a \leq 3.5\}$ **55a.** 1.8, 4.2 **55b.** $|x - 3| = 1.2$ **57.** B **59.** between 114 and 152 beats per min **61.** $\left\{x \mid x \leq -1\frac{1}{3}\right\}$ **63.** $-2; 4$ **65.** $-\frac{2}{3}; 0$ **67.** $x = \frac{3z + 2y}{e}$ **69.** -5 **71.** 4.2 **73.** Substitution Property

75.



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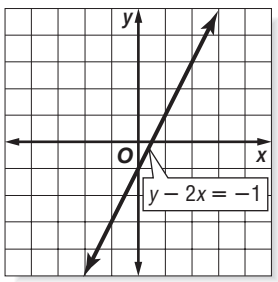

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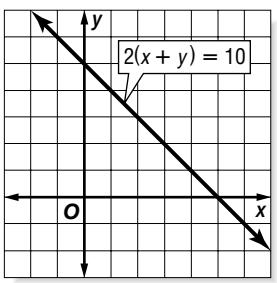
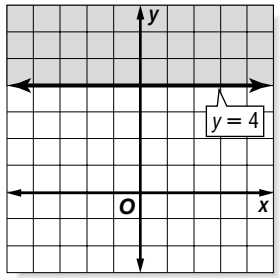


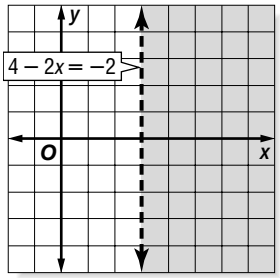
Pages 355–357 Lesson 6-6

1. The graph of $y = x + 2$ is a line. The graph of $y < x + 2$ does not include the boundary $y = x + 2$, and it includes all ordered pairs in the half-plane that contains the origin. **3.** If the test point results in a true statement, shade the half-plane that contains the point. If the test point results in a false statement, shade the other half-plane. **5.** $\{(2, 6)\}$

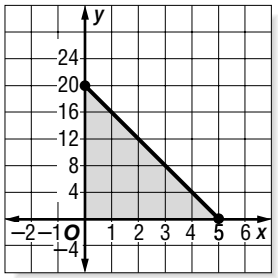
7.



9.

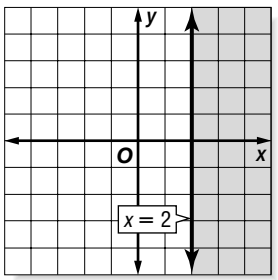


11. $12x + 3y \leq 60$



13. $\{(1, 1), (1, 2)\}$
15. $\{(-2, -4), (5, 1)\}$
17. $\{(2, -1), (-1, 1)\}$
19. $\{(6, -7)\}$ **21.** a **23.** b
25. above

27.



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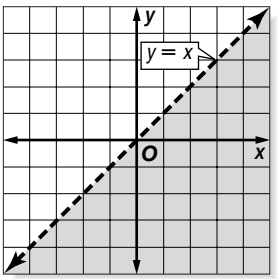

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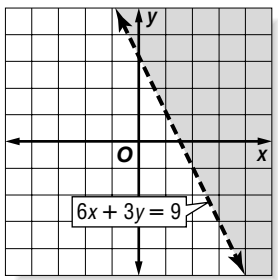

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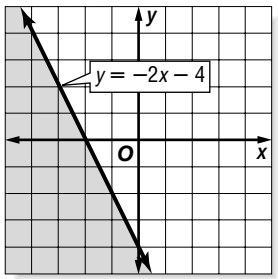

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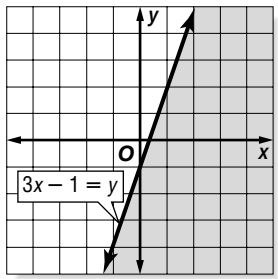

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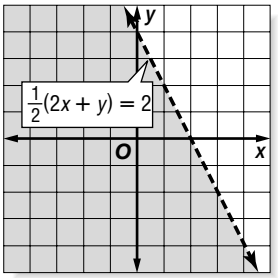
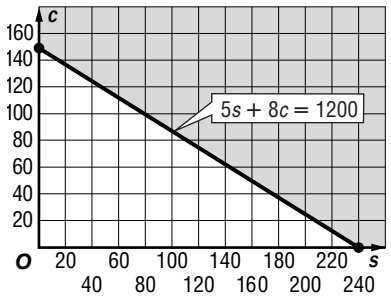


39. The solution set is limited to pairs of positive numbers.

CONTENTS

41. No, the weight will be greater than 4000 pounds.

43.



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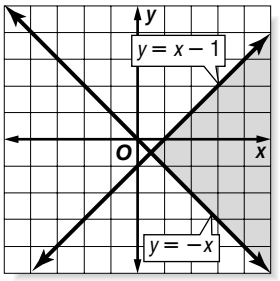
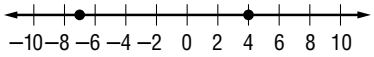
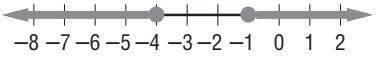


47. D

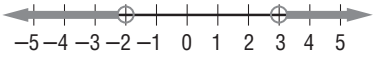
49. $\{-7, 4\}$



51. $\{y \mid y \leq -4 \text{ or } y \geq -1\}$



53. $\{m \mid m < -2 \text{ or } m > 3\}$

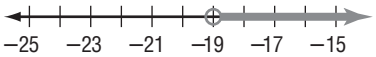


55. increase; 42% **57.** 23 **59.** 3.25 **61.** $-3c$ **63.** $6y - 3$

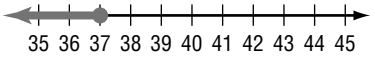
Pages 359–362 Chapter 6 Study Guide and Review

1. f **3.** d **5.** c **7.** h

9. $\{c \mid c > -19\}$



11. $\{w \mid w \leq 37\}$



13. $\{n \mid n \leq -0.15\}$

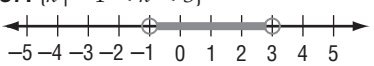
15. $\{h \mid h \leq -1\}$

17. Sample answer: Let n = the number; $21 \geq n + (-2)$; $\{n \mid n \leq 23\}$. **19.** $\{r \mid r \leq 6\}$ **21.** $\{m \mid m > -11\}$ **23.** $\{d \mid d < 65\}$

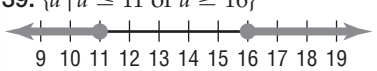
25. $\{p \mid p \leq -25\}$ **27.** $\{h \mid h < -2\}$ **29.** $\{x \mid x > -2\}$

31. $\{q \mid q > -7\}$ **33.** $\{x \mid x \geq 4\}$ **35.** Sample answer: Let n = the number; $\frac{2}{3}n - 27 \geq 9$; $\{n \mid n \geq 54\}$.

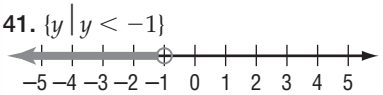
37. $\{k \mid -1 < k < 3\}$



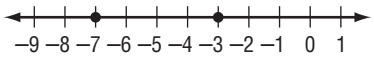
39. $\{a \mid a \leq 11 \text{ or } a \geq 16\}$



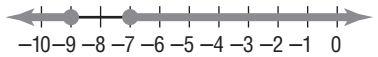
41. $\{y \mid y < -1\}$



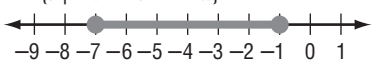
43. $\{-7, -3\}$



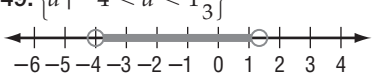
45. $\{w \mid w \leq -9 \text{ or } w \geq -7\}$



47. $\{t \mid -7 \leq t \leq -1\}$

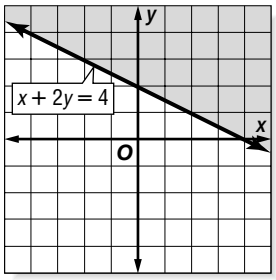


49. $\left\{d \mid -4 < d < 1\frac{1}{3}\right\}$



51. $\{(2, -5), (-1, 6)\}$ **53.** $\{(5, 10), (3, 6)\}$

55.



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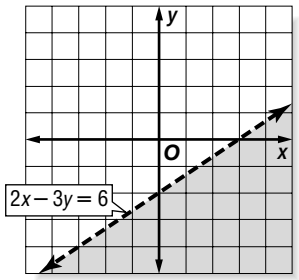
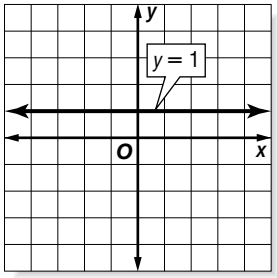


Chapter 7 Solving Systems of Linear Equations and Inequalities

Page 367 Chapter 7 Getting Started

1.



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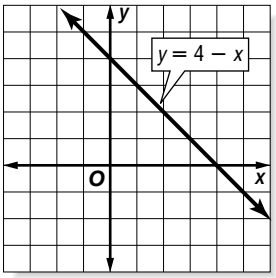

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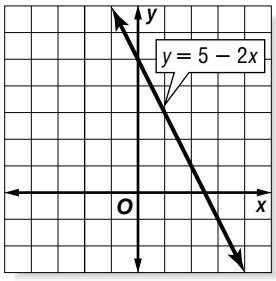
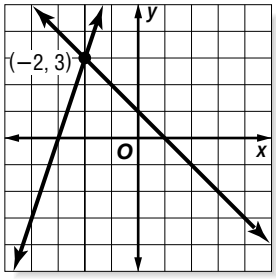


7. $x = \frac{a}{2}$ **9.** $b = \frac{120 + d}{7c}$ **11.** x **13.** $27x$ **15.** $13y$ **17.** $5x$ **19.** $7x$

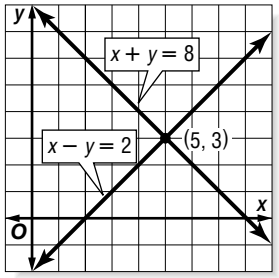
Page 371–374 Lesson 7-1

1. Sample answer:



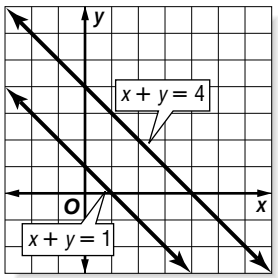
3. Sample answer: The graphs of the equations $x + y = 3$ and $2x + 2y = 6$ have a slope of -1. Since the graphs of the equations coincide, there are infinitely many solutions.
5. no solution **7.** one

9.



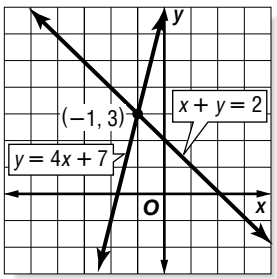
one; (5, 3)

11.



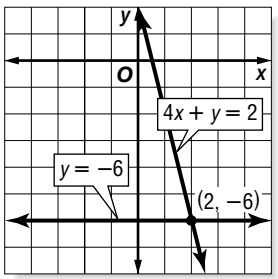
no solution

13.



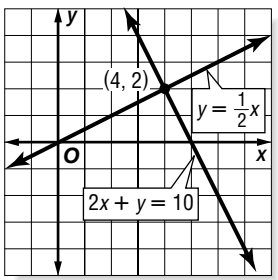
one; (−1, 3)
15. one **17.** infinitely many **19.** one **21.** one

23.



one; (2, −6)

25.



one; (4, 2)

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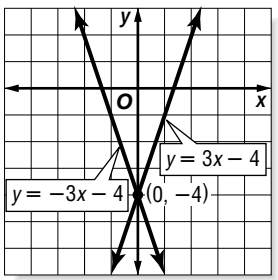

one; (0, −4)

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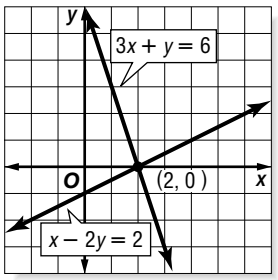
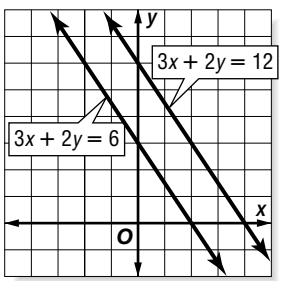


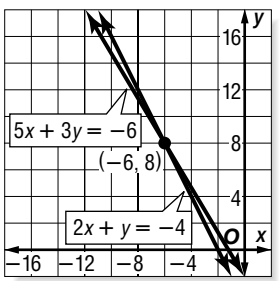
one; (2, 0)

31.



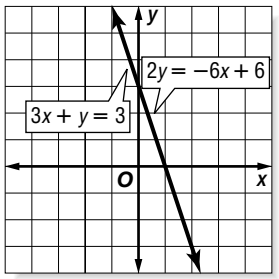
no solution

33.



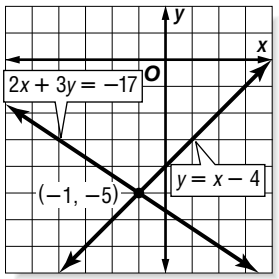
one; (−6, 8)

35.



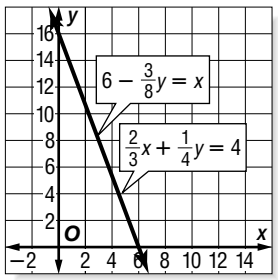
infinitely many

37.



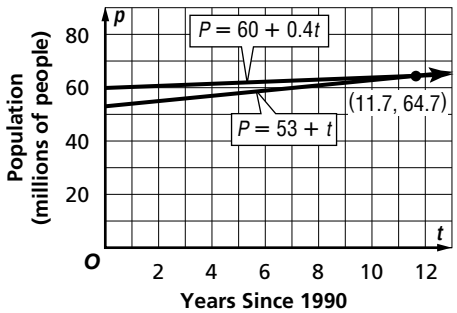
one; (−1, −5)

39.



infinitely many
41. 13 m by 7 m
43. 21 units^2 **45.** 70 m
47. \$40 **49.** neither
51. $p = 60 + 0.4t$

53.

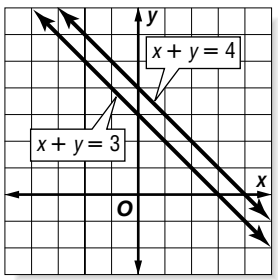


55. $A = 4, B = -4$ **57.** B **59.** $\{(5, -6)\}$ **61.** $\{n \mid 1.95 < n < 2.05\}$ **63.** $x - 3y = 3$ **65.** $y = 2x$ **67.** $q = \frac{7m - n}{10}$

Pages 379–381 Lesson 7-2

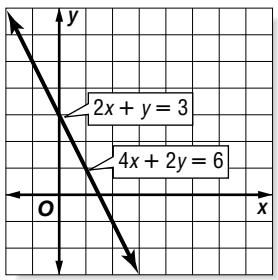
1. Substitution may result in a more accurate solution.
3. Sample answer: $y = x + 3$ and $2y = 2x + 6$ **5.** (3, 1)
7. infinitely many **9.** no solution **11.** (2, 10) **13.** (−23, −7)
15. (6, 7) **17.** no solution **19.** (7, 2) **21.** (2, 0) **23.** $\left(4\frac{1}{2}, \frac{3}{4}\right)$
25. (5, 2) **27.** $\left(2\frac{2}{3}, 4\frac{1}{3}\right)$ **29.** 14 in., 14 in., 18 in. **31.** 320 gal of 25% acid, 180 gal of 50% acid **33.** Yankees: 26, Reds: 5
35. The second offer is better if she sells less than \$80,000. The first offer is better if she sells more than \$80,000.
37. during the year 2023 **39.** (−1, 5, −4) **41.** B

43.



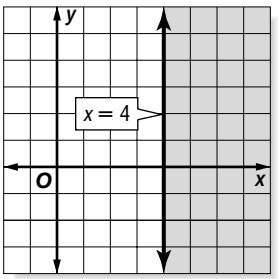
no solution

45.



infinitely many

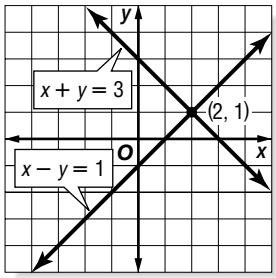
47.



49. 50 lb **51.** $12t$
53. $5d - b$

Page 381 Practice Quiz 1

1.



one; (2, 1)

3. (−4, 4) **5.** infinitely many

Pages 384–386 Lesson 7-3

1. Sample answer: $2a + b = 5$, $a - b = 4$ **3.** Michael; in order to eliminate the s terms, you must add the two equations. **5.** (−1, 3) **7.** (0, −5) **9.** $\left(-2\frac{1}{2}, -2\right)$ **11.** D **13.** (3, −1) **15.** (−1, 2) **17.** (7, 4) **19.** (−2, 3) **21.** (1, −1) **23.** $\left(2, -1\frac{1}{2}\right)$ **25.** $\left(\frac{3}{16}, -\frac{1}{2}\right)$ **27.** (15.8, 3.4) **29.** (24, 4) **31.** 32, 19 **33.** 5, 9 **35.** adult: \$16, student: \$9 **37.** $y = 0.0048x + 1.28$ **39.** 2048; 1.51 billion

41. Elimination can be used to solve problems about meteorology if the coefficients of one variable are the same or are additive inverses. Answers should include the following.

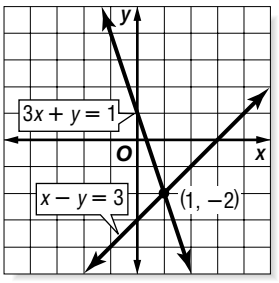
- The two equations in the system of equations are added or subtracted so that one of the variables is eliminated. You then solve for the remaining variable. This number is substituted into one of the original equations, and that equation is solved for the other variable.

- $n + d = 24$ — *Write the equations in column form and add.*
  $(+)\ n - d = 12$
  $2n = 36$ — *Notice that the d variable is eliminated.*
  $\frac{2n}{2} = \frac{36}{2}$ — *Divide each side by 2.*
  $n = 18$ — *Simplify.*
  $n + d = 24$ — *First equation*
  $18 + d = 24$ — *n = 18*
  $18 + d - 18 = 24 - 18$ — *Subtract 18 from each side.*
  $d = 6$ — *Simplify.*

On the winter solstice, Seward, Alaska, has 18 hours of nighttime and 6 hours of daylight.

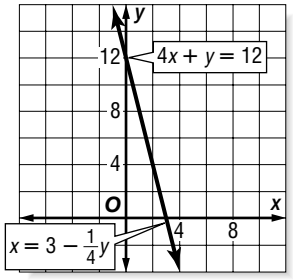
43. C **45.** (1, −1)

47.



one; (1, −2)

49.



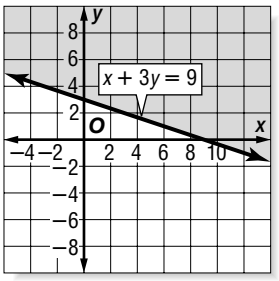
infinitely many

51. $6x + 8y$ **53.** $6m - 9n$

Pages 390–392 Lesson 7-4

1. If one of the variables cannot be eliminated by adding or subtracting the equations, you must multiply one or both of the equations by numbers so that a variable will be eliminated when the equations are added or subtracted. **3.** Sample answer: (1) You could solve the first equation for a and substitute the resulting expression for a in the second equation. Then find the value of b. Use this value for b and one of the original equations to find the value of a. (2) You could multiply the first equation by 3 and add this new equation to the second equation. This will eliminate the b term. Find the value of a. Use this value for a and one of the original equations to find the value of b. **5.** (−1, 1) **7.** (1.25, 2.75) **9.** elimination (+); (2, 0) **11.** elimination (−); (7, 11.5) **13.** (−9, −13) **15.** (2, 1) **17.** (−1, 5) **19.** (−1, −2) **21.** (10, 12) **23.** (2, −8) **25.** 2, −5 **27.** elimination (×);(−2, 1) **29.** substitution; (2, 6) **31.** elimination (+); $\left(8, \frac{4}{3}\right)$ **33.** elimination (×) or substitution; (3, 1) **35.** elimination (−); no solution **37.** elimination (−); (24, 4) **39.** 640 2-point field goals, 61 3-point field goals **41.** 95 **43.** 475 mph **45.** A **47.** (6, 2) **49.** (11, 7)**51.** (−4, 4) **53.** more than \$325,000

55.



