

CPM

Selected Answers
for
Core Connections Integrated I

Lesson 1.1.1

1-6. **a:** $y = x^2 - 6$ and then $y = \sqrt{x-5}$.

b: Yes, reverse the order of the machines ($y = \sqrt{x-5}$ and then $y = x^2 - 6$) and use an input of $x = 6$.

1-7. **a:** 54 **b:** $-7\frac{3}{5}$ **c:** 2 **d:** 2.93

1-8. **a:**

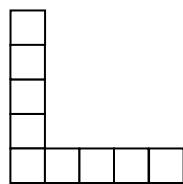


Figure 4

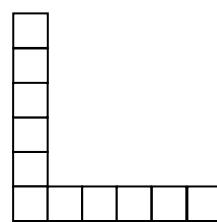


Figure 5

b: It grows by adding two tiles each time.

c: 1; The top and right tiles are removed, since the pattern is to add two tiles to expand each figure.

1-9. **a:** -59 **b:** 17 **c:** -72 **d:** 6 **e:** -24
f: -25 **g:** 25 **h:** -25 **i:** 7

1-10. **a:** $y = 1$ **b:** $y = 3$ **c:** $y = 9$

Lesson 1.1.2 (Day 1)

1-15. **a:** A 3x8 grid of squares. The top row has seven squares, the middle row has eight squares, and the bottom row has seven squares.

Figure 4

b: 42 tiles. Add 4 tiles to get the next figure.

1-16. **a:** $x = 0$ **b:** all real numbers **c:** $x = 14$ **d:** no solution

1-17. **a:** $-\frac{5}{18}$ **b:** $-\frac{51}{35}$ **c:** $-\frac{3}{5}$ **d:** $\frac{7}{8}$

1-18. **a:** \$18 **b:** Yes, it is proportional because 0 gallons cost \$0.
c: 8.4 gallons **d:** Typical response: The line would get steeper.

1-19. **a:** -17 **b:** 8 **c:** 8 **d:** 486

Lesson 1.1.2 (Day 2)

1-21. **a:** 5

b: 19

c: -76

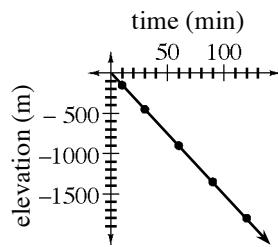
1-22. **a:** The negative number indicates the elevation is below sea level.

b: The elevation decreases, that is, becomes more negative.

c: -2700 m; -675 m; 0 m

d: See graph at right.

e: Yes, the table and resulting graph go through (0, 0) and doubling (or tripling) the time doubles (or triples) the elevation. This is a decreasing proportional relationship.



1-23. **a:** $x = -3$

b: $x = 5$

c: $x = \frac{2}{3}$

1-24. **a:** 84 and no real solution.

b: He cannot get an output of 0 with $y = x^2 + 3$. He can get an output of 0 by putting a 4 in $y = \sqrt{x} - 2$.

Lesson 1.1.3

1-28. **a:** $m = 5$

b: $a = \frac{4\pi}{7} \approx 1.80$

1-29. **a:** 2

b: 30

c: 13

d: 7

1-30. **a:** 4

b: 5

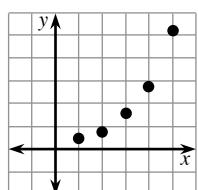
c: -2

1-31. **a:** 100° , obtuse

b: 170° , obtuse

c: 50° , acute

1-32. **a:**



b: The graph is a curve, going up—that is as x increases, y increases. The points are not connected, there is no x -intercept and no y -intercept, and negative values of either variable are not possible.

c: Possible answers: max = 10 feet (the highest she can jump), min = 0 feet

Lesson 1.2.1

1-38. **a:** 8 **b:** 10 **c:** -2 **d:** no real solution

1-39. **a:** 2 **b:** 8 **c:** 2^t

1-40. no

1-41. **a:** $-\frac{7}{10}$ **b:** $-2\frac{2}{3}$ **c:** $3\frac{1}{3}$ **d:** -3

1-42. **a:** $a = 123^\circ, b = 123^\circ, c = 57^\circ$

b: all = 98°

c: $g = h = 75^\circ$

Lesson 1.2.2

1-47. **a:** Not a function because more than one y -value is assigned for x between -1 and inclusive.

b: Appears to be a function

c: Not a function because there are two different y -values for $x = 7$

d: function

1-48. **a:** x -intercepts $(-1, 0)$ and $(1, 0)$, y -intercepts $(0, -1)$ and $(0, 4)$

b: x -intercept $(19, 0)$, y -intercept $(0, -3)$

c: x -intercepts $(-2, 0)$ and $(4, 0)$, y -intercept $(0, 10)$

d: x -intercepts $(-1, 0)$ and $(1, 0)$, y -intercept $(0, -1)$

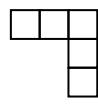
1-49. **a:** 2 tiles **b:** 19 **c:** 

Figure 1

1-50. **a:** $x = -7$ **b:** $x = -1$ **c:** $x = 9$ **d:** $x = 34$

1-51. one point and two points of intersection are possible

Lesson 1.2.3

1-59. **a:** yes **b:** $-6 \leq x \leq 6$ **c:** $-4 \leq y \leq 4$

1-60. **a:** 3 **b:** 12 **c:** 3

1-61. **a:** 1 **b:** $\frac{1}{625}$ **c:** 0 **d:** 2

1-62. **a:** Yes, it is correct because the two angles make up a 90° angle.

b: $x = 33^\circ$, so one angle is $33 - 10 = 23^\circ$ while the other is $2(33) + 1 = 67^\circ$.

c: $23^\circ + 67^\circ = 90^\circ$

1-63. **a:** ≈ 9465 people per square mile

b: ≈ 5.4 billion people

Lesson 1.3.1

1-68. **a:** h^2 **b:** x^7 **c:** $9k^{10}$

d: n^8 **e:** $8y^3$ **f:** $28x^3y^6$

1-69. **a:** Haley is correct. You cannot add unlike terms.

b: Haley is incorrect. The bases differ.

1-70. **a:** Not in scientific notation because 62.5 should be 6.25. 6.25×10^4 .

b: Not in scientific notation because 1000 should be 10^3 and it uses a “.” instead of an “ \times ”. 6.57×10^3 .

c: Not in scientific notation because 0.39 should be 3.9. 3.9×10^8 .

1-71. **a:** 12 **b:** 18 **c:** 21

1-72. **a:** $x = -2$ **b:** $x = 1\frac{1}{2}$ **c:** $x = 0$ **d:** no solution

Lesson 1.3.2

1-81. **a:** $\frac{1}{4}$ **b:** 1 **c:** $\frac{1}{5^2} = \frac{1}{25}$ **d:** $\frac{1}{x^2}$

1-83. **a - c:** (a) and (b) are functions because each only has one output for each input.

- d:** a: D: all real numbers, R: $1 \leq y \leq 3$
b: D: all real numbers, R: $y \geq 0$
c: D: $x \geq -2$, R: all real numbers

1-84. **a:** 1.6×10^8 **b:** 5.8413×10^{10}

1-85. The unshaded triangle is half the area of the rectangle ($0.5(8)(17) = 68$ sq. in.), so the shaded area is the other half.

Lesson 2.1.1

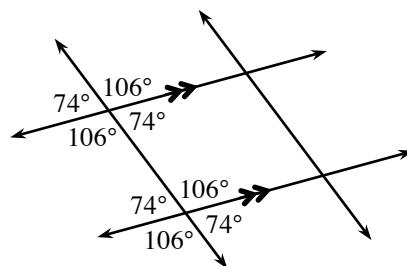
2-6. $y = 7x + 5$

2-7. $\frac{27b^3}{a^6}$

2-8. **a:** 2 **b:** -4 **c:** -5, -2, 0, 2, 4 **d:** -2 **e:** 13

2-9. **a:** 60 **b:** 127 **c:** 0

2-10. See solutions on the diagram at right.



Lesson 2.1.2

2-18. $\frac{\Delta y}{\Delta x} = \frac{1}{3}$

- 2-19.** The equation in part (b) has no solution. Possible reason: There are the same number of x -terms on each side of the equation, so if you try to solve, you end up with an equation such as $11 = 4$, which is impossible.