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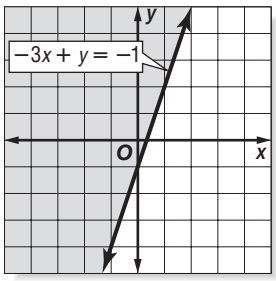
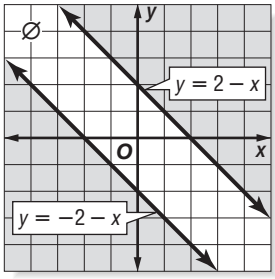


Page 392 Practice Quiz 2

1. (2, −2) **3.** (5, 3) **5.** \$0.45; \$0.15

Pages 396–398 Lesson 7-5

1. Sample answer:

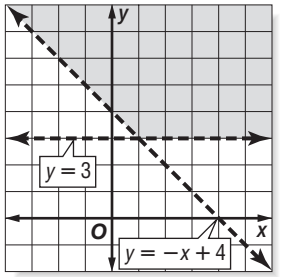


Selected Answers

CONTENTS

3. Kayla; the graph of $x + 2y \geq -2$ is the region representing $x + 2y = -2$ and the half-plane above it.

5.



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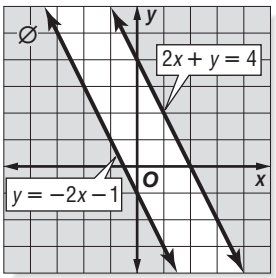

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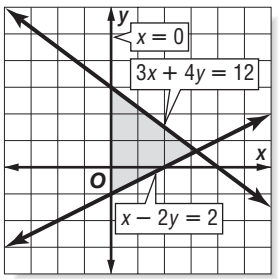
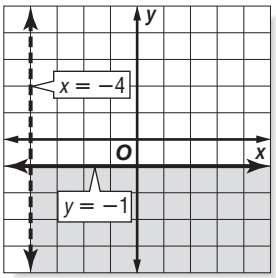


11. Sample answers: walk: 15 min, jog: 15 min; walk: 10 min, jog: 20 min; walk: 5 min, jog: 25 min

13.



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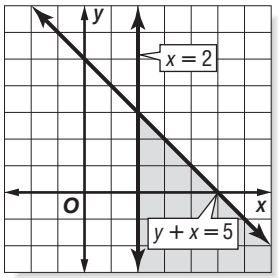

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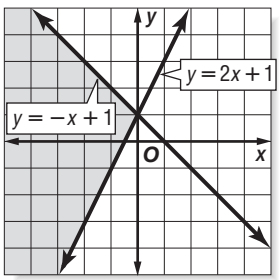

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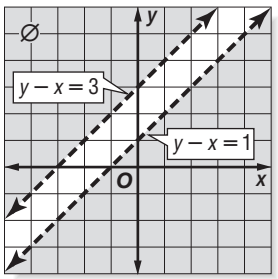

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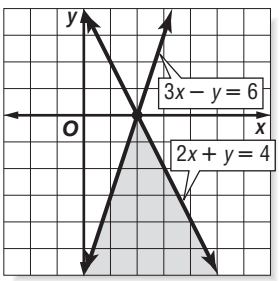

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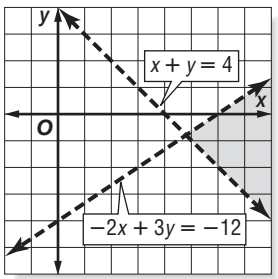

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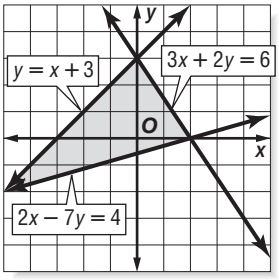
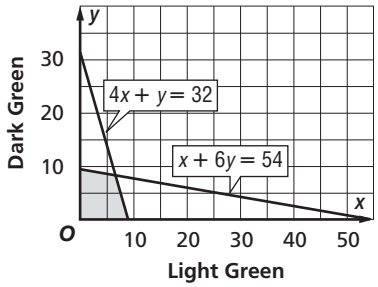


27. $y \leq x, y > x - 3$

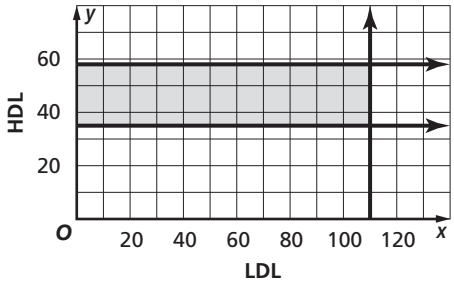
29.

Green Paint



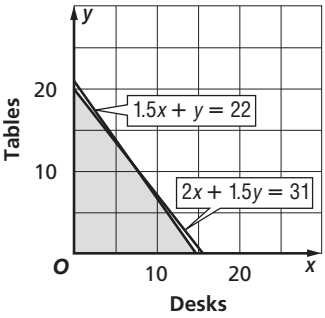
31.

Appropriate Cholesterol Levels



33.

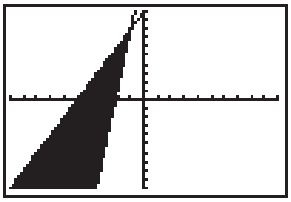
Furniture Manufacturing



35. By graphing a system of equations, you can see the appropriate range of Calories and fat intake. Answers should include the following.

- Two sample appropriate Calorie and fat intakes are 2200 Calories and 60 g of fat and 2300 Calories and 65 g of fat.
- The graph represents $2000 \leq c \leq 2400$ and $60 \leq f \leq 75$.

37.



[−10, 10] scl: 1 by [−10, 10] scl: 1

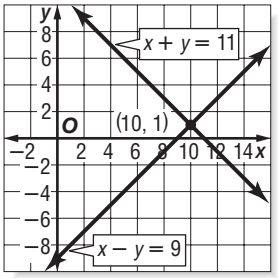
39. D **41.** (2, −1)
43. (−2, 3) **45.** (−1, 3)
47. $y = 2x - 9$
49. $y = \frac{1}{3}x - \frac{11}{3}$

CONTENTS

Pages 399–402 Chapter 7 Study Guide and Review

1. independent **3.** dependent **5.** infinitely many

7.



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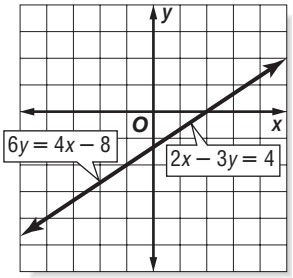
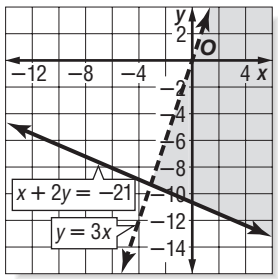


one; (10, 1) infinitely many

11. (3, −5) **13.** $\left(\frac{1}{2}, \frac{1}{2}\right)$ **15.** (2, 2) **17.** (4, 1) **19.** (5, 1)

21. $\left(2\frac{4}{5}, \frac{4}{5}\right)$ **23.** substitution; $\left(1\frac{3}{5}, 3\frac{1}{5}\right)$ **25.** substitution; (0, 0)

27.



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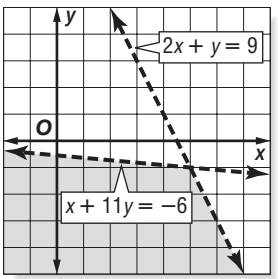

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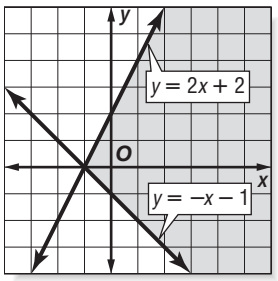
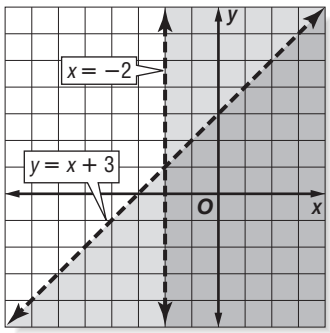
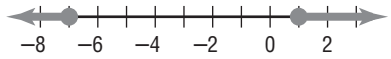


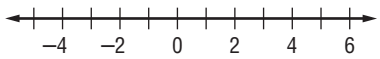
63.



65. (−3, −4) **67.** $\{h \mid h \le -7 \text{ or } h \ge 1\}$



69. ∅



71. dilation **73.** reflection **75.** $\frac{1}{3}$ **77.** 2 **79.** $\frac{7}{18}$ **81.** $\frac{11}{8}$

Chapter 8 Polynomials

Page 409 Chapter 8 Getting Started

1. 2^5 **3.** 5^2 **5.** a^6 **7.** $\left(\frac{1}{2}\right)^5$ **9.** 9 **11.** 25 **13.** 36 **15.** $\frac{16}{81}$
17. 63 yd^2 **19.** 84 ft^3

Pages 413–415 Lesson 8-1

1a. Sample answer: $n^2(n^5) = n^7$ **1b.** Sample answer: $(n^2)^5 = n^{10}$ **1c.** Sample answer: $(nm^2)^5 = n^5n^{10}$
3. Poloma; when finding the product of powers with the same base, keep the same base and add the exponents. Do not multiply the bases. **5.** No; $\frac{4a}{3b}$ shows division as well as multiplication. **7.** x^{11} **9.** 2^{18} or 262,144
11. $-48m^3n^3$ **13.** $5n^5$ **15.** Yes; 12 is a real number and therefore a monomial. **17.** No; $a - 2b$ shows subtraction, not multiplication of variables. **19.** No; $\frac{x}{y^2}$ shows division, not multiplication of variables. **21.** a^2b^6 **23.** $-28c^4d^7$
25. $30a^5b^7c^6$ **27.** $81p^2q^{14}$ **29.** 3^{16} or 43,046,721 **31.** $0.25x^6$
33. $-\frac{27}{64}c^3$ **35.** $-432c^2d^8$ **37.** $144a^8g^{14}$ **39.** $-9x^3y^9$
41. $40b^{12}$ **43.** $15f^5g^5$ **45.** $(49x^8)\pi$ **47.** x^3y^5 **49.** 10^{12} or 1 trillion **51.** 2; 8; 32 **53.** 2^{22} or 4,194,304 ways
55. False. If $a = 4$, then $(-4)^2 = 16$ and $-4^2 = -16$.
57. False. Let $a = 3$, $b = 4$, and $n = 2$. Then $(a + b)^n = (3 + 4)^2$ or 49 and $a^n + b^n = 3^2 + 4^2$ or 25. **59.** D

Pages 421–423 Lesson 8-2

1. Sample answer: $9xy$ and $6xy^2$ **3.** Jamal; a factor is moved from the numerator of a fraction to the denominator or vice versa only if the *exponent* of the factor is negative; $-4 \neq \frac{1}{4}$. **5.** x^6y^5 **7.** $\frac{1}{y^4}$ **9.** $\frac{g^8}{d^3c^5}$ **11.** $c^{11}d^{12}$ **13.** C
15. 3^6 or 729 **17.** y^2z^7 **19.** $\frac{81m^{28}}{256x^{20}y^{12}}$ **21.** $\frac{1}{3b^4}$ **23.** $\frac{1}{n^3p^4}$
25. $\frac{1}{125}$ **27.** $\frac{8}{27}$ **29.** $\frac{6k^{17}}{h^3}$ **31.** $\frac{19}{3z^{12}}$ **33.** $\frac{p}{q}$ **35.** 1
37. $\frac{27a^9c^3}{8b^9}$ **39.** $10ab$ units **41.** jet plane **43.** $\left(\frac{1}{2}\right)^n$
45. $\frac{1}{10^5}$ to $\frac{1}{10^4}$ cm; $\frac{1}{100{,}000}$ to $\frac{1}{10{,}000}$ cm **47.** a^{n+3} **49.** c^{11}

51. You can compare pH levels by finding the ratio of one pH level to another written in terms of the concentration c of hydrogen ions, $c = \left(\frac{1}{10}\right)^{pH}$. Answers should include the following.

- Sample answer: To compare a pH of 8 with a pH of 9 requires simplifying the quotient of powers.

$$\frac{\left(\frac{1}{10}\right)^8}{\left(\frac{1}{10}\right)^9} \cdot \frac{\left(\frac{1}{10}\right)^8}{\left(\frac{1}{10}\right)^9} = \left(\frac{1}{10}\right)^{8-9}$$

$$= \left(\frac{1}{10}\right)^{-1}$$

$$= \frac{1}{\left(\frac{1}{10}\right)^1} \quad \textit{Negative Exponent Property}$$

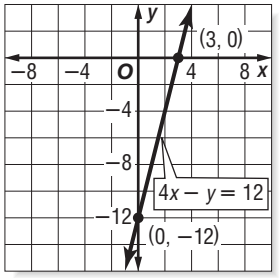
$$= 10$$

Thus, a pH of 8 is ten times more acidic than a pH of 9.

53. Since each number is obtained by dividing the previous number by 3, $3^1 = 3$ and $3^0 = 1$. **55.** $12x^8y^4$ **57.** $9c^2d^{10}$
59. $-108a^3b^9$ **61.** Sample answers: 3 oz of mozzarella, 4 oz of Swiss; 4 oz of mozzarella, 3 oz of Swiss; 5 oz of mozzarella, 3 oz of Swiss **63.** $y = -2x + 3$ **65.** $y = \frac{3}{2}x + 2$

CONTENTS

67.



69. ± 11 **71.** -7.21 **73.** 10^{-13} **75.** 10^{7} **77.** 10^{-11}

Pages 428–430 Lesson 8-3

1. When numbers between 0 and 1 are written in scientific notation, the exponent is negative. If the number is not between 0 and 1, use a positive exponent **3.** Sample answer: 6.5 million; 6,500,000; 6.5×10^6 **5.** 4590 **7.** 0.000036 **9.** 5.67×10^{-3} **11.** 3.002×10^{15} **13.** 1.88×10^{-7}; 0.000000188 **15.** 5×10^9; 5,000,000,000 **17.** $933.33 **19.** 0.0000000061 **21.** 80,000,000 **23.** 0.299 **25.** 6.89 **27.** 238,900 **29.** 0.0000000000000000000000000000091095 **31.** 3.4402×10^7 **33.** 9.0465×10^{-4} **35.** 3.807×10^2 **37.** 8.73×10^{12} **39.** 8.1×10^{-6} **41.** 1×10^9 **43.** $6.02214299 \times 10^{23}$ **45.** 1.71×10^9; 1,710,000,000 **47.** 1.44×10^{-8}; 0.0000000144 **49.** 2.548×10^5; 254,800 **51.** 4×10^{-4}; 0.0004 **53.** 2.3×10^{-6}; 0.0000023 **55.** 9.3×10^{-7}; 0.00000093 **57.** about $20,236 **59.** about 1.4×10^{14} or 140 trillion tons

61. Astronomers work with very large numbers such as the masses of planets. Scientific notation allows them to more easily perform calculations with these numbers. Answers should include the following.

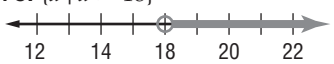
-

Planet	Mass (kg)
Mercury	330,000,000,000,000,000,000,000
Venus	4,870,000,000,000,000,000,000,000
Earth	5,970,000,000,000,000,000,000,000
Mars	642,000,000,000,000,000,000,000
Jupiter	1,900,000,000,000,000,000,000,000,000
Saturn	569,000,000,000,000,000,000,000,000
Uranus	86,800,000,000,000,000,000,000,000
Neptune	102,000,000,000,000,000,000,000,000
Pluto	12,700,000,000,000,000,000,000

- Scientific notation allows you to fit numbers such as these into a smaller table. It allows you to compare large values quickly by comparing the powers of 10 instead of counting zeros to find place value. For computation, scientific notation allows you work with fewer place values and to express your answers in a compact form.

63. 6.75×10^{18} **65.** 8.52×10^{-6} **67.** 1.09×10^3 **69.** $-\frac{4n^5}{p^5}$ **71.** no **73.** yes

75. $\{d \mid d > 18\}$



77. 20 **79.** 37 **81.** 10

Page 430 Practice Quiz 1

1. n^8 **3.** $-128w^{11}z^{18}$ **5.** $\frac{36k^6}{49n^2p^8}$ **7.** 4.48×10^6; 4,480,000 **9.** 4×10^{-2}; 0.04

Pages 434–436 Lesson 8-4

1. Sample answer: -8 **3a.** true; **3b.** false; $3x + 5$ **3c.** true **5.** yes; monomial **7.** 0 **9.** 5 **11.** $2a + 4x^2 - 7a^2x^3 - 2ax^5$ **13.** $x^3 + 3x^2y + 3xy^2 + y^3$ **15.** yes; monomial **17.** yes; binomial **19.** yes; trinomial **21.** $0.5bh$ **23.** $0.5xy - \pi r^2$ **25.** 3 **27.** 2 **29.** 4 **31.** 2 **33.** 3 **35.** 7 **37.** $-1 + 2x + 3x^2$ **39.** $8c - c^3x^2 + c^2x^3$ **41.** $4 - 5a^7 + 2ax^2 + 3ax^5$ **43.** $6y + 3xy^2 + x^2y - 4x^3$ **45.** $x^5 + 3x^3 + 5$ **47.** $2a^2x^3 + 4a^3x^2 - 5a$ **49.** $cx^3 - 5c^3x^2 + 11x + c^2$ **51.** $-2x^4 - 9x^2y + 8x + 7y^2$ **53.** $0.25q + 0.10d + 0.05n$ **55.** $\pi r^2h + \frac{2}{3}\pi r^3$ **57.** True; for the degree of a binomial to be zero, the highest degree of both terms would need to be zero. Then the terms would be like terms. With these like terms combined, the expression is not a binomial, but a monomial. Therefore, the degree of a binomial can never be zero. Only a monomial can have a degree of zero.

59. B **61.** 1.23×10^7 **63.** 1.2×10^7 **65.** $\frac{1}{b^2c}$ **67.** $\frac{16x^6y^4}{9z^2}$ **69.** no **71.** $\frac{1}{2}$ **73.** $7a^2 + 3a$ **75.** $a - 2b$

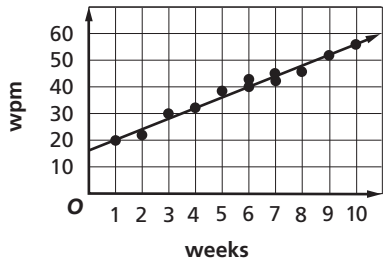
Page 441–443 Lesson 8-5

1. The powers of x and y are not the same. **3.** Kendra; Esteban added the additive inverses of both polynomials when he should have added the opposite of the polynomial being subtracted. **5.** $9y^2 - 3y - 1$ **7.** $11a^2 + 6a + 1$ **9.** $3ax^2 - 9x - 9a + 8a^2x$ **11.** about 297,692,000 **13.** $13z - 10z^2$ **15.** $-2n^2 + 7n + 5$ **17.** $5b^3 - 8b^2 - 4b$ **19.** $2g^3 - 9g$ **21.** $-2x - 3xy$ **23.** $3ab^2 + 11ab - 4$ **25.** $3x^2 - 12x + 5ax + 3a^2$ **27.** $8x^2 - 6x + 15$ **29.** $11x^3 - 7x^2 - 9$ **31.** $6x^2 - 15x + 12$ **33.** 260 outdoor screens **35.** Original number $= 10x + y$; show that the new number will always be represented by $10y + x$.

$$\begin{aligned}\text{new number} &= 9(y - x) + (10x + y)\\ &= 9y - 9x + 10x + y\\ &= 10y + x\end{aligned}$$

37. $40 - 2x$ **39.** $140 - 4x \le 108$; 8 in. **41.** $x + 1$ **43.** 4 **45.** A **47.** 5 **49.** 3 **51.** 8,000,000 **53.** 0.0005

55.



57. Sample answer: $y = 4x + 17$ **59.** No; there's a limit as to how fast one can keyboard. **61.** $D = \{-4, -1, 5\}$; $R = \{2, -3, 0, 1\}$ **63.** $18x - 48$ **65.** $35p - 28q$ **67.** $8x^2 + 24x - 32$

Page 446–449 Lesson 8-6

1. Distributive Property; Product of Powers Property **3.** Sample answer: $4x$ and $x^2 + 2x + 3$; $4x^3 + 8x^2 + 12x$ **5.** $18b^5 - 27b^4 + 9b^3 - 72b^2$ **7.** $-20x^3y + 48x^2y^2 - 28xy^3$ **9.** $20n^4 + 30n^3 - 14n^2 - 13n$ **11.** $\frac{5}{3}$ **13.** $T = 10{,}700 - 0.03x$ **15.** $5r^2 + r^3$ **17.** $-32x - 12x^2$ **19.** $7ag^4 + 14a^2g^2$ **21.** $-6b^4 + 8b^3 - 18b^2$ **23.** $40x^3y + 16x^2y^3 - 24x^2y$ **25.** $-15hk^4 - \frac{15}{4}h^2k^2 + 6hk^2$ **27.** $-10a^3b^2 - 25a^4b^2 + 5a^3b^3 - 5a^6b$ **29.** $-2d^2 + 19d$ **31.** $20w^2 - 18w + 10$ **33.** $46m^3 + 14m^2 - 32m + 20$ **35.** $6c^3 - 23c^2 + 20c - 8$ **37.** $6x^2 + 8x$ **39.** -2 **41.** $-\frac{1}{3}$ **43.** 0 **45.** $\frac{7}{4}$ **47.** -5 **49.** $T = -0.03x + 6360$ **51.** $20x^2 + 48x$ **53.** $x + 2$ **55.** Let x and y be integers.

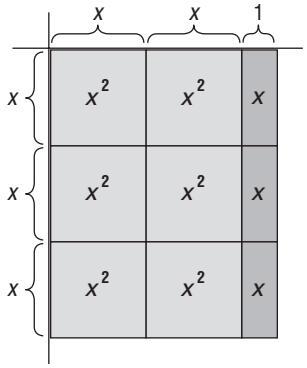
Then $2x$ and $2y$ are even numbers, and $(2x)(2y) = 4xy$. $4xy$ is divisible by 2 since one of its factors, 4, is divisible by 2. Therefore, $4xy$ is an even number.

57. Let x and y be integers. Then $2x$ is an even number and $2y + 1$ is an odd number. Their product, $2x(2y + 1)$, is always even since one of its factors is 2. **59.** \$2.20

61. \$126

63. Answers should include the following.

- The product of a monomial and a polynomial can be modeled using an area model. The area of the figure shown at the beginning of the lesson is the product of its length $2x$ and width $(x + 3)$. This product is $2x(x + 3)$, which when the Distributive Property is applied becomes $2x(x) + 2x(3)$ or $2x^2 + 6x$. This is the same result obtained when the areas of the algebra tiles are added together.
- Sample answer: $(3x)(2x + 1)$
  $(3x)(2x + 1) = (3x)(2x) + (3x)(1)$
  $= 6x^2 + 3x$



65. A **67.** $-4y^2 + 5y + 3$ **69.** $7p^3 - 3p^2 - 2p - 7$
71. yes; binomial **73.** yes; monomial **75.** $9n + 4 \geq 7 - 13n$; $\left\{n \mid n \geq \frac{3}{22}\right\}$ **77.** $y = -2x - 3$ **79.** \$50

81.

Stem	Leaf
1	0 4 5 8 8 8
2	0 0 1 1 2
3	0 4
4	3 4

$3 \mid 4 = 34$

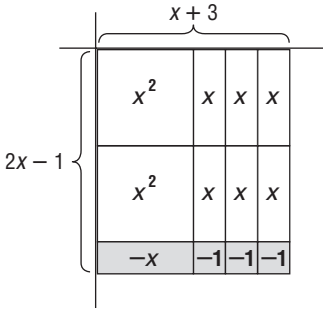
83. $6x^3$
85. $12y^2 - 24y$
87. $18p^4 - 24p^3 + 36p^2$

Page 449 Practice Quiz 2

1. 4 **3.** 3 **5.** $-12 + 9x + 4x^2 + 5x^3$ **7.** $10n^2 - 4n + 2$
9. $15a^5b - 10a^4b^2 + 30a^3b^3$

Pages 455–457 Lesson 8-7

1.



5. $x^2 + 4x - 12$
7. $4h^2 + 33h + 35$
9. $10g^2 + 19g - 56$
11. $6k^3 + 2k^2 - 29k + 15$
13. $b^2 + 10b + 16$
15. $x^2 - 13x + 36$
17. $y^2 - 4y - 32$
19. $2w^2 + 9w - 35$
21. $40d^2 + 31d + 6$
23. $35x^2 - 27x + 4$
25. $4n^2 + 12n + 9$
27. $100r^2 - 16$ **29.** $40x^2 - 22xy - 8y^2$ **31.** $p^3 + 6p^2 + p - 28$
33. $6x^3 - 23x^2 + 22x - 5$ **35.** $n^4 + 2n^3 - 17n^2 + 22n - 8$
37. $8a^4 + 2a^3 + 15a^2 + 31a - 56$ **39.** $2x^2 + 3x - 20$ units^2
41. $\frac{15}{2}x^2 + 3x - 24$ units^2 **43.** $2a^3 + 10a^2 - 2a - 10$ units^3
45. $a^3 + 3a^2 + 2a$ **47.** Sample answer: 6; the result is the same as the product in Exercise 46. **49.** $x - 2$, $x + 4$
51. bigger; 10 ft^2 **53.** 20 ft by 24 ft
55. Multiplying binomials and two-digit numbers each involve the use of the Distributive Property twice. Each procedure involves four multiplications and the addition of like terms. Answers should include the following.

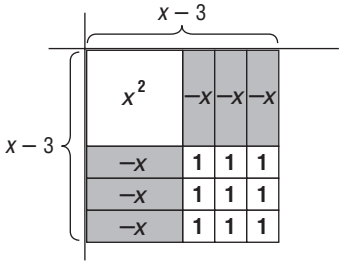
- $24 \times 36 = (4 + 20)(6 + 30)$
  $= (4 + 20)6 + (4 + 20)30$
  $= (24 + 120) + (120 + 600)$
  $= 144 + 720$
  $= 864$
- The like terms in vertical two-digit multiplication are digits with the same place value.

57. B **59.** $-28y^3 + 16y^2 - 12y$ **61.** $36x^2 - 42$
63. $(181 - 7x)°$ **65.** one; $(-6, 3)$ **67.** 5 **69.** $t = \frac{v}{a}$
71. $y = -\frac{4}{3}x + \frac{7}{3}$ **73.** $49x^2$ **75.** $16y^4$ **77.** $9g^8$

Pages 461–463 Lesson 8-8

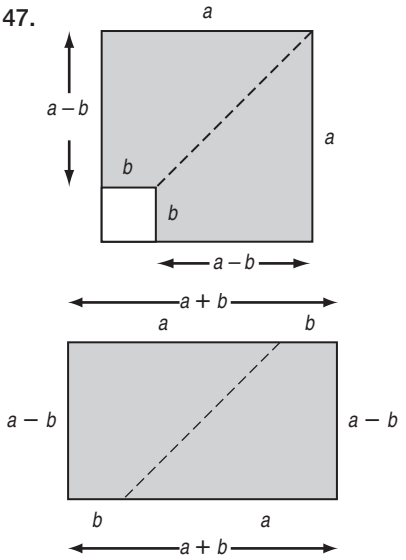
1. The patterns are the same except for their middle terms. The middle terms have different signs.

3.

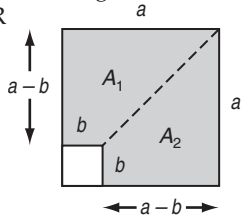


5. $a^2 + 12a + 36$
7. $64x^2 - 25$
9. $x^4 - 12x^2y + 36y^2$
11. $1.0Gg$
13. $y^2 + 8y + 16$
15. $a^2 - 10a + 25$
17. $b^2 - 49$
19. $4g^2 + 20g + 25$
21. $49 - 56y + 16y^2$
23. $121r^2 - 64$
25. $a^2 + 10ab + 25b^2$ **27.** $4x^2 - 36xy + 81y^2$ **29.** $25w^2 - 196$
31. $x^6 + 8x^3y + 16y^2$ **33.** $64a^4 - 81b^6$ **35.** $\frac{4}{9}x^2 - 8x + 36$
37. $4n^3 + 20n^2 - n - 5$ **39.** $0.5Bb + 0.5bb$ **41.** Sample answer: 2; yes **43.** $(a + 1)^2$ **45.** $s + 2$, $s + 3$

47.



Area of rectangle $= (a - b)(a + b)$
OR



Selected Answers
CONTENTS

Area of a trapezoid $= \frac{1}{2}$(height)(base 1 + base 2)

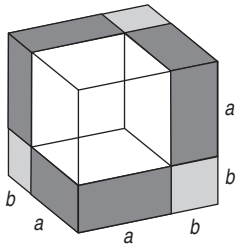
$A_1 = \frac{1}{2}(a - b)(a + b)$ $A_2 = \frac{1}{2}(a - b)(a + b)$

Total area of shaded region

$= \left[\frac{1}{2}(a - b)(a + b)\right] + \left[\frac{1}{2}(a - b)(a + b)\right]$

$= (a - b)(a + b)$

49. C **51a.** $a^3 + 3a^2b + 3ab^2 + b^3$ **51b.** $x^3 + 6x^2 + 12x + 8$ **51c.** $(a + b)^3$



53. $c^2 - 6c - 27$ **55.** $24n^2 - 25n - 25$ **57.** $4k^3 - 6k^2 - 26k + 35$ **59.** $\frac{4}{3}$ **61.** $\frac{1}{2}$ **63.** (3, −4) **65.** $y = x + 5$ **67.** $y = \frac{1}{5}x + 6$ **69.** 61

Pages 464–468 Chapter 8 Study Guide and Review

1. negative exponent **3.** Quotient of Powers **5.** trinomial **7.** polynomial **9.** binomial **11.** y^7 **13.** $20a^5x^5$ **15.** $576x^5y^2$ **17.** $-\frac{1}{2}m^4n^8$ **19.** 531,441 **21.** $\frac{27b^3c^6}{64d^3}$ **23.** $\frac{27b}{14}$ **25.** $\frac{bx^3}{3ay^2}$ **27.** $\frac{1}{64a^6}$ **29.** 240,000 **31.** 4,880,000,000 **33.** 7.96×10^5 **35.** 6×10^{11}; 600,000,000,000 **37.** 1.68×10^{-5}; 0.0000168 **39.** 4 **41.** 6 **43.** 7 **45.** $-4x^4 + 5x^3y^2 - 2x^2y^3 + xy - 27$ **47.** $4x^2 - 5xy + 6y^2$ **49.** $21m^4 - 10m - 1$ **51.** $-7p^2 - 2p + 25$ **53.** $10x^2 - 19x + 63$ **55.** $2x^2 - 17xy^2 + 10x + 10y^2$ **57.** $1\frac{1}{7}$ **59.** $4a^2 + 13a - 12$ **61.** $20r^2 - 13rs - 21s^2$ **63.** $12p^3 - 13p^2 + 11p - 6$ **65.** $16x^2 + 56x + 49$ **67.** $25x^2 - 9y^2$ **69.** $9m^2 + 24mn + 16n^2$

Chapter 9 Factoring

Page 473 Chapter 9 Getting Started

1. $12 - 3x$ **3.** $-7n^2 + 21n - 7$ **5.** $x^2 + 11x + 28$ **7.** $54a^2 - 12ab - 2b^2$ **9.** $y^2 + 18y + 81$ **11.** $n^2 - 25$ **13.** 11 **15.** $\frac{5}{6}$

Pages 477–479 Lesson 9-1

1. false; 2 **3.** Sample answer: $5x^2$ and $10x^3$ **5.** 1, 17; prime **7.** $3^2 \cdot 5$ **9.** $-1 \cdot 2 \cdot 3 \cdot 5^2$ **11.** $3 \cdot 13 \cdot b \cdot b \cdot b \cdot c \cdot c$ **13.** 5 **15.** 9 **17.** $6a^2b$ **19.** 5 rows of 24 plants, 6 rows of 20 plants, 8 rows of 15 plants, 10 rows of 12 plants, 12 rows of 10 plants, 15 rows of 8 plants, 20 rows of 6 plants, or 24 rows of 5 plants **21.** 1, 5, 25; composite **23.** 1, 61; prime **25.** 1, 7, 17, 119; composite **27.** 1, 2, 4, 8, 16, 19, 38, 76, 152, 304; composite **29.** 194 mm; the factors of 96 whose sum when doubled is the greatest are 1 and 96. **31.** 3 packages in the box of 18 cookies and 4 packages in the box of 24 cookies **33.** $-1 \cdot 2 \cdot 7^2$ **35.** $2 \cdot 3 \cdot 17$ **37.** $2^2 \cdot 3^2 \cdot 5$ **39.** $-1 \cdot 2 \cdot 3 \cdot 7 \cdot 11$ **41.** $5 \cdot 17 \cdot x \cdot x \cdot y \cdot y$ **43.** $2 \cdot 5 \cdot 5 \cdot g \cdot h$ **45.** $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot n \cdot n \cdot n \cdot m$ **47.** $-1 \cdot 13 \cdot 13 \cdot a \cdot a \cdot b \cdot c \cdot c$ **49.** 1 **51.** 14 **53.** 21 **55.** $6d$ **57.** 1 **59.** 7 **61.** $16a^2b$ **63.** 15 **65.** 7, 31 **67.** base: 1 cm, height 40 cm; base 2 cm; height 20 cm; base 4 cm, height 10 cm; base 5 cm, height 8 cm, base 8 cm, height 5 cm, base 10 cm, height 4 cm; base 20 cm, height 2 cm; base 40 cm, height 1 cm

69. Scientists listening to radio signals would suspect that a modulated signal beginning with prime numbers would indicate a message from an extraterrestrial. Answers should include the following.

- 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 79, 83, 89, 97, 101, 103, 107, 109, 113
- Sample answer: It is unlikely that any natural phenomenon would produce such an artificial and specifically mathematical pattern.

71. A **73.** $9a^2 - 25$ **75.** $12r^2 - 16r - 35$ **77.** $b^3 + 7b^2 - 6b - 72$ **79.** 0 **81.** $10x + 40$ **83.** $6g^2 - 8g$ **85.** $7(b + c)$

Pages 484–486 Lesson 9-2

1. $4(x^2 + 3x)$, $x(4x + 12)$, or $4x(x + 3)$; $4x(x + 3)$; $4x$ is the GCF of $4x^2$ and $12x$. **3.** The division would eliminate 2 as a solution. **5.** $8xz(2 - 5z)$ **7.** $2ab(a^2b + 4 + 8ab^2)$ **9.** $(5c + 2d)(1 - 2c)$ **11.** {−2, 4} **13.** 0 ft **15.** 6.25 s; The answer 0 is not reasonable since it represents the time when the flare is launched. **17.** $4(4a + b)$ **19.** $x(x^2y^2 + 1)$ **21.** $2h(7g - 9)$ **23.** $8bc(c + 3)$ **25.** $6abc^2(3a - 8c)$ **27.** $x(15xy^2 + 25y + 1)$ **29.** $3pq(p^2 - 3q + 12)$ **31.** $(x + 7)(x + 5)$ **33.** $(3y + 2)(4y + 3)$ **35.** $(6x - 1)(3x - 5)$ **37.** $(m + x)(2y + 7)$ **39.** $(2x - 3)(5x - 7y)$ **41.** 35 **43.** 63 games **45.** $2r^2(4 - \pi)$ **47.** $81a^2 - 72ab + 16b^2$ cm^2 **49.** {−16, 0} **51.** {−3, 7} **53.** $\left\{-\frac{5}{4}, \frac{7}{3}\right\}$ **55.** {0, 5} **57.** $\left\{0, \frac{6}{7}\right\}$ **59.** $\left\{-\frac{3}{4}, 0\right\}$ **61.** about 2.8 s

63. Answers should include the following.

- Let $h = 0$ in the equation $h = 151t - 16t^2$. To solve $0 = 151t - 16t^2$, factor the right-hand side as $t(151 - 16t)$. Then, since $t(151 - 16t) = 0$, either $t = 0$ or $151 - 16t = 0$. solving each equation for t, we find that $t = 0$ or $t \approx 9.44$.
- The solution $t = 0$ represents the point at which the ball was initially thrown into the air. The solution $t \approx 9.44$ represents how long it took after the ball was thrown for it to return to the same height at which it was thrown.

65. C **67.** 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 25, 30, 50, 60, 75, 100, 150, 300; composite **69.** $16s^6 + 24s^3 + 9$ **71.** $9k^2 + 48k + 64$ **73.** $\frac{3x}{2y^5}$ **75.** 37 shares **77.** $x^2 - 9x + 20$ **79.** $18a^2 - 6a - 4$ **81.** $8y^2 - 14y - 15$

Page 486 Practice Quiz 1

1. 1, 3, 5, 9, 15, 25, 45, 75, 225; composite **3.** $2 \cdot 3 \cdot 13 \cdot a \cdot a \cdot b \cdot c \cdot c \cdot c$ **5.** $xy(4y - 1)$ **7.** $(2p - 5)(3y + 8)$ **9.** {0, 3}

Pages 492–494 Lesson 9-3

1. In this trinomial, $b = 6$ and $c = 9$. This means that $m + n$ is positive and mn is positive. Only two positive numbers have both a positive sum and product. Therefore, negative factors of 9 need not be considered. **3.** Aleta; to use the Zero Product Property, one side of the equation must equal zero. **5.** $(c - 1)(c - 2)$ **7.** $(p + 5)(p - 7)$ **9.** $(x - 3y)(x - y)$ **11.** {−9, 4} **13.** {−9, −1} **15.** {−7, 10} **17.** $(a + 3)(a + 5)$ **19.** $(c + 5)(c + 7)$ **21.** $(m - 1)(m - 21)$ **23.** $(p - 8)(p - 9)$ **25.** $(x - 1)(x + 7)$ **27.** $(h - 5)(h + 8)$ **29.** $(y - 7)(y + 6)$ **31.** $(w + 12)(w - 6)$ **33.** $(a + b)(a + 4b)$ **35.** $4x + 48$ **37.** {−14, −2} **39.** {−6, 2} **41.** {−4, 7} **43.** {3, 16} **45.** {2, −9} **47.** {4, 6} **49.** {−25, 2} **51.** {−17, 3} **53.** {4, 14} **55.** −14 and −12 or 12 and 14 **57.** −18, 18 **59.** 7, 12, 15, 16 **61.** $w(w + 52)$ m^2

63. Answers should include the following.

- You would use a guess-and-check process, listing the factors of 54, checking to see which pairs added to 15.
- To factor a trinomial of the form $x^2 + ax + c$, you also use a guess-and-check process, list the factors of c, and check to see which ones add to a.

65. 15 **67.** yes **69.** no; $(x - 10)(x + 21)$ **71.** $\left\{0, \frac{4}{7}\right\}$ **73.** 12 **75.** $5x^2y^4$ **77.** $1(1.54) + 17.31(1.54) = (1 + 17.31)(1.54)$ or $18.31(1.54)$ **79.** $(a + 4)(3a + 2)$ **81.** $(2p + 7)(p - 3)$ **83.** $(2g - 3)(2g - 1)$

Pages 498–500 Lesson 9-4

1. m and n are the factors of ac that add to b. **3.** Craig; when factoring a trinomial of the form $ax^2 + bx + c$, where $a \neq 1$, you must find the factors of ac not of c. **5.** prime **7.** $(x + 4)(2x + 5)$ **9.** $(2n + 5)(2n - 7)$ **11.** $\left\{\frac{1}{2}, \frac{7}{5}\right\}$ **13.** 1 s **15.** $(3x + 2)(x + 1)$ **17.** $(5d - 4)(d + 2)$ **19.** $(3g - 2)(3g - 2)$ **21.** $(x - 4)(2x + 5)$ **23.** prime **25.** $(5n + 2)(2n - 3)$ **27.** $(2x + 3)(7x - 4)$ **29.** $5(3x + 2)(2x - 3)$ **31.** $(12a - 5b)(3a + 2b)$ **33.** $\pm 31, \pm 17, \pm 13, \pm 11$ **35.** $\left\{-5, -\frac{2}{5}\right\}$ **37.** $\left\{-\frac{1}{6}, \frac{3}{4}\right\}$ **39.** $\left\{-\frac{5}{7}, \frac{5}{2}\right\}$ **41.** $\left\{-\frac{2}{3}, 3\right\}$ **43.** $\left\{\frac{1}{2}, \frac{2}{3}\right\}$ **45.** $\{-4, 12\}$ **47.** $\left\{-4, \frac{2}{3}\right\}$ **49.** 1 in. **51.** 2.5 s **53.** Answers should include the following.

- $2x + 3$ by $x + 2$
- With algebra tiles, you can try various ways to make a rectangle with the necessary tiles. Once you make the rectangle, however, the dimensions of the rectangle are the factors of the polynomial. In a way, you have to go through the guess-and-check process whether you are factoring algebraically or geometrically (using algebra tiles).

x^2	x	x	x
x^2	x	x	x
x	1	1	1
	1	1	1

x^2	x	x
x^2	x	x
x	1	1
x	1	1
x	1	1

Guess $(2x + 1)(x + 3)$ incorrect because 8 x tiles are needed to complete the rectangle.