2-20. **a:** -10 **b:** -4 **c:** undefined **d:** $-2\frac{2}{3}$

2-21. No solution; you cannot divide by 0.

2-22. **a:** $2\frac{38}{65}$ **b:** $-37\frac{1}{8}$ **c:** $-5\frac{1}{8}$ **d:** $-6\frac{1}{3}$

Lesson 2.1.3

- 2-30.** **a:** Line a : $y = 2x - 2$; Line b : $y = 2x + 3$

b: It would lie between lines a and b , because its y -intercept is at $(0, 1)$.

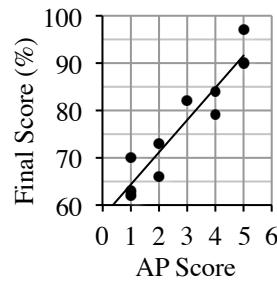
c: It would slant downward but would have the same y -intercept as the line from part (b).

- 2-31.** See graph at right. Approximately 79%

2-32. **a:** 2.4×10^8 **b:** 1.4×10^{-9} **c:** 2.25×10^{-2}

2-33. **a:** $-15x$ **b:** $64p^6q^3$ **c:** $3m^8$

- 2-34.** Graphs (a) and (b) have a domain of all real numbers, while graphs (a) and (c) have a range of all real numbers. Graphs (a) and (b) are functions.



Lesson 2.1.4

2-40. a: $m = \frac{5}{3}$, $b = (0, -4)$

b: $m = -\frac{4}{7}$, $b = (0, 3)$

c: $m = 0$, $b = (0, -5)$

2-41. a: $m = -2$

b: $m = 0.5$

c: undefined

d: $m = 0$

2-42. a: correct

b: 7.89×10^4

c: 3.15×10^3

d: correct

2-43. a: 4

b: 16

c: $y = 4x + 16$

d: It would get steeper.

2-44. a: While walking double (or triple) the distance, they would encounter double (or triple) the number of dogs. If they walked zero blocks, they would encounter zero dogs. The dogs in the area are evenly spread out along the blocks.

b: $\frac{17 \text{ dogs}}{12 \text{ blocks}} = \frac{x \text{ dogs}}{26 \text{ blocks}}$; $x \approx 36.83$ so 37 dogs would be reasonable.

c: ≈ 1.42 dogs per block

Lesson 2.2.1

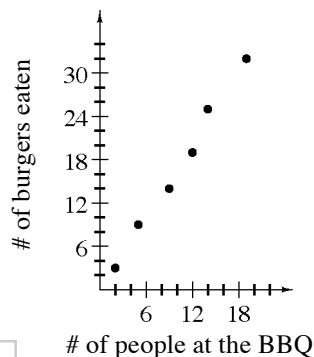
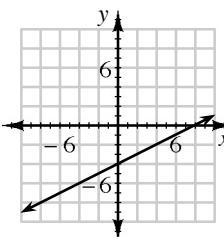
2-47. A very strong positive nonlinear association with no apparent outliers.

2-48. See graph at right. The number of people must be whole numbers, and Mikko probably did not keep track of parts of burgers, so the points should not be connected; that is, there is no possible data between the points. If a line is drawn to model the trend, it should be straight rather than go through all the points.

2-49. a: $m = \frac{1}{2}$

b: $(0, -4)$

c:



2-50. a: -15

b: -4

c: 3

d: $-m^2$

2-51. $x \neq -5$ because the denominator cannot be 0.

Lesson 2.2.2

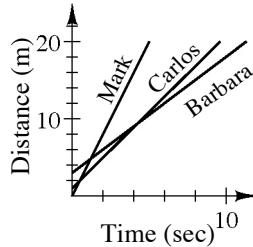
2-58. **a:** The dependent variable is y (distance in meters) and the independent variable is x (time in seconds).

b: See graph at right. Mark won the race, finishing in 5 seconds.

c: Barbara: $y = \frac{3}{2}x + 3$; Mark: $y = 4x$

d: 5 meters every 2 seconds, or $\frac{5}{2}$ meters per second.

e: 2 seconds after the start of the race, when each is 6 meters from the starting line.



2-59. **b, c, d, f**

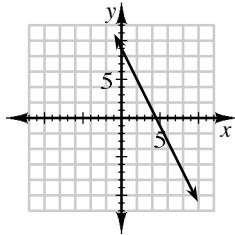
2-60. **a:** 43

b: 25.5

c: 17.5

2-61. $y = 2x + 3$

2-62.



2-63. **a:** The slope represents the change in height of a candle per minute, $m = 0$ cm per minute.

b: The slope represents the gallons per month of water being removed from a storage tank, $m = -900$ gallons per month.

2-64. -3

2-65. **a:** 9

b: $\frac{1}{64}$ or 0.15625

c: $\frac{10}{9}$

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

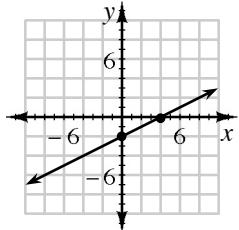
2-66. \$50 per week, $A = 50w + 100$, $A = (50)(52) + 100 = 2700$

2-67. **a:** $y = -2x + 1$

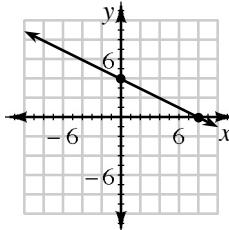
b: $x: (0.5, 0)$; $y: (0, 1)$

Lesson 2.2.3

- 2-71. a: $(4, 0)$ and $(0, -2)$



- b: $(8, 0)$ and $(0, 4)$



- 2-72. a: $x = 12$

- b: $w = 0$

- c: $x = -8$

- d: no solution

- 2-73. a: It is the slope of the line of best fit drawn on the graph. Its units are mpg/1000 pounds.

b: It is the y -intercept of the line of best fit. Its units are mpg.

c: Moderately strong negative linear association with no apparent outliers.

d: About 25 mpg

- 2-74. a: $G = 5$, Figure 0 = 3

- b: $G = -2$, y -intercept = 3

- c: $G = 3$, y -intercept = -14

- d: $G = -5$, y -intercept = 3

- e: a

- 2-75. a: No. On Day 0 the height is not 0. If the number of days is doubled (or tripled), the height is not doubled (or tripled).

b:

Days (x)	0	2	4	6	8
Height cm (y)	30	27	24	21	18

- c: $\frac{-3 \text{ cm}}{2 \text{ days}}$ or -1.5 cm/day

- d: $y = -\frac{3}{2}x + 30$

Lesson 2.2.4

2-82. $\frac{65 \text{ miles}}{1 \text{ hour}} \cdot \frac{1 \text{ gallon}}{25 \text{ miles}} \cdot \frac{1 \text{ hour}}{60 \text{ minutes}} \cdot 45 \text{ minutes} = 1.95 \text{ gallons}$. Considering precision of measurement, the car uses about 2 gallons of gas.

2-83. **a:** 3; (0, 5) **b:** $-\frac{5}{4}$; (0, 0) **c:** 0; (0, 3) **d:** 4; (0, 7)

2-84. The sum of the first four planets' distances = 3.597×10^8 miles, which is less than the distance to Jupiter.

2-85. **a:** -1 **b:** $-\frac{1}{2}$ **c:** $\frac{3}{2}$

d: The line travels downward from left to right, so $m = -1$.

2-86. $f(x) = 4x + 4$

Lesson 2.3.1

2-94. **a:** $y = 1.5x + 0.5$

b: Answers vary, but solutions should lie on $y = 1.5x + 0.5$. Possible points: (0, 0.5), (1, 2), (10, 15.5)

2-95. \$213.33 per second

2-96. There is no association between number of pets and age.