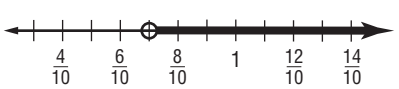
55. B **57.** prime **59.** $\left\{-\frac{7}{5}, 4\right\}$ **61.** $\{0, 12\}$ **63.** 4 **65.** 6 **67.** 10 **69.** 13

Page 500 Practice Quiz 2

1. $(x + 4)(x - 18)$ **3.** $(4a - 1)(4a - 5)$ **5.** $2(3c + 1)(4c + 9)$ **7.** $\{-16, 2\}$ **9.** $\left\{-\frac{3}{4}, \frac{4}{3}\right\}$

Pages 504–506 Lesson 9-5

1. The binomial is the difference of two terms, each of which is a perfect square. **3.** Yes; $3n^2 - 48 = 3(n^2 - 16) = 3(n + 4)(n - 4)$. **5.** $(n + 9)(n - 9)$ **7.** $2x^3(x + 7)(x - 7)$ **9.** prime **11.** $\left\{-\frac{5}{2}, \frac{5}{2}\right\}$ **13.** $\left\{-\frac{1}{6}, \frac{1}{6}\right\}$ **15.** 12 in. by 12 in. **17.** $(n + 6)(n - 6)$ **19.** $(5 + 2p)(5 - 2p)$ **21.** $(11 + 3r)(11 - 3r)$ **23.** prime **25.** $(13y + 6z)(13y - 6z)$ **27.** $3(x - 5)(x + 5)$ **29.** $2(2g^2 - 25)$ **31.** $5x(2x - 3y)(2x + 3y)$ **33.** $(a + b + c)(a + b - c)$ **35.** $\left\{\pm\frac{8}{3}\right\}$ **37.** $\left\{\pm\frac{5}{2}\right\}$ **39.** $\left\{\pm\frac{9}{10}\right\}$ **41.** $\{\pm 10\}$ **43.** $\left\{-\frac{5}{3}, 0, \frac{5}{3}\right\}$ **45.** $\left\{-\frac{3}{2}, 0, \frac{3}{2}, 4\right\}$ **47.** 2 in. **49.** 36 mph **51.** The flaw is in line 5. Since $a = b$, $a - b = 0$. Therefore dividing by $a - b$ is dividing by zero, which is undefined. **53.** A **55.** prime **57.** $(3p + 5)(7p - 2)$ **59.** $\{3, 5\}$ **61.** between 83 and 99, inclusive **63.** $r > \frac{7}{10}$



65. $x^2 + 2x + 1$ **67.** $x^2 + 16x + 64$ **69.** $25x^2 - 20x + 4$

Pages 512–514 Lesson 9-6

1. Determine if the first term is a perfect square. Then determine if the last term is a perfect square. Finally, check to see if the middle term is equal to twice the product of the square roots of the first and last terms. **3.** Sample answer: $x^3 + 5x^2 - 4x - 20$ **5.** no **7.** $(c - 3)(c - 2)$ **9.** $(2x - 7)(4x + 5)$ **11.** $(m - 2)(m + 2)(3m + 2n)$ **13.** $\{\pm 4\}$ **15.** $\{5 \pm \sqrt{13}\}$ **17.** no **19.** yes; $(2y - 11)^2$ **21.** yes; $(3n + 7)^2$ **23.** $8x + 20$ **25.** $4(k + 5)(k - 5)$ **27.** prime **29.** $3t(3t - 2)(t + 8)$ **31.** $2(5n + 1)(2n + 3)$ **33.** $3x(4x - 3)(2x - 5)$ **35.** $-3(3g - 5)^2$ **37.** $(a^2 + 2)(4a + 3b^2)$ **39.** $(y^2 + z^2)(x + 1)(x - 1)$ **41.** $x - 3y$ m, $x + 3y$ m, $xy + 7$ m **43.** $\{-4\}$ **45.** $\left\{\frac{4}{7}\right\}$ **47.** $\left\{\frac{1}{3}\right\}$ **49.** $\{-5, 3\}$ **51.** $\{8 \pm \sqrt{7}\}$ **53.** $\{-1 \pm \sqrt{6}\}$ **55.** $B = \frac{L}{16}(D - 4)^2$ **57.** 144 ft **59.** yes; 2 s **61.** 4, −4 **63.** 16 **65.** 100 **67.** C **69.** ± 5 **71.** $\pm\frac{9}{7}$ **73.** $-\frac{5}{3}; -\frac{1}{4}$ **75.** $y = -\frac{1}{2}x + \frac{9}{2}$ **77.** 2030 ft **79.** $-3, -2.5, -2$

Pages 515–518 Chapter 9 Study Guide and Review

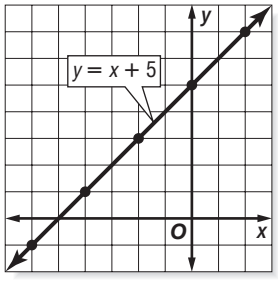
1. false, composite **3.** false, sample answer: 64 **5.** false, $2^4 \cdot 3$ **7.** true **9.** true **11.** $2^2 \cdot 7$ **13.** $2 \cdot 3 \cdot 5^2$ **15.** $-1 \cdot 83$ **17.** 5 **19.** $4ab$ **21.** $5n$ **23.** $13(x + 2y)$ **25.** $2a(13b + 9c + 16a)$ **27.** $2(r + 3p)(2s + m)$ **29.** $\left\{0, \frac{5}{2}\right\}$ **31.** $\left\{0, -\frac{7}{4}\right\}$ **33.** $(x - 12)(x + 3)$ **35.** $(r - 3)(r - 6)$ **37.** $(m + 4n)(m - 8n)$ **39.** $\{-6, 11\}$ **41.** prime **43.** $(5r + 2)(5r + 2)$ **45.** $(4b + 3)(3b + 2)$ **47.** $\left\{4, -\frac{5}{2}\right\}$ **49.** $\left\{\frac{3}{4}, -\frac{4}{5}\right\}$ **51.** prime **53.** $\{-4, 4\}$ **55.** $\left\{-\frac{9}{4}, \frac{9}{4}\right\}$ **57.** $(3k - 2)^2$ **59.** $2(4n - 5)^2$ **61.** $\left\{\frac{9}{7}\right\}$ **63.** $\left\{\pm\frac{1}{2}\right\}$

Chapter 10 Quadratic and Exponential Functions

Page 523 Chapter 10 Getting Started

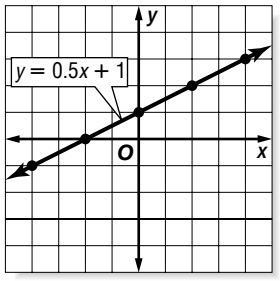
1. Sample answer:

x	y
−6	−1
−4	1
−2	3
0	5
2	7



3. Sample answer:

x	y
−4	−1
−2	0
0	1
2	2
4	3



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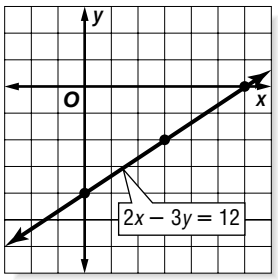
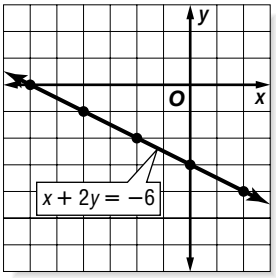
5. Sample answer:

x	y
0	−4
3	−2
6	0



7. Sample answer:

x	y
−6	0
−4	−1
−2	−2
0	−3
2	−4

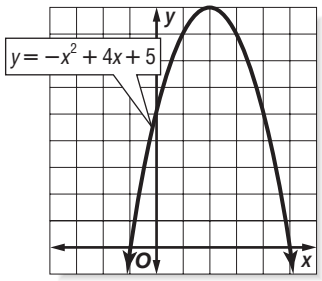


9. yes; $(t + 6)^2$ **11.** no **13.** yes; $(3b - 1)^2$ **15.** yes; $(2p + 3)^2$ **17.** 21, 25, 29 **19.** 8, 11, 14 **21.** −21, −26, −31 **23.** 8.1, 8.8, 9.5

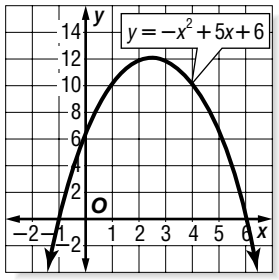
Pages 528–530 Lesson 10-1

1. Both types of parabolas are U shaped. A parabola with a maximum opens downward, and its corresponding equation has a negative coefficient for the x^2 term. A parabola with a minimum opens upward, and its corresponding equation has a positive coefficient for the x^2 term. **3.** If you locate several points of the graph on one side of the axis of symmetry, you can locate corresponding points on the other side of the axis of symmetry to help graph the equation.

5.

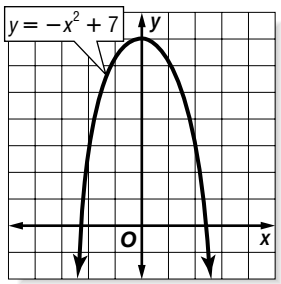


7. $x = 2.5$; (2.5, 12.25); maximum

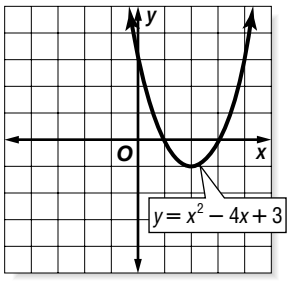


9. B

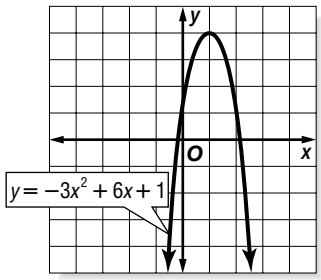
11.



13.

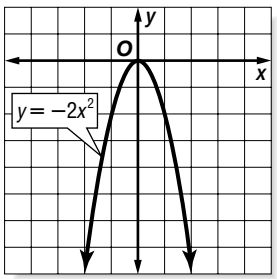


15.

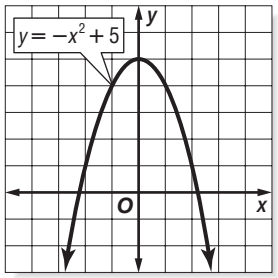


17. $x = \frac{5}{8}$

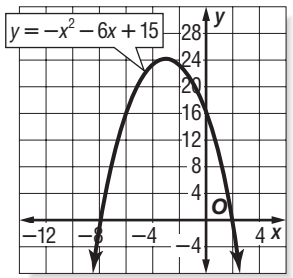
19. $x = 0$; (0, 0); maximum



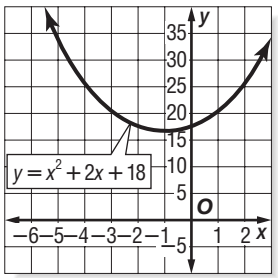
21. $x = 0$; (0, 5); maximum



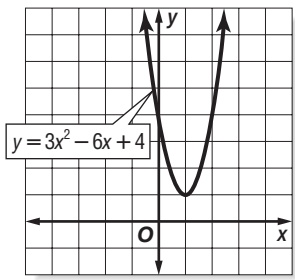
23. $x = -3$; (−3, 24); maximum



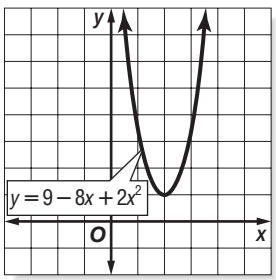
25. $x = -1$; (−1, 17); minimum



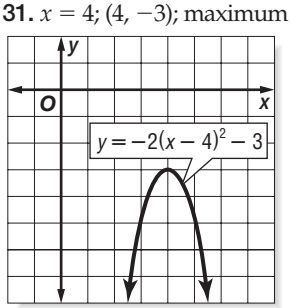
27. $x = 1$; (1, 1); minimum



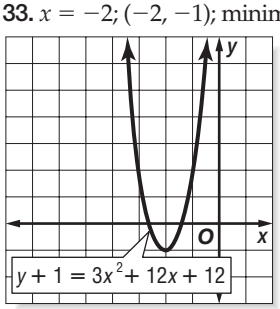
29. $x = 2$; (2, 1); minimum



31. $x = 4$; (4, −3); maximum

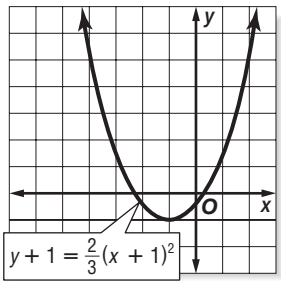


33. $x = -2$; (−2, −1); minimum



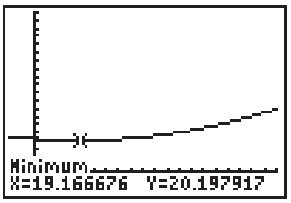
CONTENTS

35. $x = -1$; $(-1, -1)$; minimum



37. $x = -1$ **39.** 19 ft
41. $A = x(20 - x)$ or $A = -x^2 + 20x$ **43.** 100 m^2
45. 630 ft **47.** 1959

49.

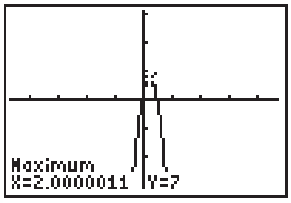


51. In order to coordinate a firework with recorded music, you must know when and how high it will explode. Answers should include the following.

- The rocket will explode when the rocket reaches the vertex or when $t = -\frac{39.2}{2(-4.9)}$ which is 4 seconds.
- The height of the rocket when it explodes is the height when $t = 4$. Therefore, $h = -4.9(4^2) + 39.2(4) + 1.6$ or 80 meters.

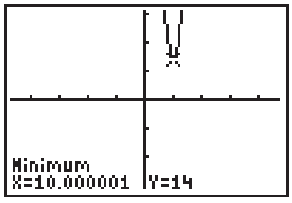
53. D

55.



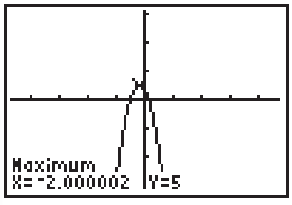
maximum; (2, 7)

57.



minimum; (10, 14)

59.



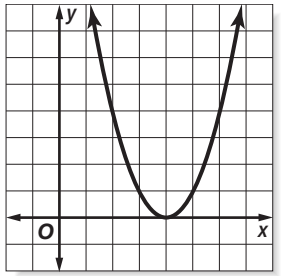
maximum; (−2, 5)

61. $(a + 11)^2$
63. $(2q - 3)(2q + 3)$
65. $(1 - 4g)(1 + 4g)$
67. $6p^2 - p - 18$
69. $\{b \mid b > -12\}$ **71.** $\left\{r \mid r \leq \frac{8}{9}\right\}$
73. $y = -7$ **75.** 8 **77.** −3.5
79. −2.5

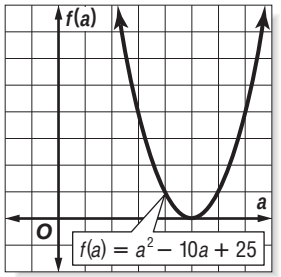
Pages 535–538 Lesson 10-2

1. −3, −1

3. Sample answer:

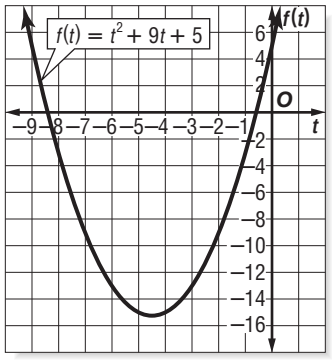


5.



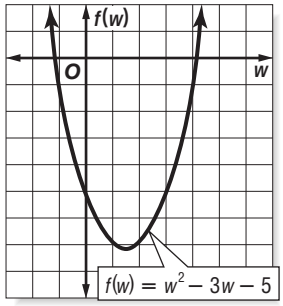
5

7.



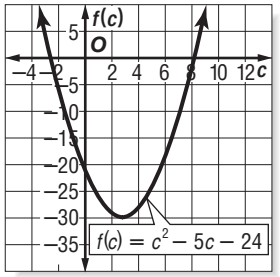
$-9 < t < -8$, $-1 < t < 0$

9.



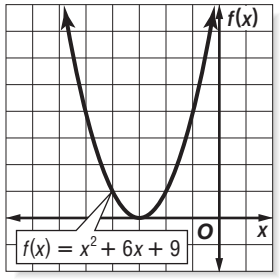
$-2 < w < -1$, $4 < w < 5$

11.



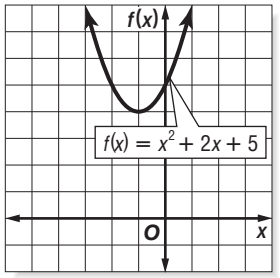
−3, 8

13.



−3

15.



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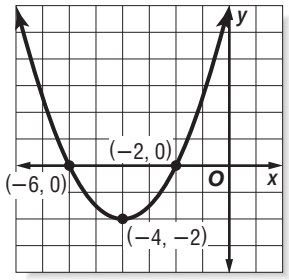
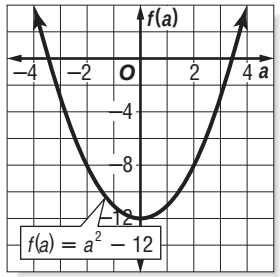
17.



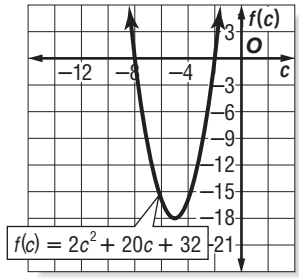
19. 4, 5

21.



$-4 < a < -3$, $3 < a < 4$

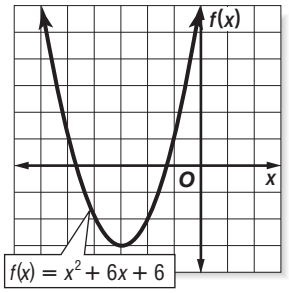
23.



−8, −2

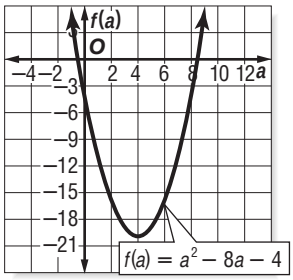
CONTENTS

25.



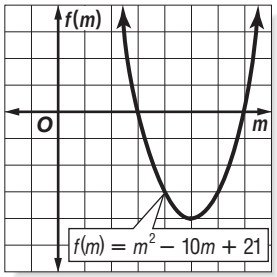
$-5 < x < -4, -2 < x < -1$

27.



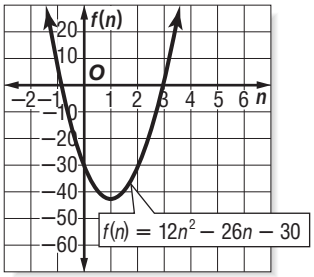
$-1 < a < 0, 8 < a < 9$

29.



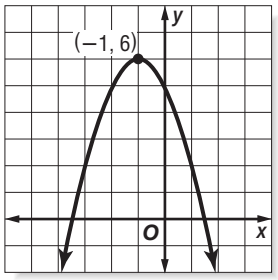
3, 7

31.

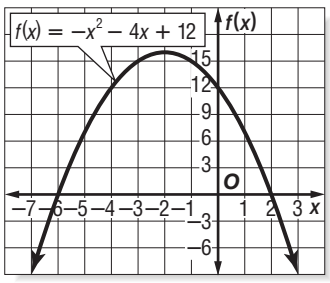


$-1 < n < 0, 3$

33. Sample answer:



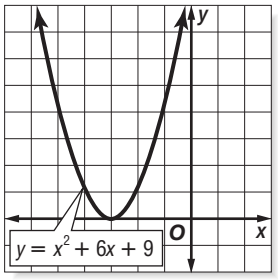
35.



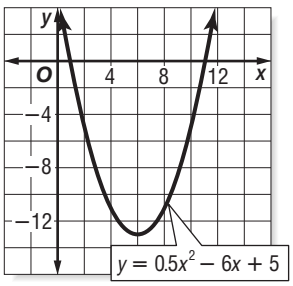
$-6, 2$

37. 16 ft **39.** \$297
41. about 9 s
43. 100,000 ft²
45. about 65 ft
47. $-3, 0, 1$ **49.** C
51. $-2, 1, 2$

53. $x = -3$; $(-3, 0)$; minimum



55. $x = 6$; $(6, -13)$; minimum



57. {5} **59.** $\frac{m^3}{3}$ **61.** $-\frac{m^5y^4}{3}$ **63.** yes; $(a + 7)^2$ **65.** no
67. no

Pages 542–544 Lesson 10-3

1. Sample answer:

x	1	1
x	1	1
x^2	x	x

$x^2 + 4x + 4$

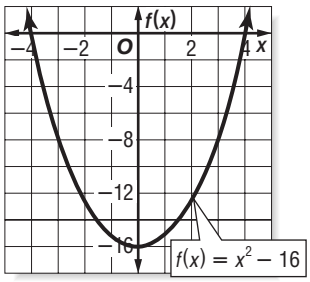
3. Divide each side by 5.
5. $-11.5, -2.5$ **7.** $\frac{25}{4}$ **9.** $-4, -3$
11. $-0.4, 4.4$ **13.** $0.2, 2.3$ **15.** $-2, 6$
17. $2.6, 5.4$ **19.** $-12.2, -3.8$ **21.** 64
23. 121 **25.** $\frac{49}{4}$ **27.** $-18, 18$
29. $-2, 6$ **31.** $-3, 22$ **33.** $1, 4$
35. $-3, -1$ **37.** $-1.9, 11.9$ **39.** $2\frac{1}{3}$ **41.** $-1, \frac{2}{3}$ **43.** $-2.5, 0.5$
45. $-1\frac{1}{2}, 4$ **47.** $-2 \pm \sqrt{4 - c}$ **49.** 1.5 m **51.** There are no real solutions since completing the square results in $(x + 2)^2 = -8$ and the square of a number cannot be negative.
53. Al-Khwarizmi used squares to geometrically represent quadratic equations. Answers should include the following.