2-97. Answers vary. Typical responses: $\frac{x^3}{x^5}$, x^3x^{-5} , and $(x^{-1})^2$

2-98. **a:** 4 **b:** 3 **c:** 1 **d:** 2

Lesson 2.3.2

2-102. $y = 7x + 9$

2-103. a: -8

b: 1

c: -2

d: 17

e: -45

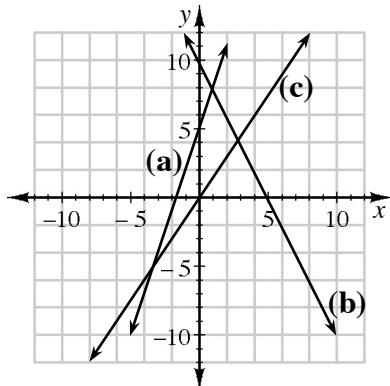
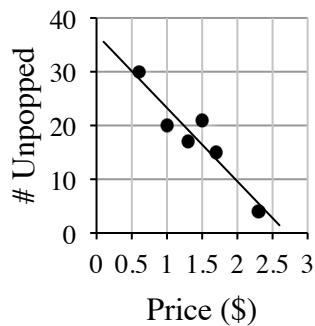
f: 125

2-104. ≈ 73 feet/second

2-105. a: See graph at right. $u = 37 - 13 \cdot 7p$ where p is the price in dollars and u is the number of unpopped kernels. The slope represents the change in price for each unpopped kernel. The y -intercept represents the number of unpopped kernels in a free (unpopped) bag.

b: ≈ 21 kernels

2-106. See graph at right.



Lesson 2.3.3

2-108. $y = \frac{4}{3}x - 4$

2-109. $m = 3$

2-110. He should thaw out 3 pounds of hamburger.

2-111. a: -6

b: -2

c: $-\frac{2}{3}$

d: undefined

e: $x = 2.25$

2-112. a: $\frac{-5 \text{ pounds}}{2 \text{ months}}$ or -2.5 pounds/month

b: $y = -\frac{5}{2}x + 120$, where x = months and y = pounds

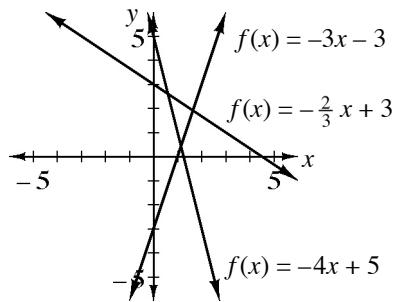
Lesson 3.1.1

- 3-8.** The flag would need to be a rectangle. The height of the cylinder would match the height of the rectangle along the pole, and the cylinder's radius would match the width of the rectangle.

- 3-9.** See solution at right.

- 3-10.** $5x - 2 + 2x + 6 = 67$, $x = 9$, so $5(9) - 2 = 43$ miles

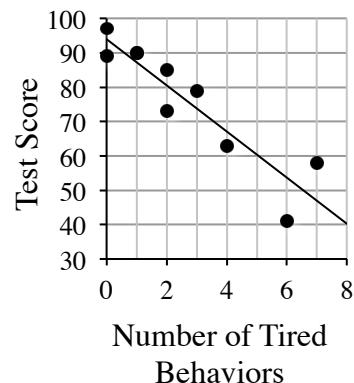
- 3-11.** **a:** $1\frac{1}{9}$ **b:** $-13\frac{3}{10}$
c: $-14\frac{17}{20}$ **d:** $-7\frac{1}{6}$



- 3-12.** **a:** See graph at right. $y = 94 - 6.7x$ where y is the test score and x is the number of tired behaviors observed.

b: ≈ 61

- 3-13.** $y = \frac{7}{2}x + 2$



Lesson 3.1.2

3-19. **a:** Reflection

b: Translation, or two reflections over parallel lines

c: Rotation, or rotation and translation

d: Rotation, or rotation and translation

e: Reflection

f: Reflection and translation, or rotation and translation, or reflection, rotation, and translation

3-20. **a:** $m = 3$ **b:** $(0, -2)$ **c:** $y = 3x - 2$

3-21. **a:** $x = 8^\circ$, right angle is 90° **b:** $x = 20^\circ$, straight angle is 180°

3-22. **a:** domain: all real numbers, range: $y \leq 1$

b: $x \geq -3$, range: $y \geq -2$

c: domain: all real numbers, range: $y \leq 0$

d: domain: all real numbers, range: $y \geq -1$

3-23. **a:** $-15\frac{1}{12}$ **b:** $-11\frac{3}{4}$ **c:** 17 **d:** $-10\frac{5}{8}$

3-24. **a:** $\frac{1}{5z^2}$ **b:** $\frac{72}{y^2}$ **c:** $\frac{1}{216g^9}$

Lesson 3.1.3

3-32. The slopes are $\frac{1}{2}$ and $-\frac{3}{2}$. Since the slopes are not opposite reciprocals, the lines must not be perpendicular.

3-33. **a:** $6x + 6$

b: $6x + 6 = 78$, so $x = 12$ and the rectangle is 15 cm by 24 cm.

c: $(2 \cdot 12)(12 + 3) = 360$

3-34. $y = -2x + 13$

3-35. $\frac{1.6}{2 \times 10^{-3}} = 800$; The flying fox bat is about 800 times heavier than the bumblebee bat.

3-36. **a:** $5\frac{5}{9}$

b: $-11\frac{17}{35}$

c: $6\frac{30}{49}$

d: $1\frac{163}{350}$

3-37. **a:** It looks the same as the original.

c: Solution should be any value of $45k$ where k is an integer.

d: circle

Lesson 3.1.4

3-45. $A'(4, 3), B'(6, -1), C'(-2, -5), D'(-4, -1)$

3-46. Rigid transformations preserve length and ΔGHJ and ΔABC do not have the same side lengths. They do however appear to have the same angle measures.

3-47. $19 + 7x - 4 + 10x + 3 = 52$, so $x = 2$. Side lengths are 19, 10, and 23.

3-48. **a:** $y = -\frac{3}{4}x + \frac{19}{4}$

b: $y = -\frac{3}{4}x - \frac{13}{2}$

c: $y = -11$

3-49. **a:** 1

b: 5

c: $\sqrt{10} \approx 3.16$

d: undefined

3-50. **a:** $x = 6$

b: $x = 1$

c: $x = -8$

d: $x = 16$

Lesson 3.1.5

- 3-55.** **a:** $(9, 3)$; 10 square units **b:** $(3, -3)$; 20 square units
c: $(-2, -7)$ **d:** $(-52, 1483)$; 208,680 sq units

3-56. (a) and (b) are perpendicular, while (b) and (c) are parallel.

- 3-57.** **a:** Multiply by 6. **b:** $x = 15$ **c:** $x = 4$

- 3-58.** **a:** 3.7×10^8 **b:** 7.6×10^3

3-59. 19.9 minutes

- 3-60.** **a:** The orientation of the hexagon does not change.
b: The orientation of the hexagon does not change.
c: There are 6 lines of symmetry, through opposite vertices and through the midpoints of opposite sides.

Lesson 3.1.6

- 3-67.** $(3, -1), (7, -1)$

- 3-68.** **a:** One possibility: $4(5x + 2) = 48$ **b:** $x = 2$
c: 144 square units

- 3-69.** **a:** $y = \frac{4}{3}x - 2$

b: The resulting line coincides with the original line. $y = \frac{4}{3}x - 2$

c: The image is parallel. $y = \frac{4}{3}x - 7$

d: They are parallel, because they all have a slope of $\frac{4}{3}$.

e: $y = -\frac{3}{4}x + 16$

- 3-70.** $y = 3x - 1$

- 3-71.** Moderate negative linear association with no outliers. The data appear to be in two clusters, probably indicating two classes of vehicles.

- 3-72.** **a:** 12 **b:** 59 **c:** 7 **d:** 9
e: -13 **f:** -5

Lesson 3.2.1

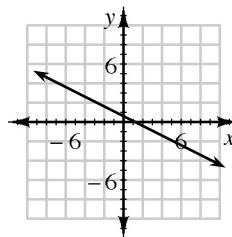
3-77. **a:** $4x + 2y = 6$

b: $2x + 4$

c: $4y + 2x + 6$

d: $2y + 2x + 6$

3-78. See graph at right.



3-79. $f(x) = \frac{1}{2}x + 1$

3-80. Problem 3-78 does, possible response: the b in its equation is 3 versus 1 in problem 3-79.

3-81. **a:** $(-5, -1)$

b: $(3, 5)$

c: $(11, 0)$; The rectangle is moved parallel to the given line.

d: 12 square units

3-82. **a:** Calculate the output for the input that is 4 less than c .

b: Calculate the output for the input that is half of b .

c: 12 more than the output when the input is d .

Lesson 3.2.2

3-90. $(x + 8)(x + 3) = x^2 + 11x + 24$

3-91. **a:** $x = -4.75$

b: $x = -94$

c: $x \approx 1.14$

d: $a = 22$

3-92. **a:** $15x^3y$

b: y

c: x^5

d: $\frac{8}{x^3}$

3-93. $1500 - 35x = 915$; $x = 17$ weeks

3-94. **a:** Using side AB as the base, Area $\Delta = \frac{1}{2}bh = \frac{1}{2}(5)(6) = 15$ square units.

b: $A'(-8, 4)$, $B'(-8, -1)$, and $C'(-2, 0)$

c: $B''(-4, -1)$

d: $A'''(-4, -8)$

3-95. **a:** It should be a triangle with a horizontal base of length 4 and a vertical base of length 3.

b: $-\frac{4}{3}$

c: Any equation of the form $y = -\frac{3}{4}x + b$.

Lesson 3.2.3

3-101. **a:** $(12x + 1)(x - 5) = 12x^2 - 59x - 5$

b: $(2m^2 - 4m - 1)(3m + 5) = 6m^3 - 2m^2 - 23m - 5$

c: $(2x + 5)(x + 6) = 2x^2 + 17x + 30$

d: $(3 - 5y)(2 + y) = 6 - 7y - 5y^2$

3-102. **a:** $-20xy - 32y^2$ **b:** $-36x + 90xy$ **c:** $x^4 + 3x^3 + 3x^2 - 6x - 10$

3-103. **a:** $(3, 4)$ **b:** $(10, 9)$

3-104. **a:** 20 square units

b: 2600 square units; subtract the x - and y -coordinates to determine the length of the two sides.

3-105. Yes, he can.

a: $x = 2$ **b:** Divide both sides by 100.

3-106. **a:** $-\frac{19}{24}$

b: $4\frac{5}{6}$

c: $\frac{7}{5} = 1\frac{2}{5}$

d: $-\frac{8}{3} = -2\frac{2}{3}$

e: $-3\frac{7}{12}$

f: $2\frac{2}{7}$

Lesson 3.3.1

3-114. **a:** $x - 2 = 4$

b: For each, $x = 6$.

c: $x + 3 = 8, x = 5$

3-115. Part (c) is correct; $x = 7$

3-116. They all are equivalent to $12x^6$.

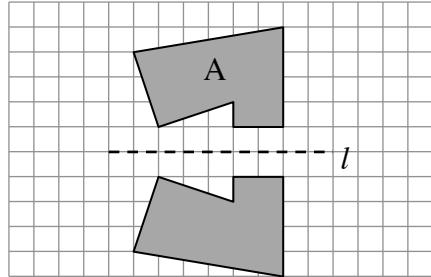
3-117. **a:** $4x^2 + 17x + 15$

b: $-6x^3 - 20x^2 - 16x$

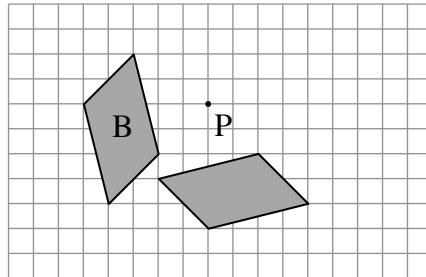
c: $-3xy + 3y^2 + 8x - 8y$

d: $3xy + 5y^2 - 22y - 12x + 8$

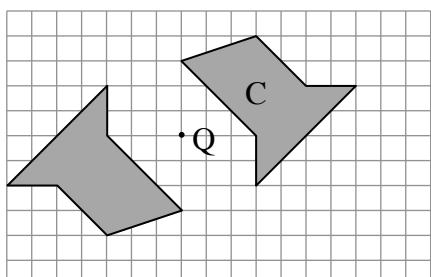
3-118. **a:**



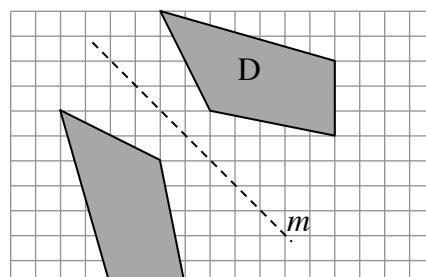
b:



c:



d:



3-119. **a:** $y = -\frac{5}{2}x + 10$; inches/hour and inches

b: 12.5 inches

Lesson 3.3.2

3-127. **a:** $x = 4$

b: $x = -21$

c: $x = \frac{16}{3}$

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

3-128. **a:** $y = x + 2$; grams/inch and inches **b:** 28 grams

3-129. **a:** $A'(-6, -3)$, $B'(-2, -1)$, and $C'(-5, -7)$

b: $B''(8, 13)$

c: $A'''(3, -6)$

3-130. **a:** $2d - 3$ **b:** $2d - 3 = 19$; $d = 11$ candies

3-131. **a:** $x = 3$ **b:** $x = 5$ **c:** $x = 2$ **d:** $x = 3$

Lesson 3.3.3

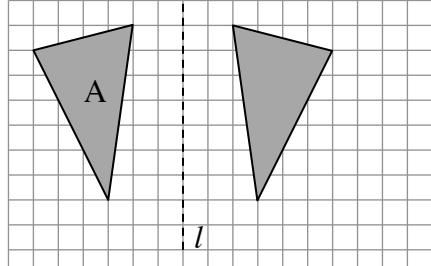
3-136. **a:** $x = 2$ **b:** $x = 1.5$ **c:** $y = -1$

3-137. 68 trees

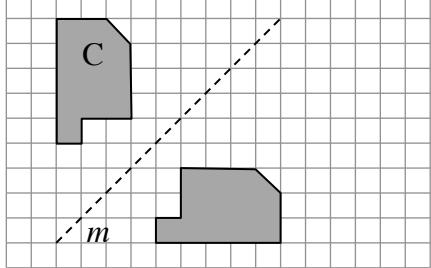
3-138. **a:** $\frac{1}{2}bh = \frac{1}{2}(7)(5) = 17.5$ square units **b:** $(-6, 5)$, $(1, 5)$, and $(-1, 0)$

3-139. Reasoning will vary. $a = 108^\circ$, $b = 108^\circ$, $c = 52^\circ$, $d = 52^\circ$

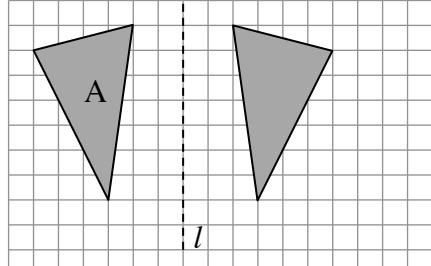
3-140. **a:**



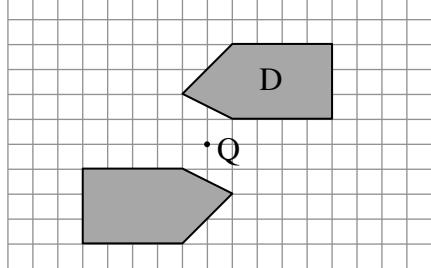
c:



b:



d:



3-141. **a:** $x = 5$

b: $x = 2$

c: $y = 0$

d: $x = 38$

Lesson 4.1.1

- 4-4.** **a:** Strong positive linear association with one apparent outlier at 2.3 cm.
b: She reversed the coordinates of (4.5, 2.3) when she graphed the data.
c: An increase of 1 cm length is expected to increase the weight by 0.25 g.
d: $1.4 + 0.25(11.5) \approx 4.3$ g
e: We predict that when the pencil is so short that there is no paint left, the pencil is expected to weigh 1.4 g.