- Al-Khwarizmi represented x^2 by a square whose sides were each x units long. To this square, he added 4 rectangles with length x units long and width $\frac{8}{4}$ or 2 units long. This area represents 35. To make this a square, four 4×4 squares must by added.
- To solve $x^2 + 8x = 35$ by completing the square, use the following steps.

$x^2 + 8x = 35$	*Original equation*
$x^2 + 8x + 16 = 35 + 16$	*Since* $\left(\frac{8}{2}\right)^2 = 16$, *add 16 to each side.*
$(x + 4)^2 = 51$	*Factor* $x^2 + 8x + 16$.
$x + 4 = \pm\sqrt{51}$	*Take the square root of each side.*
$x + 4 - 4 = \pm\sqrt{51} - 4$	*Subtract 4 from each side.*
$x = -4 \pm \sqrt{51}$	*Simplify.*

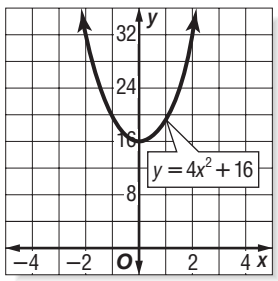
$x = -4 - \sqrt{51}$ or $x = -4 + \sqrt{51}$
$x \approx -11.14$ $x \approx 3.14$
The solution set is $\{-11.14, 3.14\}$.

55. A
57.

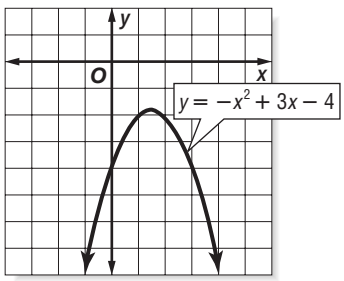


$-4, 4$

59.



61.



63. $8m^2n$ **65.** (4, 1)
67. $-3 < x < 1$
69. $y = -\frac{3}{5}x + \frac{14}{5}$
71. $y = -2x$ **73.** 5
75. 9.4

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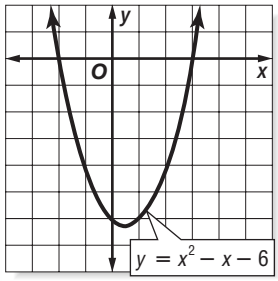
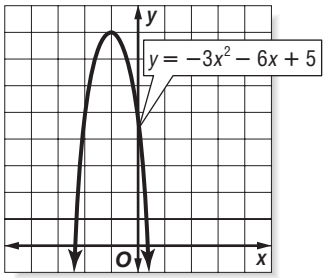
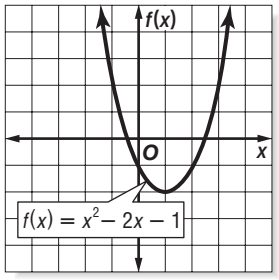
Page 544 Practice Quiz 1

1. $x = 0.5$; $(0.5, -6.25)$; minimum **3.** $x = -1$; $(-1, 8)$; maximum





5.



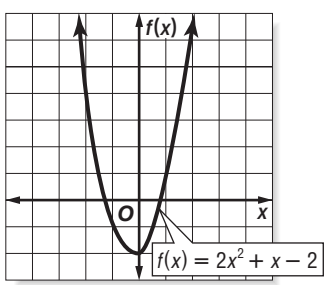
$-1 < x < 0, 2 < x < 3$

7. $-5, -3$ **9.** 4.8, 9.2

Pages 550–552 Lesson 10-4

1. Sample answer: (1) Factor $x^2 - 2x - 15$ as $(x + 3)(x - 5)$. Then according to the Zero Product Property, either $x + 3 = 0$ or $x - 5 = 0$. Solving these equations, $x = -3$ or $x = 5$. (2) Rewrite the equation as $x^2 - 2x = 15$. Then add 1 to each side of the equation to complete the square on the left side. Then $(x - 1)^2 = 16$. Taking the square root of each side, $x - 1 = \pm 4$. Therefore, $x = 1 \pm 4$ and $x = -3$ or $x = 5$. (3) Use the Quadratic Formula. Therefore, $x = \frac{-2 \pm \sqrt{(-2)^2 - 4(1)(-15)}}{2(1)}$ or $x = \frac{2 \pm \sqrt{64}}{2}$. Simplifying the expression, $x = -3$ or $x = 5$. **3.** Juanita; you must first write the equation in the form $ax^2 + bx + c = 0$ to determine the values of a, b, and c. Therefore, the value of c is -2, not 2. **5.** $-12, 1$ **7.** $\varnothing$ **9.** $\frac{1}{5}, \frac{2}{5}$ **11.** 0; 1 real root **13.** about 18.8 cm by 18.8 cm **15.** $-10, -2$ **17.** $-\frac{4}{5}, 1$ **19.** $\varnothing$ **21.** 5 **23.** $-0.4, 3.9$ **25.** $-0.5, 0.6$ **27.** $-\frac{3}{4}, \frac{5}{6}$ **29.** $-0.3, 0.6$ **31.** $-0.6, 2.6$ **33.** 5 cm by 16 cm **35.** -9 and -7 or 7 and 9 **37.** about -0.2 and 1.4 **39.** 5; 2 real roots **41.** -20; no real roots **43.** 0; 1 real root **45.** 0 **47.** about 2.3 s **49.** about 29.4 ft/s **51.** about 41 yr **53.** 2049; Sample answer: No; the death rate from cancer will never be 0 unless a cure is found. If and when a cure will be found cannot be predicted. **55.** A **57.** 1, 7 **59.** $-0.4, 12.4$

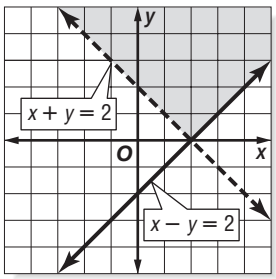
61.



$-2 < x < -1, 0 < x < 1$

63. $y^3(15x + y)$
65. 1.672×10^{-21}

67.

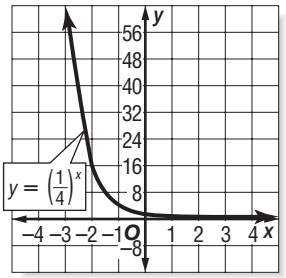


69. $\{m \mid m > 5\}$
71. $\{k \mid k \leq -4\}$ **73.** 147

Pages 557–560 Lesson 10-5

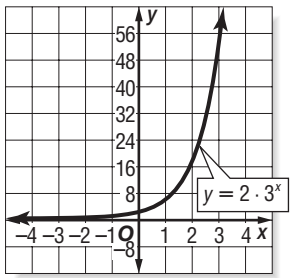
1. never **3.** Kiski; the graph of $y = \left(\frac{1}{3}\right)^x$ decreases as x increases.

5.



1; 0.1

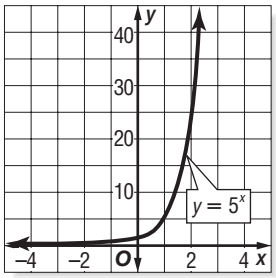
7.



2

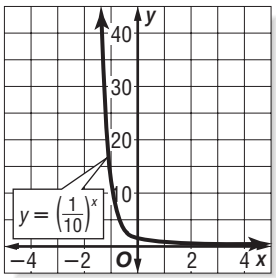
9. Yes; the domain values are at regular intervals and the range values have a common factor 6.
11. about 1.84×10^{19} grains

13.



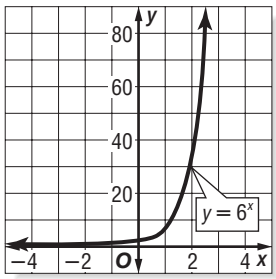
1; 5.9

15.



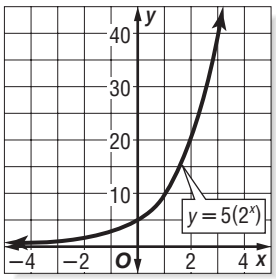
1; 20.0

17.



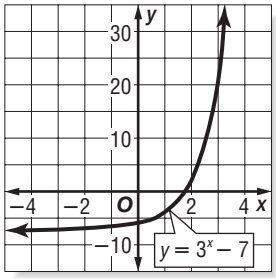
1; 1.7

19.



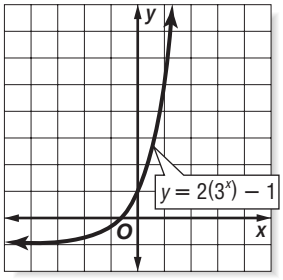
5

21.



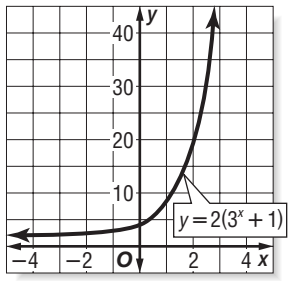
−6

23.



1

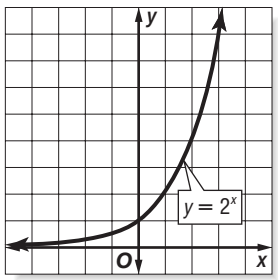
25.



27. No; the domain values are at regular intervals and the range values have a common difference 3. **29.** Yes; the domain values are at regular intervals and the range values have a common factor 0.75.

4

31. No; the domain values are at regular intervals, but the range values do not change. **33.** about \$37.27 million; about \$41.74 million; about \$46.75 million **35.** \$12 million sales in 1995 **37.** $y = 729\left(\frac{1}{3}\right)^x$ **39.** 6 rounds **41.** 10th week **43.** a translation 2 units up **45.** If the number of items on each level of a piece of art is a given number times the number of items on the previous level, an exponential function can be used to describe the situation. Answers should include the following.

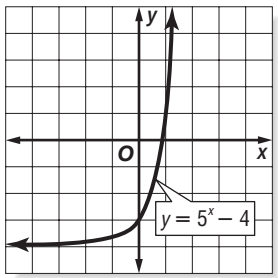
- For the carving of the pliers, $y = 2^x$.
- For this situation, x is an integer between 0 and 8 inclusive. The values of y are 1, 2, 4, 8, 16, 32, 64, 128, and 256.
- 

47. A **49.** −1.8, 0.3 **51.** 2, 5 **53.** −5.4, −0.6 **55.** prime **57.** 6, 9 **59.** $\{x \mid x \leq 2\}$ **61.** 11.25 **63.** 144

Page 560 Practice Quiz 2

1. −7, 5 **3.** −0.2, 2.2

5.

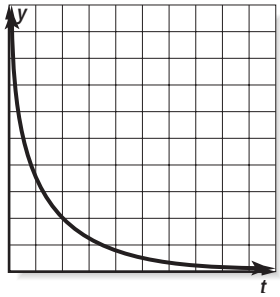


−3

Pages 563–565 Lesson 10-6

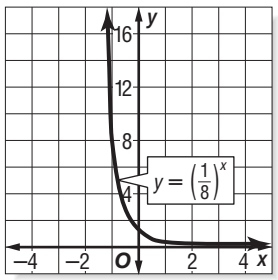
1. Exponential growth is an increase by the same percent over a period of time, while exponential decay is a decrease by the same percent over a period of time.

3.



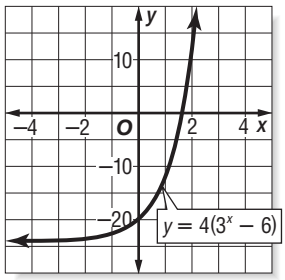
5. about \$43,041 **7.** about 1,767,128 people **9.** $C = 18.9(1.19)^t$ **11.** $W = 43.2(1.06)^t$ **13.** about 122,848,204 people **15.** about \$14,607.78 **17.** about \$135,849,289 **19.** about \$10,761.68 **21.** about 15.98% **23.** growth; 2.6% increase **25.** 128 g **27.** about 76.36 g **31.** C

33.



1

35.



−20

37. −0.6, 2.6 **39.** $m^{10}b^2$ **41.** $0.09x^6y^4$ **43.** {1} **45.** yes **47.** −5, −8, −11

Pages 570–572 Lesson 10-7

1. Both arithmetic sequences and geometric sequences are lists of related numbers. In an arithmetic sequence, each term is found by adding the previous term to a constant called the common difference. In a geometric sequence, each term is found by multiplying the previous term by a constant called the common ratio. **3.** Sample answer: 1, 4, 9, 16, 25, 36, … **5.** yes **7.** 1280, 5120, 20,480 **9.** −40.5, 60.75, −91.125 **11.** −32 **13.** ±14 **15.** ±20 **17.** yes **19.** no **21.** no **23.** yes **25.** 256, −1024, 4096 **27.** 64, 32, 16 **29.** −0.3125, 0.078125, −0.01953125 **31.** $\frac{8}{81}, \frac{16}{243}, \frac{32}{729}$ **33.** 48 in^2, 24 in^2, 12 in^2, 6 in^2, 3 in^2 **35.** 320 **37.** 250 **39.** −288 **41.** 0.5859375 **43.** ±10 **45.** ±45 **47.** ±32 **49.** ±14 **51.** ±3.5 **53.** $\pm\frac{3}{10}$ **55.** 6 m, 3.6 m, 2.16 m **57.** 18 questions **59.** in 16 days **61.** always **63.** Since the distance of each bounce is $\frac{3}{4}$ times the distance of the last bounce, the list of the distances from the stopping place is a geometric sequence. Answers should include the following.

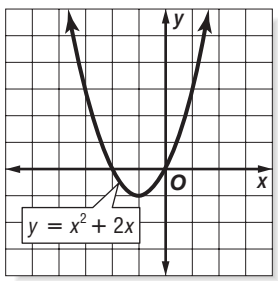
- To find the 10th term, multiply the first term 80 by $\frac{3}{4}$ to the 9th power.
- The 17th bounce will be the first bounce less than 1 ft from the resting place.

65. 1/7 **67.** 0 **69.** about \$1822.01 **71.** Yes; the domain values are at regular intervals and the range values have a common factor 3. **73.** $(2x + 3)(x - 4)$

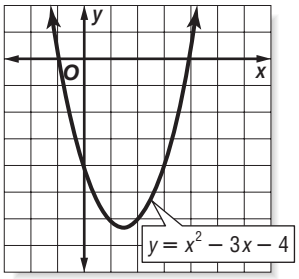
Pages 574–578 Chapter 10 Study Guide and Review

1. d **3.** i **5.** c **7.** b **9.** f

11. $x = -1$; $(-1, -1)$; minimum

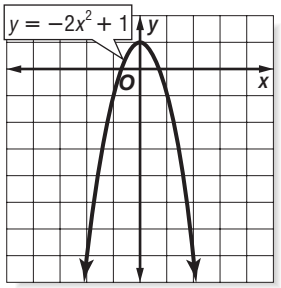


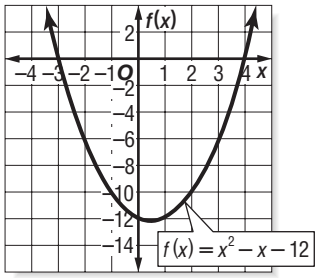
13. $x = 1\frac{1}{2}$; $\left(1\frac{1}{2}, -6\frac{1}{4}\right)$; minimum



CONTENTS

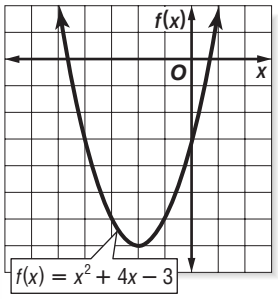
15. $x = 0$; (0, 1); maximum **17.**

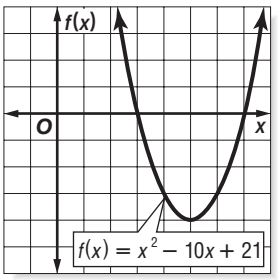




$-3, 4$

19. **21.**

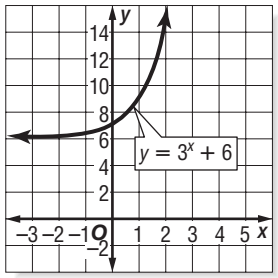


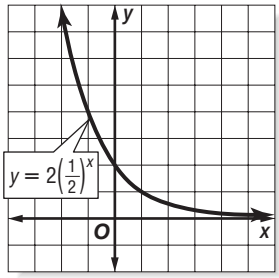


$-5 < x < -4, 0 < x < 1$ 3, 7

23. $-1.2, 1.2$ **25.** $-0.7, 7.7$ **27.** $-4.4, 0.4$ **29.** $-2, 10$
31. $-2.5, 1.5$ **33.** $-4, 0$

35. **37.**





7 2

39. \$12,067.68 **41.** \$24,688.36 **43.** $\frac{56}{27}$ **45.** ± 10 **47.** $\pm\frac{1}{2}$

Chapter 11 Radical Expressions and Triangles

Page 585 Chapter 11 Getting Started

1. 5 **3.** 7.48 **5.** $a + 7b$ **7.** $16c$ **9.** {0, 5} **11.** {−3, 9}
13. yes **15.** no

Pages 589–592 Lesson 11-1

1. Both x^4 and x^2 are positive even if x is a negative number.
3. Sample answer: $2\sqrt{2} + 3\sqrt{3}$ and $2\sqrt{2} - 3\sqrt{3}$; -19 **5.** 4 **7.** $3|ab|\sqrt{6}$ **9.** $\frac{2\sqrt{6}}{3}$ **11.** $\frac{8(3+\sqrt{2})}{7}$ **13.** 28 ft²
15. $3\sqrt{2}$ **17.** $4\sqrt{5}$ **19.** $\sqrt{30}$ **21.** $84\sqrt{5}$ **23.** $2a^2\sqrt{10}$
25. $7|x^3y^3|\sqrt{3y}$ **27.** $\frac{\sqrt{6}}{3}$ **29.** $\frac{\sqrt{2t}}{4}$ **31.** $\frac{c^2\sqrt{5cd}}{2|d^3|}$
33. $\frac{54+9\sqrt{2}}{17}$ **35.** $2\sqrt{7} - 2\sqrt{2}$ **37.** $\frac{-16-12\sqrt{3}}{11}$
39. $60\sqrt{2}$ or about 84.9 cm² **41.** $s = \sqrt{A}$; $6\sqrt{2}$ in.
43. $6\sqrt{5}$ or about 13.4 m/s **45.** $3\sqrt{2d}$ **47.** about 44.5 mph, about 51.4 mph **49.** $20\sqrt{3}$ or about 34.6 ft² **51.** A lot of formulas and calculations that are used in space exploration contain radical expressions. Answers should include the following.

- To determine the escape velocity of a planet, you would need to know its mass and the radius. It would be very important to know the escape velocity of a planet before you landed on it so you would know if you had enough fuel and velocity to launch from it to get back into space.
- The astronomical body with the smaller radius would have a greater escape velocity. As the radius decreases, the escape velocity increases.

53. B **55.** 6°F **57.** x^2 **59.** $a^{-\frac{5}{6}}$ or $\frac{\sqrt[6]{a}}{a}$ **61.** $s^{18}t^6\sqrt{s}$
63. 16, −32, 64 **65.** 144, 864, 5184 **67.** 0.08, 0.016, 0.0032
69. 84.9°C **71.** $(5x - 4)(7x - 3)$ **73.** $3(x - 7)(x + 5)$
75. $(4x - 3)(2x - 1)$ **77.** {(2, 0), (1, 2.5)} **79.** $\left\{\left(4, -\frac{1}{2}\right), (2, 1)\right\}$
81. 6 **83.** −1885 **85.** $a^2 + 7a + 10$ **87.** $4x^2 + x - 3$
89. $12a^2 + 13ab - 14b^2$

Pages 595–597 Lesson 11-2

1. to determine if there are any like radicands **3.** Sample answer: $(\sqrt{2} + \sqrt{3})^2 = 2 + 2\sqrt{6} + 3$ or $5 + 2\sqrt{6}$
5. $-5\sqrt{6}$ **7.** $4\sqrt{3}$ **9.** $9\sqrt{3} + 3$ **11.** $17 + 7\sqrt{5}$
13. $10\sqrt{110} - 5\sqrt{330} \approx 14.05$ volts **15.** $13\sqrt{6}$ **17.** 0
19. $10\sqrt{5b}$ **21.** $4\sqrt{6} - 6\sqrt{2} + 5\sqrt{17}$ **23.** $\sqrt{6} + 4\sqrt{3}$
25. $-2\sqrt{2}$ **27.** $\frac{4\sqrt{10}}{5}$ **29.** $\frac{53\sqrt{7}}{7}$ **31.** $10\sqrt{2} + 3\sqrt{10}$
33. $59 - 14\sqrt{10}$ **35.** $3\sqrt{7}$ **37.** $15\sqrt{2} + 11\sqrt{5}$
39. $\sqrt{3} + 2$ cm **41.** $5\sqrt{87} - 25\sqrt{3} \approx 3.34$ mi **43.** 6 in.
45. 40 ft/s; 80 ft/s **47.** The velocity should be $\sqrt{9}$ or 3 times the velocity of an object falling 25 feet; $3 \cdot 40 =$ 120 ft/s, $\sqrt{2(32)(225)} = 120$ ft/s. **49.** Sample answer: $a = 4, b = 9$; $\sqrt{4+9} \neq \sqrt{4} + \sqrt{9}$ **51.** The distance a person can see is related to the height of the person using $d = \sqrt{\frac{3h}{2}}$. Answers should include the following.