4-5. **a:** $-6xy^4$ **b:** x **c:** $\frac{2}{x^4}$ **d:** $-\frac{1}{8x^3}$

4-6. 21 yards apart

4-7. The better route to save time is the 122 miles at a slower pace of 65 miles per hour (although you only save approximately three minutes). 115.2 minutes on the freeway or 112.6 minutes if taking the scenic route.

4-8. **a:** $x = 39.75$ **b:** $x = 6$

4-9. $f(x) = -5x + 3$

input (x)	2	10	6	7	-3	0	-10	100	x
output ($f(x)$)	-7	-47	-27	-32	18	3	53	-497	$-5x + 3$

Lesson 4.1.2

4-17. The predicted price for a 2800 sq ft home in Smallville is \$264,800 while in Fancyville it is \$804,400. The selling price is much closer to what was predicted in Smallville, so she should predict that the home is in Smallville.

4-18. Cadel is correct because he followed the exponent rules. Jorge is incorrect; the problem only contains multiplication, so there are not two terms and the Distributive Property cannot be used. Lauren did not follow the exponent rules.

4-19. **a:** 14 **b:** 16 **c:** 50

4-20. If x is the age of the van, then $x + (x + 17) = 41$ or if x is the age of the truck, then $x + (x - 17) = 41$.

4-21. **a:** It is a reflection across both the x - and y -axes or a rotation of 180 degrees. (The reflection is *not* across the line $x = y$.) The side lengths and angle measures have been preserved. (Area and perimeter have also been preserved.)

b: No, the new triangle is not the result of rigid transformations, it has been stretched. The side lengths are not preserved.

4-22. **a:** $5x^2 - 30x$ **b:** $-54y + 27y^2$

Lesson 4.1.3

4-25. **a:** The form is linear, the direction is negative, the strength is moderate, and there are no apparent outliers.

b: Answers will vary. One possibility: $y = 5 - 1.6x$; where x is the number of months taking the supplement and y is the length of the cold in days; about 2.6 days

c: Using the equation from part (b): $3.3 - 2.6 = 0.7$ days. The cold actually lasted 0.7 days longer than was predicted by the linear model.

d: Using the equation from part (b): The y -intercept of 5 means that we expect a person who has not taken any supplement to have a cold that lasts five days; more generally, the average cold is five days long.

4-26. **a:** $y = -\frac{2}{3}x + 8$ **b:** $(12, 0)$

4-27. **a:** $y(x + 3 + y) = xy + 3y + y^2$ **b:** $(x + 8)(x + 3) = x^2 + 11x + 24$

4-28. **a:** -2 **b:** 86 **c:** 3
d: 1 **e:** 8 **f:** 6

4-29. **a:** $x = \frac{-119}{20}$ or -5.95 **b:** $x = \frac{1}{2}$

4-30. **a:** The total volume of both drink sizes combined.

b: The total number of drinks served that day.

c: The total volume of drinks served that day.

Lesson 4.1.4 (Day 1)

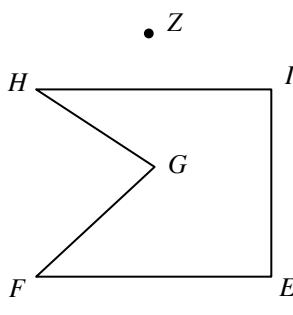
4-36. **a:** The slope means that for every increase of one ounce in the patty size you can expect to see a price increase of \$0.74. The y -intercept would be the cost of the hamburger with no meat. The y -intercept of \$0.23 seems low for the cost of the bun and other fixings, but is not entirely unreasonable.

b: One would expect to pay $0.253 + 0.735(3) = \$2.46$ for a hamburger with a 3 oz patty while the cost of the given 3 oz patty is \$3.20, so it has a residual of $\$3.20 - \$2.46 = \$0.74$. The 3 oz burger costs \$0.74 more than predicted by the LSRL model.

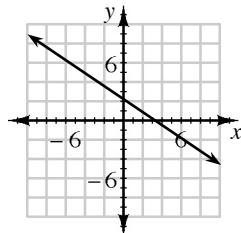
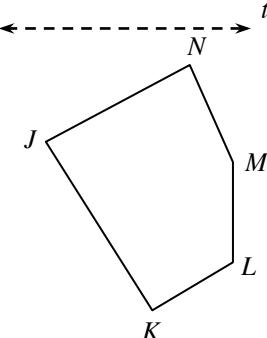
c: The LSRL model would show the expected cost of a 16 oz burger to be $0.253 + 0.735(16) = \$12.01$. 16 oz represents an extrapolation of the LSRL model; however, \$14.70 is more than \$2 overpriced.

4-37. $m = -\frac{2}{3}$, $(3, 0)$, $(0, 2)$; See graph at right.

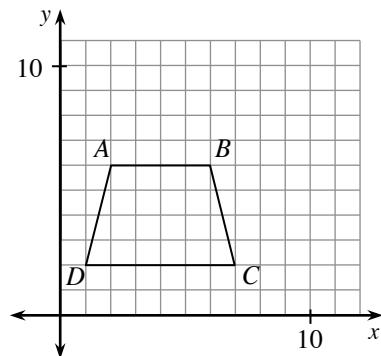
4-38. **a:**



b:



c:



4-39. (a), (b), and (d)

4-40. **a:** $\frac{1}{8}$

b: b^4

c: 9.66×10^{-1}

d: 1.225×10^7

4-41. **a:** $x = \frac{1}{3}$

b: $x = \frac{35}{8}$

Lesson 4.1.4 (Day 2)

- 4-42.** **a:** Answers will vary. Students may say negative because “in-town” prices can be higher than prices in the outskirts, or out-of-town families may grow some of their food. Students may say positive because transportation costs make out-of-town prices higher, or out-of-town families eat at restaurants less. The association is probably pretty weak.
- b:** The y -intercept should be approximately halfway between 11.27 and 7.67, so a possible equation is $g = 9.47 - 0.14d$.
- c:** For each additional mile from church, we expect families to pay \$140 less for groceries this year.
- d:** \$8860
- 4-43.** **a:** $x = -7$ **b:** $x = -1$ **c:** $x = 9$ **d:** $x = 34$
- 4-44.** **a:** $\sqrt{240.56} \approx 15.51$ cm **b:** $\approx \sqrt{481.12} \approx 21.93$ cm
- 4-45.** **a:** $15x^2$ **b:** $8x$ **c:** $6x^2$ **d:** $7x$
- 4-46.** All equations are equivalent and have the same solution: $x = 4$.
- 4-47.** $x = 6x - 15$

Lesson 4.2.1 (Day 1)

- 4-56.** **a:** $y = 5.37 - 1.58x$, where x is the number of months taking the supplement and y is the number of days the cold lasted.
- b:** $y = 6.16 - 1.58x$ and $y = 4.58 - 1.58x$, based on a maximum residual of -0.79 .
- c:** 0 to 1.4 days. The measurements had one decimal place.
- d:** Between 4.6 and 6.2 days. The y -intercept is the number of days a cold will last for a person who takes no supplements.
- e:** Students should predict that a negative number of days makes no sense here.
Statistical models often cannot be extrapolated far beyond the edges of the data.
- f:** A negative residual is desirable because it means the actual cold was shorter than the model predicted.

4-57. **a:** $x = \frac{12}{7}$ **b:** $x = 15$

4-58. 48 m/minute for cockroach versus 30 m/minute for centipede or 80 cm/second for cockroach versus 50 cm/second for centipede. The cockroach is faster.

4-59. $y = 2x + 6$; 206 tiles

4-60. **a:** -3 **b:** $\sqrt{10} \approx 3.16$

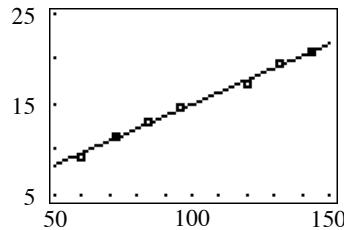
4-61. **a:** 4^7 **b:** 1 **c:** $x^{-2} = \frac{1}{x^2}$

d: $\frac{y^6}{x^3}$ **e:** 1.28×10^4 **f:** 8×10^{-3}

Lesson 4.2.1 (Day 2)

- 4-62.** **a:** See scatterplot at right. $y = 1.6568 + 0.1336x$.