- You can find how far each lifeguard can see from the height of the lifeguard tower. Each tower should have some overlap to cover the entire beach area.
- On early ships, a lookout position (Crow's nest) was situated high on the foremast. Sailors could see farther from this position than from the ship's deck.

53. D **55.** $8\sqrt{2}$ **57.** $\frac{5}{2}$ **59.** $\frac{3\sqrt{14}}{16|ab|}$ **61.** −5103
63. $\left\{\pm\frac{9}{7}\right\}$ **65.** $\left\{-\frac{5}{4}, 0, \frac{5}{4}\right\}$ **67.** $n \geq \frac{5}{8}$ **69.** $k > \frac{3}{5}$
71. $x^2 - 4x + 4$ **73.** $x^2 + 12x + 36$ **75.** $4x^2 - 12x + 9$

Pages 600–603 Lesson 11-3

1. Isolate the radical on one side of the equation. Square each side of the equation and simplify. Then check for extraneous solutions. **3.** Sample answer: $\sqrt{x+1} = 8$; 63
5. 25 **7.** 7 **9.** 2 **11.** 3 **13.** 6 **15.** about 5994 m **17.** 100
19. 50 **21.** 4 **23.** no solution **25.** 5 **27.** 2 **29.** 180
31. 2 **33.** 57 **35.** 2 **37.** 2, 3 **39.** 3 **41.** 6 **43.** 2 **45.** 11
47. sometimes **49.** about 0.0619 **51.** $4\sqrt{6}$ or about 9.8 m
53. It increases by a factor of $\sqrt{2}$. **55.** about 2.43 ft
57. about 43.84°C **59.** $V < 330.45$ m/s **61.** You can determine the time it takes an object to fall from a given height using a radical equation. Answers should include the following.

- It would take a skydiver approximately 42 seconds to fall 10,000 feet. Using the equation, it would take 25 seconds. The time is different in the two calculations because air resistance slows the skydiver.
- A skydiver can increase the speed of his fall by lowering air resistance. This can be done by pulling his arms and legs close to his body. A skydiver can decrease his speed

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by holding his arms and legs out, which increases the air resistance.

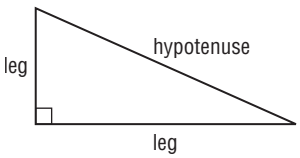
63. C **65.** 11 **67.** 15.08 **69.** no solution **71.** $20\sqrt{3}$ **73.** $8\sqrt{3}$ **75.** $3\left(\sqrt{10} - \sqrt{3}\right)$ **77.** yes; $(2n - 7)^2$ **79.** $r^2 - r - 12$ **81.** $6p^3 + 7p^2 - 2p + 45$ **83.** $14x - 7y = -3$ **85.** $15x - 2y = 49$ **87.** 25 **89.** $4\sqrt{13}$

Page 603 Practice Quiz 1

1. $4\sqrt{3}$ **3.** $\frac{-2 + \sqrt{10}}{2}$ **5.** $20\sqrt{3}$ **7.** $11 + 4\sqrt{7}$ or about 21.6 cm^2 **9.** 4

Pages 607–610 Lesson 11-4

1.



3. $d = \sqrt{2s^2}$ or $d = s\sqrt{2}$ **5.** 9 **7.** 60 **9.** $\sqrt{65} \approx 8.06$ **11.** Yes; $16^2 + 30^2 = 34^2$. **13.** 14.14 **15.** 53 **17.** 42.13 **19.** 65 **21.** 11 **23.** $\sqrt{115} \approx 10.72$ **25.** $\sqrt{67} \approx 8.19$ **27.** $\sqrt{253} \approx 15.91$ **29.** $17x$ **31.** Yes; $30^2 + 40^2 = 50^2$. **33.** No; $24^2 + 30^2 \neq 36^2$. **35.** Yes; $15^2 + \left(\sqrt{31}\right)^2 = 16^2$. **37.** 18 ft **39.** $4\sqrt{3}$ in. or about 6.93 in. **41.** about 415.8 ft **43.** The roller coaster makes a total horizontal advance of 404 feet, reaches a vertical height of 208 feet, and travels a total track length of about 628.3 feet. **45.** about 116.6 ft **47.** 900 ft^2 **49.** about 1081.7 ft, 324.5 ft **51.** C **53.** 144 **55.** 12 **57.** $-3\sqrt{z}$ **59.** 5^5 or 3125 **61.** $\frac{2a^2b^3}{c^8}$ **63.** 5 **65.** $\sqrt{53}$ **67.** $\sqrt{130}$

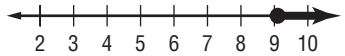
Pages 612–615 Lesson 11-5

1. The values that are subtracted are squared before being added and the square of a negative number is always positive. The sum of two positive numbers is positive, so the distance will never be negative. **3.** There are exactly two points that lie on the line $y = -3$ that are 10 units from the point (7, 5). **5.** 13 **7.** $\sqrt{10} \approx 3.16$ **9.** 2 or -14 **11.** about 25.5 yd, 25 yd **13.** 20 **15.** 5 **17.** $4\sqrt{5} \approx 8.94$ **19.** $\sqrt{41} \approx 6.40$ **21.** $\frac{10}{3} \approx 3.33$ **23.** $\frac{13}{10}$ or 1.30 **25.** $2\sqrt{14} \approx 7.48$ **27.** 1 or 7 **29.** -2 or 4 **31.** -10 or 4 **33.** two; $AB = BC = 10$ **35.** 3 **37.** 109 mi **39.** Yes; it will take her about 10.6 minutes to walk between the two buildings. **41.** Minneapolis-St. Cloud, 53 mi; St. Paul-Rochester, 64 mi, Minneapolis-Eau Claire, 79 mi; Duluth-St. Cloud, 118 mi **43.** Compare the slopes of the two potential legs to determine whether the slopes are negative reciprocals of each other. You can also compute the lengths of the three sides and determine whether the square of the longest side length is equal to the sum of the squares of the other two side lengths. Neither test holds true in this case because the triangle is not a right triangle. **45.** B **47.** 25 **49.** 3 **51.** 11 **53.** {2, 10} **55.** Asia, 1.113×10^{12}; Europe, 1.016×10^{12}; U.S./Canada, 8.84×10^{11}; Latin America, 2.41×10^{11}; Middle East, 1.012×10^{11}; Africa, 5.61×10^{10}.

57. $\{m \mid m \geq 9\}$

59. $\{x \mid x \leq -3\}$

61. $\{r \mid r \geq 9.1\}$



63. 6 **65.** 12 **67.** 1

Pages 618–621 Lesson 11-6

1. If the measures of the angles of one triangle equal the measures of the corresponding angles of another triangle, and the lengths of the sides are proportional, then the two triangles are similar. **3.** Consuela; the arcs indicate which angles correspond. The vertices of the triangles are written in order to show the corresponding parts. **5.** Yes; the angle measures are equal. **7.** $b = 15$, $d = 12$ **9.** $d = 10.2$, $e = 9$ **11.** Yes; the angle measures are equal. **13.** No; the angle measures are not equal. **15.** No; the angle measures are not equal. **17.** $\ell = 12$, $m = 6$ **19.** $k = \frac{55}{6}$, $\ell = \frac{22}{3}$ **21.** $k = 3$, $o = 8$ **23.** $k = 2.8$, $m = 3.6$ **25.** always **27.** $3\frac{1}{3}$ in. **29.** 8 **31.** about 53 ft **33.** Yes; all circles are similar because they have the same shape. **35.** 4:1; The area of the first is πr^2 and the area of the other is $\pi(2r)^2 = 4\pi r^2$. **37.** D **39.** 5 **41.** $\sqrt{26} \approx 5.1$ **43.** Yes; $25^2 + 60^2 = 65^2$. **45.** Yes; $49^2 + 168^2 = 175^2$. **47.** $3x^2 - 7x + 1$ **49.** $-3x^2 + 6x + 3$ **51.** (3, -2) **53.** (1.5, 0) **55.** about -0.044 **57.** $-\frac{5}{6}$ or $-0.8\overline{3}$ **59.** $\frac{9}{5}$ or 1.8 **61.** $-\frac{1}{3}$ or $-0.\overline{3}$

Page 621 Practice Quiz 2

1. 50 **3.** $2\sqrt{5} \approx 4.47$ **5.** $\sqrt{306} \approx 17.49$ **7.** $2\sqrt{2} \approx 2.83$ **9.** $a = 20$, $c = 15$

Pages 627–630 Lesson 11-7

1. If you know the measure of the hypotenuse, use sine or cosine, depending on whether you know the measure of the adjacent side or the opposite side. If you know the measures of the two legs, use tangent. **3.** They are equal. **5.** sin $Y = 0.3846$, cos $Y = 0.9231$, tan $Y = 0.4167$ **7.** 0.2588 **9.** 80° **11.** 18° **13.** 22° **15.** $\angle A = 60°$, $AC = 21$ in., $BC \approx 36.4$ in. **17.** $\angle B = 35°$, $BC = 5.7$ in., $AB = 7.0$ in. **19.** sin $R = 0.6$, cos $R = 0.8$, tan $R = 0.75$ **21.** sin $R = 0.7241$, cos $R = 0.6897$, tan $R = 1.05$ **23.** sin $R = 0.5369$, cos $R = 0.8437$, tan $R = 0.6364$ **25.** 0.5 **27.** 0.7071 **29.** 0.6249 **31.** 2.3559 **33.** 0.9781 **35.** 40° **37.** 62° **39.** 33° **41.** 12° **43.** 39° **45.** 51° **47.** 36° **49.** 37° **51.** 56° **53.** $\angle A = 63°$, $AC \approx 9.1$ in., $BC \approx 17.8$ in. **55.** $\angle B = 50°$, $AC \approx 12.3$ ft, $BC \approx 10.3$ ft **57.** $\angle B = 52°$, $AC \approx 30.7$ in., $AB \approx 39$ in. **59.** $\angle A \approx 23°$, $\angle B \approx 67°$, $AB = 13$ ft **61.** about 8.1° **63.** about 20.6° **65.** about 2.74 m to 0.7 m **67.** If you know the distance between two points and the angles from these two points to a third point, you can determine the distance to the third point by forming a triangle and using trigonometric ratios. Answers should include the following.

- If you measure your distance from the mountain and the angle of elevation to the peak of the mountain from two different points, you can write an equation using trigonometric ratios to determine its height, similar to Example 5.
- You need to know the altitude of the two points you are measuring.

69. D **71.** $k = 8$, $o = 13.5$ **73.** -5 or 3 **75.** $4s^3 - 9s^2 + 12s$ **77.** (11, 3) **79.** (-2, 1)

Selected Answers

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Pages 632–636 Chapter 11 Study Guide and Review

1. false, $-3 - \sqrt{7}$ **3.** true **5.** false, $3x + 19 = x^2 + 6x + 9$
7. false, $\frac{x\sqrt{2xy}}{y}$ **9.** $\frac{2\sqrt{15}}{|y|}$ **11.** $57 - 24\sqrt{3}$
13. $\frac{5\sqrt{21} - 3\sqrt{35}}{15}$ **15.** $5\sqrt{3} + 5\sqrt{5}$ **17.** $36\sqrt{3}$
19. $-6\sqrt{2} - 12\sqrt{7}$ **21.** $3\sqrt{2} + 3\sqrt{6}$ **23.** $\sqrt{6} - 1$
25. no solution **27.** $\frac{26}{7}$ **29.** 12 **31.** 34 **33.** $\sqrt{115} \approx 10.72$
35. 24 **37.** no **39.** yes **41.** 17 **43.** $\sqrt{205} \approx 14.32$
45. $\sqrt{137} \approx 11.70$ **47.** 5 or -1 **49.** 10 or -14
51. $d = \frac{45}{8}$, $e = \frac{27}{4}$ **53.** $b = \frac{44}{3}$, $d = 6$ **55.** 0.5283
57. 0.8491 **59.** 1.6071 **61.** 39° **63.** 12° **65.** 27°

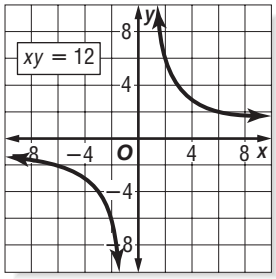
Chapter 12 Rational Expressions and Equations

Page 641 Chapter 12 Getting Started

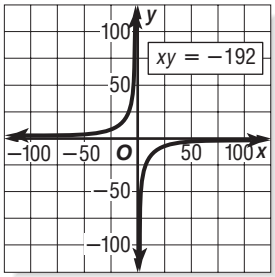
1. $-\frac{63}{16}$ **3.** 5 **5.** 4.62 **7.** 10.8 **9.** 6 **11.** $4m^2n$
13. $3c^2d(1 - 2d)$ **15.** $(x + 3)(x + 8)$ **17.** $(2x + 7)(x - 3)$
19. -1 **21.** $-\frac{149}{6}$ **23.** $\frac{31}{7}$ **25.** 8, -7

Pages 645–647 Lesson 12-1

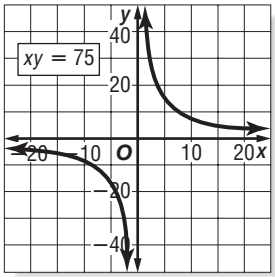
1. Sample answer: $xy = 8$ **3.** b; Sample answer: As the price increases, the number purchased decreases.
5. $xy = 12$



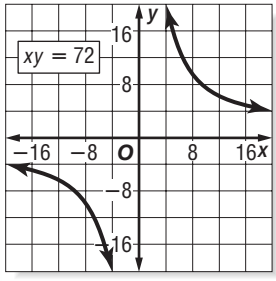
7. $xy = 24$; 4
9. $xy = 8$; $\frac{1}{4}$
11. $xy = -192$



13. $xy = 75$

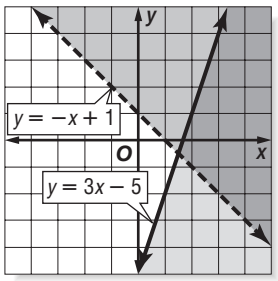


15. $xy = 72$

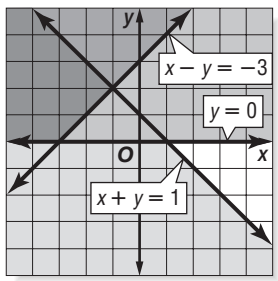


17. $xy = 60$; 20
19. $xy = -8.5$; 8.5
21. $xy = 28.16$; 8.8
23. $xy = 16$; $\frac{16}{7}$ **25.** $xy = \frac{14}{3}$; $\frac{2}{3}$
27. $xy = 26.84$; 8.3875 **29.** 8 in.
31. 7.2 h **33.** about 37 min
35. 20 m^3 **37.** 24 kg **39.** It is one third of what it was.
41. B **43.** 41° **45.** 73°
47. $a = 6$, $f = 14$ **49.** -9

51.



53.



55. 3 **57.** 30 **59.** $6xy^2$

Pages 651–653 Lesson 12-2

1. Sample answer: Factor the denominator, set each factor equal to 0, and solve for x. **3.** Sample answer: You need to determine excluded values before simplifying. One or more factors may have been canceled in the denominator. **5.** -3
7. $\frac{4}{5xy}$; 0, 0 **9.** $\frac{1}{x + 4}$; -4 **11.** $\frac{a + 6}{a + 4}$; -4, 2 **13.** $\frac{b + 1}{b - 9}$; 4, 9
15. $\frac{4}{9 + 2g}$ **17.** -5 **19.** -5, 5 **21.** -5, 3 **23.** -7, -5
25. $\frac{a^2}{3b}$; 0, 0 **27.** $\frac{3x}{8z}$; 0, 0, 0 **29.** $\frac{mn}{12n - 4m}$; $m \neq 3n$, 0, 0
31. $z + 8$; -2 **33.** $\frac{2}{y + 5}$; -5, 2 **35.** $\frac{a + 3}{a + 9}$; -9, 3
37. $\frac{(b + 4)(b - 2)}{(b - 4)(b - 16)}$; 4, 16 **39.** $\frac{n - 2}{n(n - 6)}$; 0, 6 **41.** $\frac{3}{4}$; -2, -1
43. about 29 min **45.** The times are not doubled; the difference is 12 minutes. **47.** 42.75 **49.** $450 + 4n$ **51.** 41
53. $\frac{\pi x^2}{4x^2}$ or $\frac{\pi}{4}$ **55a.** Sample answer: The graphs appear to be identical because the second equation is the simplified form of the first equation. **55b.** Sample answer: The first graph has a hole at $x = 4$ because it is an excluded value of the equation. **57.** C **59.** $xy = 60$; -5 **61.** $xy = -7.5$; 0.9375
63. 71° **65.** 45° **67.** 7 **69.** 6 **71.** 1536, 6144, 24,576
73. $\frac{81}{64}$, $\frac{243}{256}$, $\frac{729}{1024}$ **75.** 7 **77.** 15,300 **79.** 72

Pages 657–659 Lesson 12-3

1. Sample answer: $\frac{2}{1}$, $\frac{1}{x}$ **3.** Amiri; sample answer: Amiri correctly divided by the GCF. **5.** $\frac{2t}{s}$ **7.** $2(x + 2)$ **9.** $\frac{x + 3}{5}$
11. $1\frac{2}{3}$ days **13.** $\frac{2}{n}$ **15.** $\frac{12ag}{5b}$ **17.** $\frac{n - 4}{n + 4}$ **19.** $\frac{(x - 1)(x + 7)}{(x - 7)(x + 1)}$
21. $\frac{y - 2}{y - 1}$ **23.** $\frac{x - 6}{(x + 8)(x + 2)}$ **25.** $\frac{2}{n(n + 3)}$ **27.** $\frac{(a - 3)(a + 3)}{(a - 4)(a + 2)}$
29. about 16.67 m/s **31.** 20 yd^3 **33.** about \$16.02
35. 3 lanes $\cdot \frac{13 \text{ miles}}{1 \text{ lane}} \cdot \frac{5280 \text{ feet}}{1 \text{ mile}} \cdot \frac{1 \text{ vehicle}}{30 \text{ feet}}$ **37.** 5.72 h
39. Sample answer: Multiply rational expressions to perform dimensional analysis. Answers should include the following.
- 25 lights $\cdot$ h hours $\cdot \frac{60 \text{ watts}}{\text{light}} \cdot \frac{1 \text{ kilowatt}}{1000 \text{ watts}} \cdot \frac{15 \text{ cents}}{1 \text{ kilowatt hour}} \cdot \frac{1 \text{ dollar}}{100 \text{ cents}}$
- Sample answer: converting units of measure

41. A **43.** -5, 2 **45.** $xy = 72$; 12 **47.** $xy = -192$; -48
49. -7^3 or -343 **51.** $\frac{4b^4c^5}{a^3}$ **53.** $\{r \mid r \geq 2.1\}$ **55.** 11 days
57. $(n + 8)(n - 8)$ **59.** $(a + 7)(a - 5)$ **61.** $3x(x - 2)(x - 6)$

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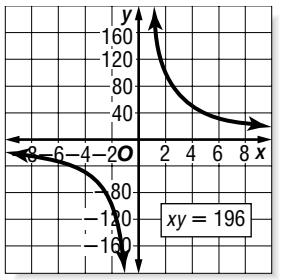
Page 659 Practice Quiz 1

1. $xy = 196$



3. $\frac{4a}{7b}$ **5.** $\frac{b+1}{b-9}$ **7.** $3m^2$ **9.** $\frac{4}{5(n+5)}$

Pages 662–664 Lesson 12-4

1. Sample answer: $\frac{15z}{4y^2} \div \frac{3x}{4y}$ **3.** Sample answer: Divide the density by the given volume, then perform dimensional analysis. **5.** $\frac{2a}{a+7}$ **7.** $\frac{2}{x+5}$ **9.** $\frac{2(x-2)(x+3)}{(x+1)(x+9)}$ **11.** $\frac{2}{9}$ lb/in^2 **13.** ab **15.** $\frac{x}{2y^2}$ **17.** $\frac{sy^2}{z^2}$ **19.** $\frac{b+3}{4b}$ **21.** $\frac{3k}{(k+1)(k-2)}$ **23.** $\frac{3(x+4)}{4(2x-9)}$ **25.** 648 **27.** 225 **29.** $x+3$ **31.** $\frac{(x+1)(x-1)}{2}$ **33.** $\frac{3(a+4)}{2(a-3)}$ **35.** $\frac{x+4}{x+3}$ **37.** about 9.2 mph **39.** $n = 20{,}000$ yd$^3 \div \left[\frac{5 \text{ ft}(18 \text{ ft} + 15 \text{ ft})}{2} \cdot 9 \text{ ft} \cdot \frac{1 \text{ yd}^3}{27 \text{ ft}^3}\right]$; $727.\overline{27}$ **41.** 63.5 mph **43.** $\left(x - \frac{1}{2}\right)\left(x - \frac{3}{4}\right)(x)$

45. Sample answer: Divide the number of cans recycled by $\frac{5}{8}$ to find the total number of cans produced. Answers should include the following.

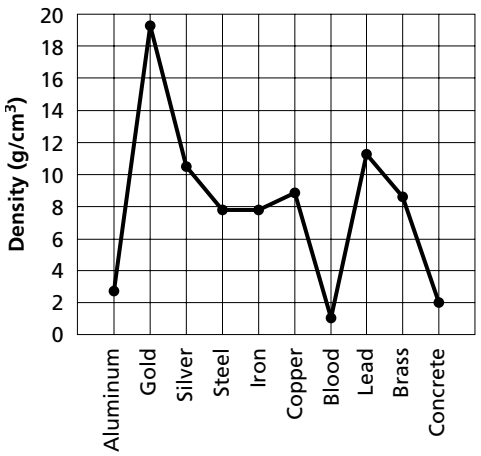
- $x = 63{,}900{,}000 \text{ cans} \div \frac{5}{8} \cdot \frac{1 \text{ pound}}{33 \text{ cans}}$

47. C **49.** $\frac{x-2}{x+2}$ **51.** $\frac{7(x+2y)(x+5)}{x+y}$ **53.** $-\frac{x+5}{x+6}$ **55.** $\frac{n+4}{n-4}$ **57.** $\left\{\frac{4}{3}\right\}$ **59.** $\left\{-6 \pm \sqrt{14}\right\}$ **61.** 3 **63.** $\{g \mid g \geq 7.5\}$ **65.** $\{x \mid x \geq -0.7\}$ **67.** $\left\{r \mid r < -\frac{1}{20}\right\}$ **69.** 39,000 covers **71.** $\frac{m^3}{5}$ **73.** $\frac{b^3}{c^3}$ **75.** $\frac{7x^4}{z}$

Pages 669–671 Lesson 12-5

1. b and c **3.** Sample answer: $x^3 + 2x^2 + 8$; $x^3 + 2x^2 + 0x + 8$ **5.** $2 + \frac{5}{a} + \frac{2}{7b^2}$ **7.** $r + 3 + \frac{9}{r+9}$ **9.** $b + 2 - \frac{3}{2b-1}$ **11.** $\frac{x}{3} + 3 - \frac{7}{3x}$ **13.** $3s - \frac{5}{t} + \frac{8t}{s^2}$ **15.** $x + 4$ **17.** $n - 7$ **19.** $z - 9 + \frac{33}{z+7}$ **21.** $2r + 7$ **23.** $t + 6$ **25.** $3x^2 + 2x - 3 - \frac{1}{x+2}$ **27.** $3x^2 + \frac{6}{2x-3}$ **29.** $3n^2 - 2n + 3 + \frac{3}{2n+3}$ **31.** $\frac{150(60-x)}{x}$ **33.** 3 rolls **35.** 5/\$1.02, 10/\$0.93, 16/\$0.82; 18-inch

37.



39. $2w + 4$ **41.** 12 **43.** Sample answer: Division can be used to find the number of pieces of fabric available when you divide a large piece of fabric into smaller pieces. Answers should include the following.

- The two expressions are equivalent. If you use the Distributive Property, you can separate the numerator into two expressions with the same denominator.
- When you simplify the right side of the equation, the numerator is $a - b$ and the denominator is c. This is the same as the expression on the left.

45. B **47.** $\frac{m+4}{m+1}$ **49.** $\frac{1}{z+6}$ **51.** $10\sqrt{2}$ **53.** $(d+5)(d-8)$ **55.** prime **57.** $4m^3 + 6m^2 - n$ **59.** $-2a^3 - 2a^2b + b^2 - 3b^3$

Pages 674–677 Lesson 12-6

1. Sample answer: $\frac{x+6}{x+2} + \frac{x-4}{x+2} = 1$ **3.** Sample answer: Two rational expressions whose sum is 0 are additive inverses, while two rational expressions whose difference is 0 are equivalent expressions. **5.** $\frac{a}{2}$ **7.** $\frac{3-n}{n-1}$ **9.** $-\frac{a}{6}$ **11.** $\frac{3m+6}{m-2}$ **13.** $\frac{1}{10}$ **15.** z **17.** $n - 1$ **19.** 3 **21.** $\frac{n-3}{n+3}$ **23.** $\frac{3a+1}{a-4}$ **25.** $\frac{14b+7}{2b+6}$ **27.** $\frac{22x+7}{2x+5}$ **29.** $\frac{2n}{3}$ **31.** $\frac{1}{3}$ **33.** $\frac{10}{z-2}$ **35.** $\frac{4-7m}{7m-2}$ **37.** $\frac{10y}{y-3}$ **39.** 3 **41.** $\frac{4b-23}{2b+12}$ **43.** $\frac{60}{n}$ **45.** $\frac{1}{7.48}$ ft^3 **47.** $\frac{x}{16}, \frac{x}{18}, \frac{x}{24}$ **49.** c **51.** A **53.** $x^2 + 2x - 3$ **55.** $\frac{b+3}{4b}$ **57.** $(a+7)(a+2)$ **59.** $(y - 4z)(y - 7z)$ **61.** $7x^2 - 3x + 22$ **63.** 36 **65.** 24 **67.** 30 **69.** 400 **71.** 144

Page 677 Practice Quiz 2

1. $\frac{a}{a+11}$ **3.** $\frac{x-1}{x+5}$ **5.** $x - 5 - \frac{1}{2x+3}$ **7.** $\frac{7}{x+7}$ **9.** $\frac{3x}{3x+2}$

Pages 681–683 Lesson 12-7

1. Sample answer: To find the LCD, determine the least common multiple of all of the factors of the denominators. **3.** Sample answer: $\frac{x}{2x+6}, \frac{5}{x+3}$ **5.** $6(x-2)$ **7.** $\frac{12x+7}{10x^2}$ **9.** $\frac{y^2+12y+25}{(y-5)(y+5)}$ **11.** $\frac{2z-wz}{4w^2}$ **13.** $\frac{4}{(b-4)(b+4)}$ **15.** C **17.** $21x^2y$ **19.** $(2n-5)(n+2)$ **21.** $(p+1)(p-6)$ **23.** $\frac{2+7a}{a^3}$ **25.** $\frac{15m+28}{35m^2}$ **27.** $\frac{n^2+12}{(n+4)(n-3)}$ **29.** $\frac{7x^2+3x}{(x-3)(x+1)}$ **31.** $\frac{1}{3}$ **33.** $\frac{7y+39}{(y+3)(y-3)}$

35. $\frac{3x^2 + 6x + 6}{(x + 4)(x - 1)^2}$ **37.** $\frac{a^3 - a^2b + a^2 + ab}{(a + b)(a - b)^2}$ **39.** $\frac{4 - 25x}{15x^2}$

41. $\frac{5ax - a}{7x^2}$ **43.** $\frac{k^2 - 6k - 15}{(k + 5)(k - 3)}$ **45.** $\frac{2m^2 - m - 9}{(m + 1)(2m + 5)}$

47. $\frac{-3a + 6}{a(a - 6)}$ **49.** $\frac{3a + 5}{-3(a - 2)}$ **51.** $\frac{4a^2 + 2a + 4}{(a + 4)(a + 1)(a - 1)}$

53. $\frac{-m^3 - 11m^2 - 56m - 48}{(m - 4)(m + 4)^2}$ **55.** 12 mi; $30 **57.** 66,000 mi

59. Sample answer: You can use rational expressions and their least common denominators to determine when elections will coincide. Answers should include the following.

- Use each factor of the denominators the greatest number of times it appears.
- 2012

61. C **63.** $\frac{4x + 5}{2x + 3}$ **65.** $b + 10$ **67.** $2m - 3 + \frac{2}{2m + 7}$

69. $(5r - 3)(r + 2)$ **71.** $54.85 **73.** $\frac{ab}{2}$ **75.** $\frac{1}{4n}$ **77.** $\frac{x + 4}{x + 6}$

Pages 686–689 Lesson 12-8

1. Sample answer: Both mixed numbers and mixed expressions are made up by the sum of an integer or monomial and a fraction or rational expression. **3.** Bolton; Lian omitted the factor $(x + 1)$. **5.** $\frac{42y + 5}{6y}$ **7.** $\frac{14}{19}$

9. $\frac{a - b}{x + y}$ **11.** $\frac{8n + 3}{n}$ **13.** $\frac{2xy + x}{y}$ **15.** $\frac{2m^2 - m - 4}{m}$

17. $\frac{b^3 + ab^2 + a - b}{a + b}$ **19.** $\frac{5n^3 - 15n^2 - 1}{n - 3}$ **21.** $\frac{x^2 - 7x + 17}{x - 3}$

23. $\frac{3}{4}$ **25.** $\frac{1}{ab^2}$ **27.** $\frac{y^2(x + 4)}{x^2(y - 2)}$ **29.** $\frac{1}{y + 4}$ **31.** $\frac{n + 2}{n + 3}$

33. $\frac{(x + 3)(x - 1)}{(x - 2)(x + 4)}$ **35.** $\frac{a(b^2 + 1)}{b(a^2 + 1)}$ **37.** 60 **39.** 404.60 cycles/s

41. $66\frac{2}{3}$ lb/in^2

43. Sample answer: Most measurements used in baking are fractions or mixed numbers, which are examples of rational expressions. Answers should include the following.

- You want to find the number of batches of cookies you can make using the 7 cups of flour you have on hand when a batch requires $1\frac{1}{2}$ cups of flour.
- Divide the expression in the numerator of a complex fraction by the expression in the denominator.

45. C **47.** $\frac{3a^2 + 3ab - b^2}{(a - b)(2b + 3a)}$ **49.** $\frac{2n^2 - 8n - 2}{(n - 2)^2(n + 3)}$ **51.** $\frac{1}{x - 3}$

53. $\frac{2}{n + 6}$ **55.** $\{\pm 4\}$ **57.** $\{-5, -3, 3\}$ **59.** about 2.59×10^0

61. $C = 0.16m + 0.99$ **63.** -48 **65.** 16 **67.** -14.4

Pages 693–695 Lesson 12-9

1. Sample answer: When you solve the equation, $n = 1$. But $n < 1$, so the equation has no solution. **3.** Sample answer: $\frac{x}{4} = 0$ **5.** -13 **7.** $\frac{5}{4}$ **9.** $-1, \frac{2}{5}$ **11.** 8 **13.** 3 **15.** -3

17. 0 **19.** $\frac{1}{2}$ **21.** -3 **23.** 1 **25.** –2, 1 **27.** 7 **29.** 9

31. about 0.82 mi **33.** 600 ft^3 **35.** $-\frac{14}{3}$ **37.** A **39.** $\frac{x + 1}{x - 2}$

41. $\frac{x + 1}{x + 5}$ **43.** $\frac{1}{y^2 - 2y + 1}$ **45.** $4(5x - 2y)$

47. $(2p + 5)(5p - 6)$

Pages 696–700 Chapter 12 Study Guide and Review

1. false, rational **3.** true **5.** false, $x^2 - 144$ **7.** $xy = 1176$; 21

9. $xy = 144$; 48 **11.** $\frac{x}{4y^2z}$ **13.** $\frac{a - 5}{a - 2}$ **15.** $\frac{14a^2b}{3}$ **17.** $\frac{30}{x - 10}$

19. $\frac{(x + 4)^2}{(x + 2)^2}$ **21.** $2p$ **23.** $\frac{3}{(y + 4)(y - 2)}$ **25.** $2ac^2 - 4a^2c + \frac{3c^2}{b}$

27. $x^2 + 2x - 3$ **29.** $\frac{2m + 3}{5}$ **31.** $a + b$ **33.** 2 **35.** $\frac{4c^2 + 9d}{6cd^2}$

37. $\frac{8d^2 - 7a}{(a - 2)(a + 1)}$ **39.** $\frac{14a - 3}{6a^2}$ **41.** $\frac{5x - 8}{x - 2}$ **43.** $\frac{4x^2 - 2y^2}{x^2 - y^2}$

45. $\frac{20a + 16}{2a^2 - 3a}$ **47.** -5 **49.** $-\frac{1}{4}$ **51.** -1; extraneous 0

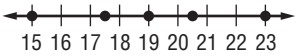
Chapter 13 Statistics

Page 707 Chapter 13 Getting Started

1. Sample answer: If $a = 5$ and $b = -2$, then $c = 3$. However, $5 > 3$. **3.** Sample answer: The speed limit could be 55 mph, and Tara could be driving 50 mph. **5.** 15

7. 375

9.



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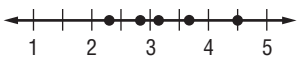

Pages 710–713 Lesson 13-1

1. All three are unbiased samples. However, the methods for selecting each type of sample are different. In a simple random sample, a sample is as likely to be chosen as any other from the population. In a stratified random sample, the population is first divided into similar, nonoverlapping groups. Then a simple random sample is selected from each group. In a systematic random sample, the items are selected according to a specified time or item interval. **3.** Sample answer: Ask the members of the school's football team to name their favorite sport. **5.** work from 4 students; work from all students in the 1st period math class; biased; voluntary response **7.** 12 pencils; all pencils in the school store; biased; convenience **9.** 20 shoppers; all shoppers; biased; convenience **11.** 860 people from a state; all people in the state; unbiased; stratified **13.** 3 students; all of the students in Ms. Finchie's class; unbiased; simple **15.** a group of U.S. district court judges; all U.S. district court judges; unbiased; stratified **17.** 4 U.S. Senators; all U.S. Senators; biased; convenience **19.** a group of high-definition television sets; all high-definition television sets manufactured on one line during one shift; unbiased; systematic **21.** a group of readers of a magazine; all readers of the magazine; biased; voluntary response **23.** Additional information needed includes how the survey was conducted, how the survey respondents were selected, and the number of respondents. **25.** Sample answer: Get a copy of the list of registered voters in the city and call every 100th person. **27.** Sample answer: Randomly pick 5 rows from each field of tomatoes and then pick a tomato every 50 ft along each row. **29.** It is a good idea to divide the school population into groups and to take a simple random sample from each group. The problem that prevents this from being a legitimate stratified random sample is the way the three groups are formed. The three groups probably do not represent all students. The students who do not participate in any of these three activities will not be represented in the survey. Other students may be involved in two or three of these activities. These students will be more likely to be chosen for the survey. **31.** B **33.** $3\frac{1}{3}$ **35.** $\frac{3}{25}$ **37.** $\frac{a + 5}{a + 12}$ **39.** $22\sqrt{6}$ cm

41. $-1\frac{2}{3}, -1\frac{1}{2}$ **43.** $y^2 + 12y + 35$ **45.** $x^2 - 4x - 32$

47. 24.11 **49.** 3.8 **51.** 12.45

Pages 717–721 Lesson 13-2

1°. A 2-by-4 matrix has 2 rows and 4 columns, and a 4-by-2 matrix has 4 rows and 2 columns. **3.** Estrella; Hiroshi did

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not multiply each element of the matrix by -5. **5.** 1 by 4; first row, first column **7.** 3 by 2; first row, second column **9.** $\begin{bmatrix} -5 & 24 \\ -22 & -13 \end{bmatrix}$ **11.** $[20 \quad -28]$ **13.** No; the corresponding elements are not equal. **15.** the total sales for the weekend **17.** 2 by 2; first row, first column **19.** 3 by 1; third row, first column **21.** 3 by 3; second row, third column **23.** 2 by 3; second row, third column

25. $\begin{bmatrix} 2 & 1 & 1 \\ 1 & 5 & 1 \end{bmatrix}$ **27.** $\begin{bmatrix} -13 & 12 & -7 \\ 5 & 6 & 11 \\ 23 & 18 & 14 \end{bmatrix}$

29. $\begin{bmatrix} 86 & 82 & -7 \\ 130 & 87 & 15 \end{bmatrix}$ **31.** $\begin{bmatrix} -5 & 25 & 45 \\ 0 & -20 & -10 \\ 15 & 35 & 30 \end{bmatrix}$

33. impossible **35.** $\begin{bmatrix} -25 & 19 & -23 \\ 10 & 16 & 24 \\ 43 & 29 & 22 \end{bmatrix}$

37. $\begin{bmatrix} 224 & 155 & -84 \\ 309 & 182 & -15 \end{bmatrix}$ **39.** $V = [70 \quad 2 \quad 2 \quad 0.3]$, $S = [160 \; 0 \quad 0 \quad 0]$, $C = [185 \quad 2 \quad 11 \quad 3.9]$

41. $[555 \quad 16 \quad 19 \quad 5.8]$ **43.** 1.20

45. $A = \begin{bmatrix} 533 & 331 & 4135 & 26 & 15 \\ 515 & 304 & 3840 & 24 & 14 \\ 499 & 325 & 4353 & 41 & 13 \\ 571 & 343 & 4436 & 36 & 15 \end{bmatrix}$,

$B = \begin{bmatrix} 571 & 357 & 4413 & 33 & 15 \\ 473 & 284 & 3430 & 28 & 11 \\ 347 & 235 & 3429 & 21 & 18 \\ 533 & 324 & 3730 & 19 & 18 \end{bmatrix}$

47. $T = \begin{bmatrix} 1104 & 688 & 8548 & 59 & 30 \\ 988 & 588 & 7270 & 52 & 25 \\ 846 & 560 & 7782 & 62 & 31 \\ 1104 & 667 & 8166 & 55 & 33 \end{bmatrix}$

49a. sometimes **49b.** always **49c.** sometimes **49d.** sometimes **49e.** sometimes **49f.** sometimes **51.** C

53. $\begin{bmatrix} 0.7 & -0.4 & 2.3 \\ -1.6 & -4 & -2.4 \end{bmatrix}$ **55.** $\begin{bmatrix} -5.3 & -12.4 & 21.1 \\ 2.4 & -7.7 & 4 \end{bmatrix}$

57. $\begin{bmatrix} 3.92 & -0.48 & 2.08 \\ -3.12 & 2.04 & -3.6 \end{bmatrix}$ **59.** biased; convenience

61. $\frac{3}{5}$ **63.** 324 **65.** 64 **67.** $(a - b)(a + 3b)$ **69.** Sample answer: Megan saved steadily from January to June. In July, she withdrew money to go on vacation. She started saving again in September. Then in November, she withdrew money for holiday presents.

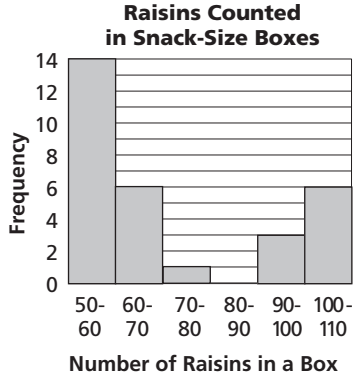
Page 721 Practice Quiz 1

1. half of the households in a neighborhood; all households in the neighborhood; unbiased; systematic **3.** $\begin{bmatrix} -3 & -4 \\ -5 & -9 \end{bmatrix}$ **5.** $\begin{bmatrix} 24 & -9 & -12 & 15 \\ 18 & -3 & 6 & 30 \end{bmatrix}$

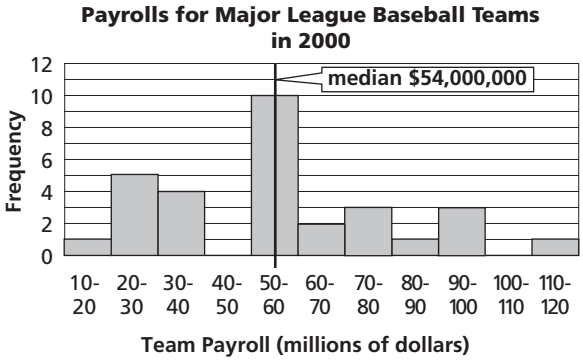
Pages 725–728 Lesson 13-3

1. First identify the greatest and least values in the data set. Use this information to determine appropriate measurement classes. Using these measurement classes, create a frequency table. Then draw the histogram. Always remember to label the axes and give the histogram a title. **3.** Sample answer: 1, 1, 2, 4, 5, 5, 8, 9, 10, 11, 12, 13, 22, 24, 41 **5.** There are no gaps. The data are somewhat symmetrical. **7.** The Group A test scores are somewhat more symmetrical in appearance than the Group B test scores. There are 25 of 31 scores in Group A that are 40 or greater, while only 14 of 26 scores in Group B are 40 or greater. Also, Group B has 5 scores less than 30. Therefore, we can conclude that Group A performed better overall on the test. **9.** B **11.** 3400–3800 points; There are no gaps. The data appear to be skewed to the left. **13.** Age at inauguration: 50–60 years old; age at death: 60–70 years old; both distributions show a symmetrical shape. The two distributions differ in their spread. The inauguration ages are not spread out as much as the death ages data.