Students need to round to four decimals, because if they round to fewer decimals, the LSRL gets too far away from the actual points due to the lack of precision.



- b:** See table at right; sum of the squares is 0.5881 in^2 .

4-63. $y = 2x - 1$

4-64. **a:** $x = 2$

b: $x = -\frac{1}{2}$

4-65. **a:** -127 **b:** 10

c: $\frac{1}{32}$ or 0.03125 **d:** -8.476

Distance from wall (in)	Residual (in)
144	-0.198
132	0.305
120	-0.391
96	0.316
84	0.219
72	0.123
60	-0.374

- 4-66.** **a:** It is a parallelogram, because $\overline{MN} \parallel \overline{PQ}$ (both have a slope of $-\frac{2}{5}$) and $\overline{NP} \parallel \overline{MQ}$ (both have a slope of -3).

b: $(1, 7)$

c: Possible response: Reflect $M'N'P'Q'$ across the y -axis and then rotate it 180° .

4-67. $x = \frac{11}{4}$

Lesson 4.2.2

4-74. **a:** See graph at right.

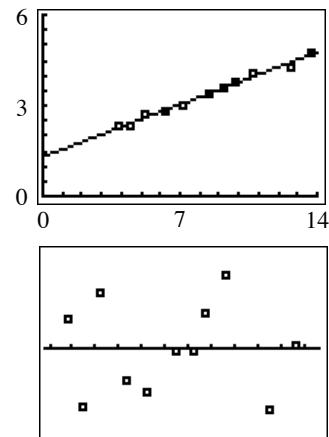
b: $y = 1.300 + 0.248x$ where x is the length of the paint (cm) and y is the weight of the pencil (g).

c: See graph below right.

d: Yes, the residual plot appears randomly scattered with no apparent pattern.

e: Predicted weight is $1.300 + 0.248(16.8) = 5.5$ g, residual is $6.0 - 5.5 = 0.5$ g. The measurements had one decimal place.

f: A positive residual means the pencil weighed more than was predicted by the LSRL model.



4-75. **a:** $-\frac{1}{60}$

b: $-7\frac{5}{9}$

c: $\frac{1}{24}$

d: -12

4-76. **a:** $3y(y - 4) = 3y^2 - 12y$

b: $(3y + 5)(y - 4) = 3y^2 - 7y - 20$

4-77. **a:** $m = -\frac{2}{7}, b = 2$

b: $m = -\frac{1}{3}, b = 6$

c: $m = 5, b = -1$

d: $m = 3, b = 0$

4-78. \$36.88; \$8.85/foot

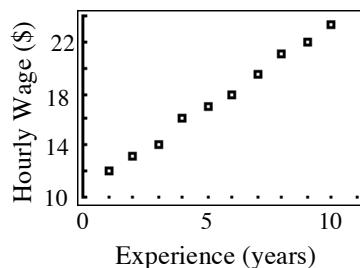
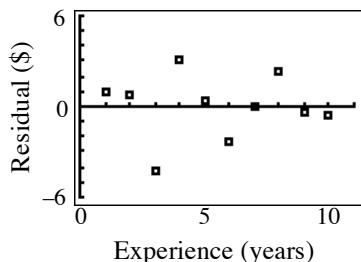
4-79. **a:** $x = 2$

b: $x = -1$

Lesson 4.2.3

- 4-86.** **a:** A very strong positive linear association with no outliers. See graph at right.

- b:** See plot below right. Yes, the residual plot shows random scatter with no apparent pattern.



- c:** $r = 0.998$; There is a very strong positive linear association.

- 4-87.** **a:** With each one degree of temperature increase, we predict an increase of 410 park visitors.

- b:** The residuals are positive, so we expect the actual values to be greater than the predicted values, hence the predictions from the model may be too low.

- c:** The residual is about -7 (thousand people); the LSRL predicts 24.95 thousand people. $\text{actual} - 24.95 = -7$; the actual number of people in attendance was about 17,900.

- d:** The predicted attendance is between 11,800 and 25,800 people.

- f:** The residual plot shows a clear curve; the linear model is not appropriate. For temperatures in the 80s, the model predicts too low an attendance; for temperatures in the mid 90s, the model predicts too high an attendance. The range for predicted attendance in part (d) is very large and therefore not useful.

4-88. **a:** $\frac{8}{25}$ **b:** xy^6 **c:** 1.2×10^9 **d:** 8×10^3

4-89. **a:** D: $-2 \leq x \leq 2$, R: $-3 \leq y \leq 2$ **b:** D: $x = 2$, R: all real numbers

c: D: $x \geq -2$, R: all real numbers **d:** Only graph (a).

4-90. **a:** 2 **b:** $1\frac{1}{64}$ **c:** $x = 2$

4-91. $y = \frac{1}{2}x + \frac{5}{2}$

Lesson 4.2.4

4-98. **a:** $y = 5.372 - 1.581x$

b: Yes. There is random scatter in the residual plot with no apparent pattern.

c: $r = -0.952$ and $R^2 = 90.7\%$; 90.7% of the variability in the length of a cold can be explained by a linear relationship with the amount of time taking the supplement.

d: A residual plot with random scatter confirms the relationship is linear. It is negative with a slope of -1.581 , so an increase in one month of supplements is expected to decrease the length of a cold by 1.581 days. The association is strong: 90.7% of the variability in the length of a cold can be explained by a linear relationship with the amount of time taking the supplement. There are no apparent outliers.

4-99. **a:** With a car readily available, these teens might simply be driving more, and the extra time on the road is causing them to be in more crashes.

b: Families that can afford the considerable expense of bottled water can also afford better nutrition and better healthcare.

4-100. **a:** incorrect, x^{100}

b: correct

c: incorrect, $8m^6n^{45}$

4-101. $y = -\frac{4}{3}x + 12$

4-102. Answers vary, but the answer should have the same number of x -terms on both sides of the equation, and the constant terms on each side should not be equal.

4-103. **a:** 1

b: 3

c: 2

Lesson 5.1.1 (Day 1)

5-6. **a:**

Months	Rabbits
0	4
1	12
2	36
3	108
4	324

b:

Months	Rabbits
0	6
1	12
2	24
3	48
4	96

- 5-7.** **a:** Sample answers: $(3, 0)$ and $(3, 1)$; All points on this line have an x -coordinate of 3.
 $x = 3$

b: $y = -1$

c: $x = 0$

- 5-8.** $x = 1$; It will create a fraction with a denominator of zero, which is undefined.

- 5-9.** 7 pounds 4 ounces

- 5-10.** **a:** It is a reflection across the y -axis. $A'(-1, 1), B'(1, -1), C'(-4, -1)$

b: $A''(4, 5), B''(2, 3), C''(7, 3)$

- 5-11.** **a:** Many nighttime jobs involve working in bars, casinos, or restaurants where smoking is prevalent. Night employment is generally considered less desirable, so people who work at night may have less money and therefore less access to medical care.

b: This might be connected to gender. Men as a group eat more meat and do not live as long as women. Also, if the meat is highly processed like hotdogs, it might be the additives that are harmful and not the meat itself.

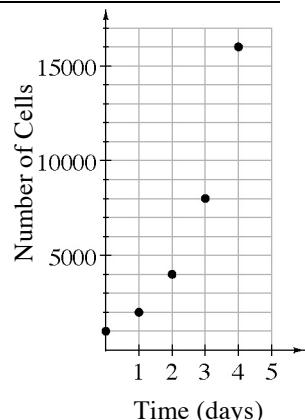
Lesson 5.1.1 (Day 2)

5-12. **a:** curved

b: See table and graph at right.

c: The graph is curved; the y -intercept is 1000; there is no x -intercept; the function is increasing from left to right; negative x -values and negative y -values are not possible.

Time (days)	Number of cells
0	1000
1	2000
2	4000
3	8000
4	16,000



5-13. **a:** $5^2 = 25$

b: 3^{51}

c: 1

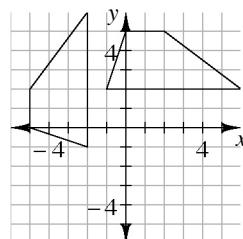
d: 1.6×10^{11}

5-14. Jackie squared the binomials incorrectly. It should be: $x^2 + 8x + 16 - 2x - 5 = x^2 - 2x + 1$, $6x + 11 = -2x + 1$, $8x = -10$, and $x = -1.25$.

5-15. **a:** $y = -2x + 7$

b: $y = -\frac{3}{2}x + 6$

c: $y = \frac{2}{3}x - \frac{8}{3}$

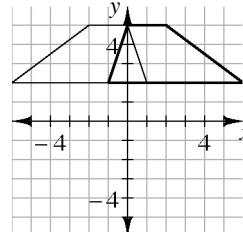


5-16. See graph at right.

a: See graph above right. $A'(-2, -1)$, $B'(-5, 0)$, $C'(-5, 2)$, $D'(-2, 6)$

b: See graph at right. $A''(1, 2)$ and $C''(-2, 5)$

c: 13.5 square units



5-17. -14

Lesson 5.1.2

5-22. **a:** $x = -1$ **b:** $x = 8$

5-23. **a:** $y = -\frac{4}{3}x$ **b:** Yes; $(-3, 4)$ is a solution to the equation from part (a).

5-24. **a:** $R^2 = 0.815$; 81.5% of the variability in fuel efficiency can be explained by a linear relationship with weight.

b: The negative slope means there is a negative association. An increase of 1000 pounds in weight is expected to decrease the fuel efficiency by 8.4 miles per gallon.

5-25. **a:** $5 + 0.25x = 2 + 0.35x$ **b:** 30 ounces

5-26. **a:** $24 \div 1 = 24$ minutes; $24 \div 2 = 12$ minutes

b:	Speed (blocks per minute)	1	2	3	4	6	8	10	12	24
	Time to Get to Friend's House (minutes)	24	12	8	6	4	3	2.4	2	1

c: The time decreases.

d: No. The table and resulting graph do not go through $(0, 0)$. If Meredith's speed is 0 blocks per minute, then it does *not* take 0 minutes to get to her friend's house. Furthermore, doubling (or tripling) the speed does not double (or triple) the time.

5-27. No; $(12, 108)$ is not a solution to the equation.

Lesson 5.1.3

5-35. **a:** Answers vary but should be close to 0.83.

b: Approximately 228 cm. Since DeShawna measured to the nearest centimeter, a prediction rounded to the nearest centimeter is reasonable.

c: 72 cm

d: 166 meters

e: 138 meters; 114 meters

5-36. **a:** $10(0.555) = 5.55$ feet

b: $10(0.555)(0.555) \approx 3.08$ feet

c: $10(0.555)^5 \approx 0.527$ feet

5-37. $f(x) = 3x - 5$

5-38. **a:** College admission rates and student anxiety have a plausible negative association.

However, admission rates could be plunging because the average number of universities a typical student applies to has increased dramatically with the widespread use of online college applications. It is more likely that student anxiety and the ease of online applications is fueling lower university admission rates. The total number of students attending college may actually be the same or even be increasing.

b: For a small part of the population, those with celiac disease, gluten is a serious health problem. Those people aside, it is possible there is a link between gluten and obesity. Gluten is found in many grains. Grains are used to make many highly processed food products that are loaded with sugar and fats. Perhaps it is the sugar and fats in these foods causing obesity rather than the gluten.

5-39. **a:** $x = 34$

b: $x = 20$

5-40. **a:** an isosceles triangle

b: a rectangle

Lesson 5.2.1

- 5-45.** **a:** One possible answer is that their growth grows linearly.
b: Answers vary. Sample: The sequence of differences between terms turns out to be almost the same as the sequence itself. Or, add the two previous terms to get the next term.
- 5-46.** **a:** Exponential, because the ratio of one rebound to the next is roughly constant (≈ 0.6).
b: 475, 290, 175, 100, 60; Roughly geometric, because it has a multiplier (though students may say it is neither because the multiplier is not exact).
- 5-47.** 2.1×10^9 pencils
- 5-48.** **a:** -3 **b:** $y = -3x - 5$
- 5-49.** 43 ounces
- 5-50.** $\frac{1}{2}bh = \frac{1}{2}(200)(270) = 27,000$ square units
- 5-51.** **a:** 500 liters **b:** 31.25 liters
- 5-52.** **a:** $1.03y$ **b:** $0.8z$ **c:** $1.002x$
- 5-53.** $y = -10x + 170$
- 5-54.** **a:** The output for the input that is 4 less than c .
b: The output for the input that is half of b .
c: 12 more than the output when the input is d .
- 5-55.** **a:** $20 - 4x = 29 - 7x$; 3 hours **b:** 8 lily pads
- 5-56.** **a:** $G + D + C + E + S$ or $B + L + F$
b: either $\frac{L}{G+D+C+E+S}$ or $\frac{L}{B+L+F}$
c: either $\frac{D+E}{G+D+C+E+S}$ or $\frac{D+E}{B+L+F}$

Lesson 5.2.2

5-66. **a:** Yes, the 90th term or $t(90) = 447$.

b: no

c: Yes, the 152nd term or $t(152) = 447$.

d: no

e: No, $n = -64$ is not in the domain of a sequence.

5-67. Justifications vary.

5-68. **a:** 3 , $t(n) = 3n + 1$

b: 5 , $t(n) = 5n - 2$

c: -5 , $t(n) = -5n + 29$

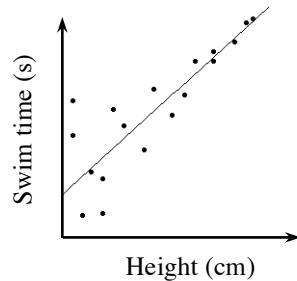
d: 2.5 , $t(n) = 2.5n + 4.5$

5-69. **a:** Descriptions vary, but students may say they are multiplying by 1.1 or growing by 10% each year.

b: \$88.58

5-70. **a:** Sample solution at right. The y -intercept and slope could vary—the slope might even be negative—but the x -coordinates and the position of the points relative to each other are precise.

b: The model made predictions that were closer to the actual values for taller swimmers.



5-71. 88 feet

Lesson 5.2.3

5-77. **a:** $-3.5, 1, 5.5, 10$

b: Evaluate the equation for $n = 15$.

c: $t(n + 1) = t(n) + 4.5; t(1) = -3.5$

5-78. $t(n) = 3n + 2; t(n + 1) = t(n + 3); t(1) = 5$

5-79. **a:** $16x^2 - 25$ **b:** $16x^2 + 40x + 25$

5-80. **a:** $144, 156, 168, 180$

b: 264 stamps

c: $t(n) = 12n + 120$

d: $n = 31.67$; She will not be able to fill her book exactly, because 500 is not a multiple of 12 more than 120. The book will be filled after 32 months.

5-81. There is a weak, negative, linear association: as dietary fiber is increased, blood cholesterol drops. 20.25% of the variability in blood cholesterol can be explained by a linear association with dietary fiber.