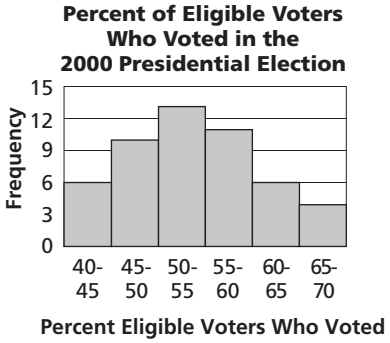
15. Sample answer:



17. Sample answer:



19. Sample answer:



23. Histograms can be used to show how many states have a median within various intervals. Answers should include the following.

- A histogram is more visual than a frequency table and can show trends easily.

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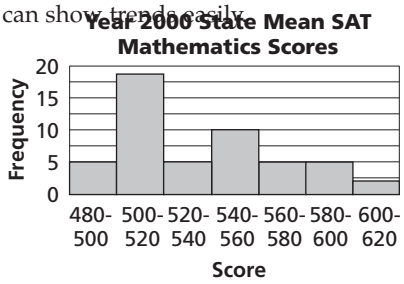
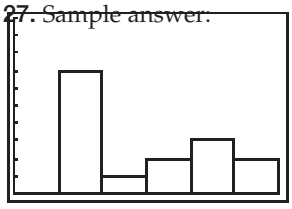
can show trends easily.

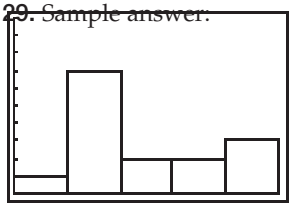
- 

25. B

27. Sample answer:



29. Sample answer:



31. $\begin{bmatrix} 9 & -8 & -5 \\ 0 & 4 & -3 \\ -2 & 9 & 2 \end{bmatrix}$ **33.** $\begin{bmatrix} 10 & -15 & -35 \\ 0 & 20 & -30 \\ -5 & 25 & -20 \end{bmatrix}$ **35.** $\frac{s}{s-5}$

37. 13 **39.** 87 **41.** 9 **43.** about 4.56

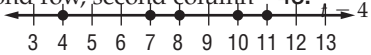
Pages 733–736 Lesson 13-4

1. Sample answer: 1, 4, 5, 6, 7, 8, 15 and 1, 2, 4, 5, 9, 9, 10
3. Alonso; the range is the difference between the greatest and the least values of the set. **5.** 4.6; 9.05; 8.0; 10.05; 2.05; none **7.** 5 runs **9.** 6 runs **11.** 37; 73; 60.5; 79.5; 19; none **13.** 1.1; 30.6; 30.05; 30.9; 0.85; none **15.** 46; 77; 66.5; 86; 19.5; none **17.** 6.7; 7.6; 6.35; 8.65; 2.3; none **19.** 471,561 visitors **21.** 147,066.5 visitors; 470,030 visitors **23.** none **25.** 22.5 Calories **27.** 46 Calories **29.** 1000 ft; 970 ft **31.** 520 ft; 280 ft **33.** Although the range of the cable-stayed bridges is only somewhat greater than the range of the steel-arch bridges, the interquartile range of the cable-stayed bridges is much greater than the interquartile range of the steel-arch bridges. The outliers of the steel-arch bridges make the ranges of the two types of bridges similar, but in general, the data for steel-arch bridges are more clustered than the data for the cable-stayed bridges.
35. Measures of variation can be used to discuss how much the weather changes during the year. Answers should include the following.

- The range of temperatures is used to discuss the change in temperatures for a certain area during the year and the interquartile range is used to discuss the change in temperature during the moderate 50% of the year.
- The monthly temperatures of the local area listed with the range and interquartile range of the data.

37. A **39.** 1 by 3; first row, first column **41.** 2 by 4; second row, second column **43.** $\frac{1}{4}$; 3, 4

45.



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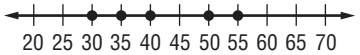


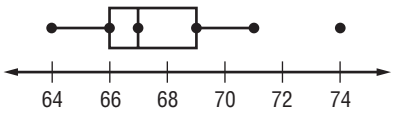
Page 736 Practice Quiz 2

1. $10–$20 **3.** 340 **5.** 835

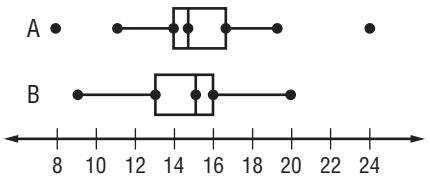
Pages 739–742 Lesson 13-5

1. The extreme values are 10 and 50. The quartiles are 15, 30, and 40. There are no outliers. **3.** Sample answer: 2, 8, 10, 11, 11, 12, 13, 13, 14, 15, 16

5.

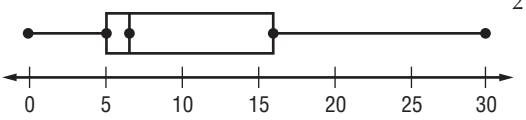


7.



The A data are more diverse than the B data.
9. Most of the data are spread fairly evenly from about $450 million to $700 million. The one outlier ($1397 million) is far removed from the rest of the data. **11.** 30 **13.** $\frac{1}{2}$

15.



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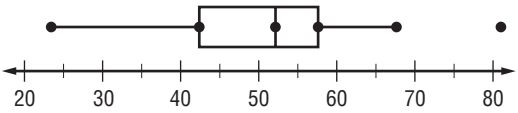

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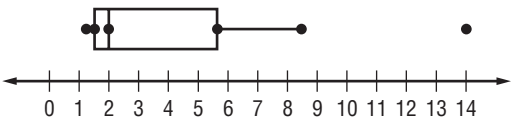
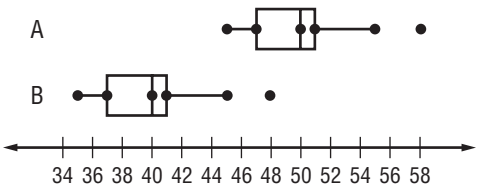


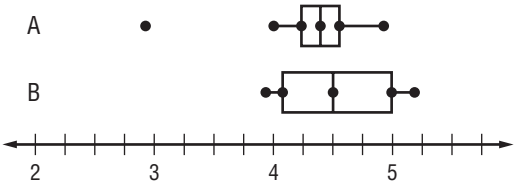
21. B **23.** B

25.



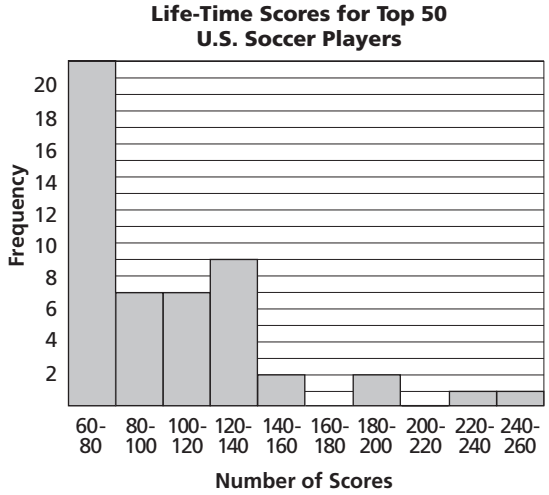
The distribution of both sets of data are similar. In general, the A data are greater than the B data.

27.



The A data have an outlier. Excluding the outlier, the B data are more diverse than the A data. **29.** The upper half of the data is very dispersed. The range of the lower half of the data is only 1. **31.** Top half; the top half of the data goes from $48,000 to $181,000, while the bottom half goes from $35,000 to $48,000. **33.** Bottom half; the top half of the data goes from 70 yr to 80 yr, while the bottom half goes from 39 yr to 70 yr. **35.** No; although the interval from 54 yr to 70 yr is wider than the interval from 70 yr to 74 yr, both intervals represent 25% of the data values.

37. Sample answer:



39. Sample answer: 40, 45, 50, 55, 55, 60, 70, 80, 90, 90, 90 **41.** C **43.** 80; 54.5; 45; 67; 22; none **45.** $\frac{-y^2 + 6y + 12}{(y - 3)(y + 4)}$ **47.** $\frac{3w - 4}{3(5w + 2)}$ **49.** $3(r + 3)$ **51.** $m\angle B = 51°$, $AB \approx 15.4$, $BC \approx 9.7$ **53.** 1, 6 **55.** −9.8, 1.8 **57.** $8a^2 + 2a - 1$

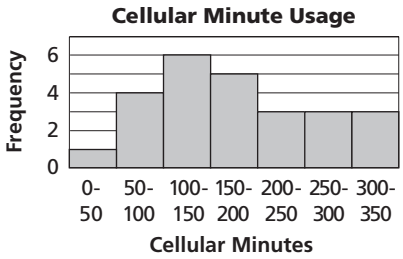
Pages 745–748 Chapter 13 Study Guide and Review

1. simple random sample **3.** quartile **5.** biased sample **7.** interquartile range **9.** outlier **11.** 8 test tubes with results of chemical reactions; the results of all chemical reactions performed; biased; convenience

13. $\begin{bmatrix} 2 & 4 & -4 \\ 4 & 3 & 3 \\ -2 & -3 & 3 \end{bmatrix}$ **15.** $\begin{bmatrix} -4 & -2 \\ 4 & 0 \end{bmatrix}$ **17.** $\begin{bmatrix} 5 & -1 \\ -1 & 4 \end{bmatrix}$

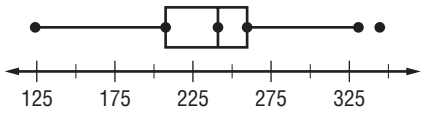
19. $\begin{bmatrix} 5 & 15 & -5 \\ 10 & 0 & 20 \\ -5 & -5 & 15 \end{bmatrix}$ **21.** $\begin{bmatrix} 9 & 1 \\ -5 & 4 \end{bmatrix}$

23. Sample answer:

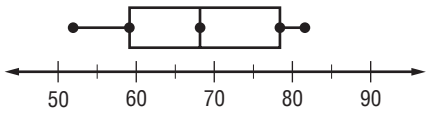


25. 70; 65; 45; 85; 40; none **27.** 37; 73; 62; 77; 15; none

29.



31.



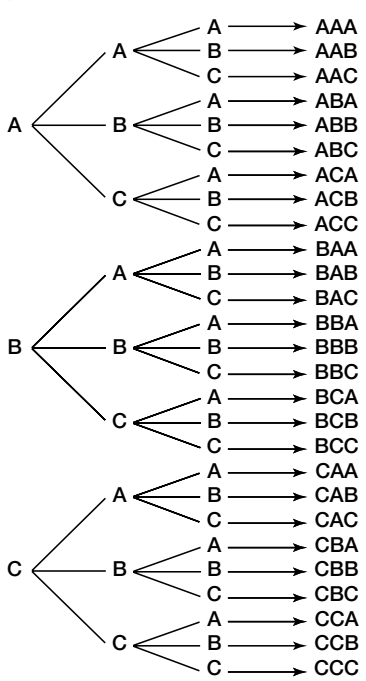
Chapter 14 Probability

Page 753 Chapter 14 Getting Started

1. $\frac{3}{7}$ **3.** $\frac{2}{7}$ **5.** $\frac{3}{5}$ **7.** $\frac{7}{95}$ **9.** $\frac{1}{52}$ **11.** 72.5% **13.** 40% **15.** 87.5% **17.** 85.6%

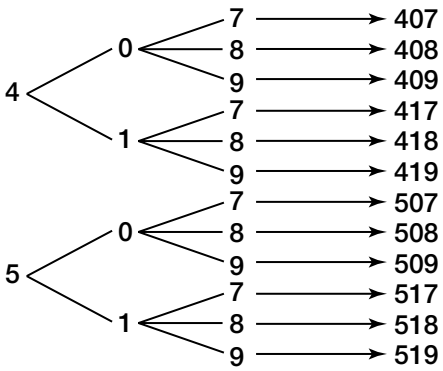
Pages 756–758 Lesson 14-1

1. Sample answer: choosing 2 books from 7 books on a shelf **3.** $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$ **5.** 64 **7.** 40,320 **9.** 27



11. 24 **13.** 39,916,800 **15.** 216 **17.** 24

19.



21. 6 **23.** 20 **25.** A **27.** A: 32, 88, 44, 85, 60; B: 38, 86, 48, 74, 64 **29.** B **31.** 79 **33.** 73.5; 39.5; 34.0 **35.** $\frac{5x^2 + 8x - 6}{(3x - 1)(x - 2)}$ **37.** $\frac{3z - 1}{3z - 6}$ **39.** $\pm\sqrt{22}$ **41.** 7 **43.** −8.6, 0.6 **45.** −4.7, −0.3 **47.** $\frac{1}{13}$ **49.** $\frac{1}{52}$ **51.** $\frac{2}{13}$

Pages 764–767 Lesson 14-2

1. Sample answer: Order is important in a permutation but not in a combination. Permutation: the finishing order of a race Combination: toppings on a pizza **3.** Alisa; both are correct in that the situation is a combination, but Alisa's method correctly computes the combination. Eric's calculations find the number of permutations. **5.** Permutation; order is important. **7.** 21 **9.** 60 **11.** 720 **13.** B **15.** Permutation; order is important. **17.** Permutation; order is important. **19.** Combination; order is not important. **21.** Combination; order is not important. **23.** 4 **25.** 35 **27.** 125,970 **29.** 524,160 **31.** 16,598,400 **33.** 6720 **35.** 362,880 **37.** 495 **39.** $\frac{1}{12}$ **41.** 7776 **43.** 61,425 **45.** 336 **47.** 36 **49.** $\frac{1}{12}$ or about 8% **51.** $\frac{1}{30,240}$ **53.** 24 **55.** Sample answer: Combinations can be used to show how many different ways a committee

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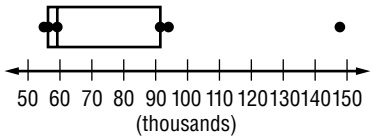
can be formed by various members. Answers should include the following.

- Order of selection is not important.
- Order is important due to seniority, so you need to find the number of permutations.

57. C **59.**



61. \$56,700, \$91,300 **63.** $\frac{1}{x+3}$ **65.** $\frac{n-5}{n+5}$ **67.** $4\sqrt{29}$, 21.54 **69.** −0.59, −3.41 **71.** 1.69, −1.19 **73.** $\frac{27}{32}$ **75.** $\frac{1}{3}$ **77.** $\frac{69}{100}$

Page 767 Practice Quiz 1

1. 24 **3.** 1287 **5.** $\frac{45}{1001}$

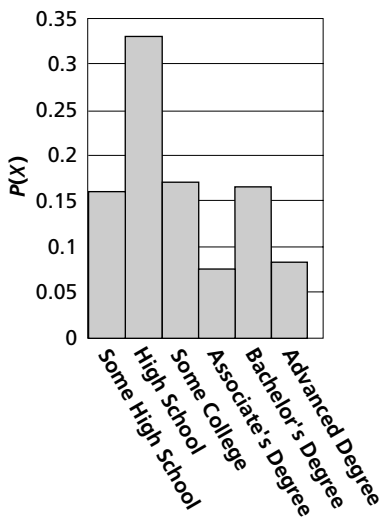
Pages 772–776 Lesson 14-3

1. A simple event is a single event, while a compound event involves two or more simple events. **3.** Sample answer: With dependent events, a first object is selected and not replaced. With independent events, a first object is selected and replaced. **5.** $\frac{10}{147}$ **7.** $\frac{80}{3087}$ **9.** $\frac{1}{2}$ **11.** 1 **13.** independent **15.** $\frac{1}{3}$ **17.** $\frac{2}{51}$ **19.** $\frac{7}{408}$ **21.** $\frac{1}{5}$ **23.** $\frac{1}{10}$ **25.** $\frac{27}{280}$ **27.** $\frac{69}{280}$ **29.** 98% or 0.98 **31.** no; $P(A \text{ and } B) \neq P(A) \cdot P(B)$ **33.** $\frac{9}{16}$ **35.** $\frac{1}{4}$ **37.** 356 **39.** ≈ 0.09 **41.** 1 **43.** $\frac{3}{5}$ **45.** $\frac{7}{8}$ **47.** $\frac{3}{4}$ **49.** 101 **51.** $\frac{39}{40}$ **53.** C **55.** 10 **57.** 604,800 **59.** $\begin{bmatrix} 5 & 2 \\ 4 & -1 \end{bmatrix}$ **61.** $3\sqrt{5}$ **63.** $2b^2\sqrt{10}$ **65.** $18\sqrt{14}$ **67.** 0.375 **69.** 0.492 **71.** 0.222 **73.** 0.033 **75.** 0.036

Pages 779–781 Lesson 14-4

1. The probability of each event is between 0 and 1 inclusive. The probabilities for each value of the random variable add up to 1. **3.** Sample answer: the number of possible correct answers on a 5-question multiple-choice quiz, and the probability of each **5.** $P(X = 4) = \frac{1}{12}$, $P(X = 5) = \frac{1}{9}$, $P(X = 6) = \frac{5}{36}$ **7.** 0.05 + 0.10 + 0.40 + 0.40 + 0.05 = 1 **9.** 0.45 **11.** $P(X = 0) = \frac{1}{64}$, $P(X = 1) = \frac{3}{64}$, $P(X = 2) = \frac{9}{64}$, $P(X = 3) = \frac{27}{64}$ **13.** No; it is more probable to spin blue than red. **15.** 0.10 + 0.15 + 0.40 + 0.25 + 0.10 = 1 **17.** 0.75

19.

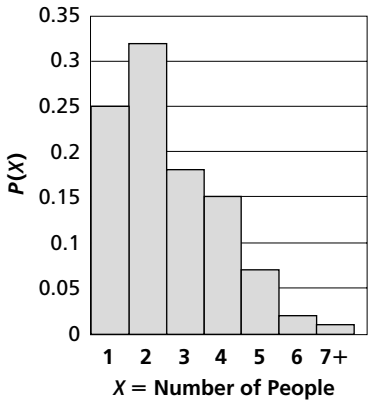


21. No; 0.221 + 0.136 + 0.126 + 0.065 + 0.043 = 0.591. The sum of the probabilities does not equal 1. **23a.** $P(X = 1) = \frac{1}{2}$, $P(X = 2) = \frac{1}{4}$, $P(X = 3) = \frac{1}{8}$, $P(X = 4) = \frac{1}{16}$ **23b.** $\frac{1}{16}$ **25.** A **27.** $\frac{2}{13}$ **29.** $\frac{25}{52}$ **31.** 792 **33.** $\begin{bmatrix} -2 & 4 \\ 3 & 12 \end{bmatrix}$ **35.** $xy = 1.44$; 0.8 **37.** $13\sqrt{2}$ **39.** $-\sqrt{7}$ **41.** \$1250.46 **43.** 20% **45.** 26% **47.** 21%

Page 781 Practice Quiz 2

1. 0.25 + 0.32 + 0.18 + 0.15 + 0.07 + 0.02 + 0.01 = 1

3.



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

Pages 785–788 Lesson 14-5

1. An empirical study uses more data than a single study, and provides better calculations of probability. **3.** Sample answer: a survey of 100 people voting in a two-person election where 50% of the people favor each candidate; 100 coin tosses **5.** Sample answer: 5 marbles of two colors where three of the marbles are one color to represent making a free throw, and the other two are a different color to represent missing a free throw. Randomly pick one marble to simulate a free throw 25 times. **9.** Yes; 70% of the marbles in the bag represent water and 30% represent land. **11.** about 0.25 or 25% **13.** Sample answer: a coin tossed 15 times **15.** Sample answer: a coin and a number cube since there are 12 possible outcomes **21.** 4 or 9 **23.** ≈ 0.74 or 74% **25.** Sample answer: 3 coins **33.** Sample answer: Probability can be used to determine the likelihood that a medication or treatment will be successful. Answers should include the following.

- Experimental probability is determining probability based on trials or studies.
- To have the experimental more closely resemble the theoretical probability the researchers should perform more trials.

35. B **43.** 0.145 **45.** $\frac{125}{1331}$ **47.** $\frac{80}{583}$ **49.** 6, 8 **51.** $-\frac{9}{4}$ **53.** $-1, \frac{2}{5}$ **55.** no **57.** yes **59.** 11 **61.** $-\frac{2}{5}$ **63.** $\frac{10}{9}$

Pages 789–792 Chapter 14 Study Guide and Review

1. permutation **3.** independent **5.** are not **7.** 1 **9.** 720 **11.** 20 **13.** 56 **15.** 140 **17.** 12 **19.** $\frac{1595}{32{,}412}$ **21.** $\frac{1}{2}$ **23.** $\frac{4}{13}$ **25.** 0.79 or 79% **27.** 39.6% **29.** 28.8%

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