5-82. **a:** $10,000 + 1500m = 18,000 + 1300m$ **b:** $m = 40$ months

Lesson 5.3.1

5-86. **a:** geometric, multiply by 12

c: other (quadratic)

b: arithmetic, add 5

d: geometric, multiply by 1.5

5-87. **a:** $-3, 6, -12, 24, -48$

c: $2, \frac{1}{2}, 2, \frac{1}{2}, 2$

b: $8, 3, -2, -7, -12$

5-88. $4x - 5^\circ = 2x + 9^\circ; x = 7^\circ$

5-89. 7 cm

5-90. **a:** $8m^5$

b: $2y^3$

c: $\frac{-2}{3y^5}$

d: $-8x^6$

5-91. **a:** $y = 2x - 3$

b: $y = -3x - 1$

c: $y = \frac{2}{3}x - 2$

d: $y \approx \frac{5}{2}x + 9$

Lesson 5.3.2 (Day 1)

5-102. **a:** 1.03

b: 0.75

c: 0.87

d: 1.0208

5-103. **a:** #1 is arithmetic, #2 is neither, #3 is geometric

b: #1 the generator is to add -3 , #3 the generator is to multiply by $\frac{1}{2}$

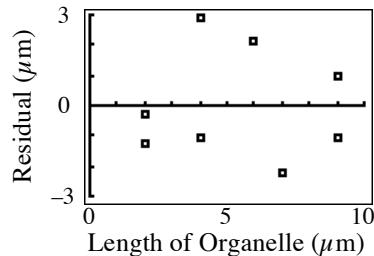
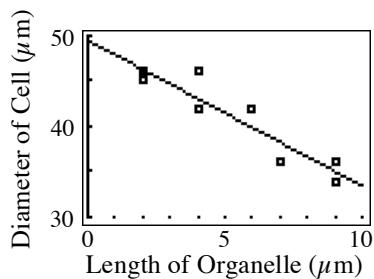
5-104. $y = -\frac{1}{3}x + 2$

5-105. **a:** $x = 2$

b: undo, then look inside; $x = 25$

5-106. **a:** Create a scatterplot; compute and draw the LSRL; verify linearity with a residual plot; describe form, direction (including the slope and y-intercept in context), strength (including an interpretation of r and R^2), and possible outliers; draw upper and lower bounds to the model used for prediction.

b: See graphs below. $y = 49.50 - 1.60x$. The linear model is appropriate because the residual plot shows no apparent pattern. The slope is -1.60 , meaning that an increase of $1 \mu\text{m}$ in the length of the organelle is expected to decrease the diameter of the cell by $1.60 \mu\text{m}$. The y-intercept of 49.50 means that a cell with no organelle has a length of $49.50 \mu\text{m}$; this is possible even though it is an extrapolation. The correlation coefficient is $r = -0.928$ and $R^2 = 86.1\%$, so 86.1% of the variability in the diameter of the overall cell can be explained by a linear relationship with the diameter of the organelle. There are no apparent outliers. The upper bound can be given by $y = 52.42 - 1.60x$, and the lower bound by $y = 46.58 - 1.60x$.



5-107. Technically, Mathias can never leave, either because he will never reach the door or because he cannot avoid breaking the rules. The equation for this situation is $y = 100(0.5)^x$, where x is the number of minutes that have passed and y is the distance (meters) from the door.

Lesson 5.3.2 (Day 2)

5-108. 112.5 minutes or 1 hour 52 minutes, $5\frac{1}{3}$ miles per hour

5-109. a: Sequence 1: 10, 14, 18, 22, add 4, $t(n) = 4n - 2$; Sequence 2: 0, -12, -24, -36, subtract 12, $t(n) = -12n + 36$; Sequence 3: 9, 13, 17, 21, add 4, $t(n) = 4n - 3$

b: Yes, Sequence 1: 18, 54, 162, 486, multiply by 3, $t(n) = \frac{2}{3}(3)^n$; Sequence 2: 6, 3, 1.5, 0.75, multiply by $\frac{1}{2}$, $t(n) = 48(\frac{1}{2})^n$; Sequence 3: 25, 125, 625, 3125, multiply by 5, $t(n) = \frac{1}{5}(5)^n$

c: Answers vary, but the point is to have students create their own equation and write terms that correspond to it.

5-110. a: $x = -\frac{16}{5}$

b: no solution

c: $x = 2$

d: $x = -1$

5-111. $y = \frac{2}{3}x - 3$

5-112. a: -1

b: 2

c: undefined

d: -1.8

5-113. a: $7^2 = 49$ sq cm

b: $0.5(10)4 = 20$ sq in

c: $0.5(16 + 8)6 = 72$ sq ft

Lesson 5.3.3

5-120. a: all numbers

b: 1, 2, 3, 4, ...

c: $x \neq 0$

d: 1, 2, 3, 4, ...

5-121. a: No; the 5th term is 160, and the 6th term is 320. Justifications vary.

b: Yes, $x \approx 5.322$.

5-122. a: $a_4 = a_3 + 6 = 23$

b: $a_5 = a_4 + 6 = 29$

c: 5, 11, 17, 23, 29

5-123. a: The total number of batters that Kasmir faced.

b: The average number of strikeouts per inning pitched by Kasmir.

c: The total number of innings played by the Coopersville Mad Hens.

d: The fraction of the total innings played that were pitched by Kasmir.

e: The average number of pitches per inning for Kasmir.

5-124. $775 - x$ meters

5-125. $y = 3x$

Lesson 6.1.1

6-7. **a:** $x = 6 + \frac{2}{3}y$

b: $y = \frac{3}{2}x - 9$

c: $r = \frac{C}{2\pi}$

6-8. **a:** $6(13x - 21) = 78x - 126$

b: $(x + 3)(x - 5) = x^2 - 2x - 15$

c: $4(4x^2 - 6x + 1) = 16x^2 - 24x + 4$

d: $(3x - 2)(x + 4) = 3x^2 + 10x - 8$

- 6-9.** There is a moderately strong negative association, meaning that the more a student watches TV, the lower his/her grade point average is predicted to be. 52% of the variability in GPAs can be explained by a linear relationship with number of hours spent watching TV. However, we are careful not to imply a cause. Watching less TV will not necessarily cause a rise in GPA.

6-10. **a:** arithmetic

b: $t(n) = 4n + 3$

c: No, $n = 26.5$.

6-11. Yes; both points makes the equation true.

6-12. If x = the width, $2(x) + 2(3x - 1) = 30$, width is 4 inches, length is 11 inches.

Lesson 6.1.2

6-15. **a:** $y = -2x + \frac{1}{2}$

b: $y = 4x - \frac{7}{3}$

6-16. **a:** $a = 0$

b: $m = -2$

c: $x = 10$

d: $t = 2$

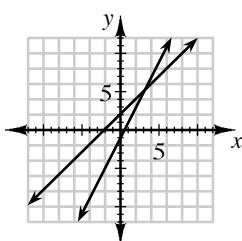
6-17. They will be the same after 20 years, when both are \$1800.

6-18. **a:** -43 **b:** 58.32

6-19. **a:** $(-1, 9)$

b: Possible response: Reflect over the x -axis and then rotate clockwise (or counterclockwise) 180° around the origin.

6-20. $(3, 5)$



Lesson 6.1.3

6-25. **a:** In 7 weeks.

b: George will score more with 1170 points, while Sally will have 970.

6-26. **a:** no solution

b: $x = 13$

6-27. $(-1, 3)$

6-28. From an earlier lesson, association does not mean that one variable caused the other. One possible lurking variable is per capita wealth: wealthier nations may tend to have more TVs and also better health care.

6-29. **a:** $17, 14, 11, \dots; a_n = 20 - 3n$

b: $20, 10, 5, \dots; a_n = 40(\frac{1}{2})^n$

6-30. **a:** $x = 3$

b: $x = 1$

Lesson 6.1.4

6-38. **a:** The units of measurement, centimeters. Side #2 = x , Side #3 = $2x - 1$

b: $x + x + (2x - 1) = 31$

c: $x = 8$, so Side #1 = Side #2 = 8 cm and Side #3 = $2 \cdot 8 - 1 = 15$ cm.

6-39. 1,600,000 miles per day; $66,666\bar{6}$ miles per hour

6-40. She combined terms from opposite sides of the equation. Instead, line 4 should read $2x = 14$, so $x = 7$ is the solution.

6-41. **a:** geometric

b: $5^5 = 3125$

c: $a_n = 5^n$

6-42. C

6-43. $AC^2 = 3^2 + 7^2 = 58$, $AC = \sqrt{58} \approx 7.62$. The length of \overline{AC} is rounded up to 8 because the original measurements were whole numbers.

Lesson 6.2.1

6-49. **a:** $a + c = 150$

b: $14.95c + 39.99v = 84.84$

6-50. $3 - m$ miles

6-51. **a:** $x = \frac{y+5}{2}$

b: $w = \frac{p-9}{-a}$

c: $m = \frac{(4n+10)}{2} = 2n + 5$

d: $y = -bx$

6-52. Lakeisha, Samantha, Carly, Barbara, and Kendra

6-53. 5 years

6-54. **a:** $-3, -1, 1, 3, 5$

b: $3, -6, 12, -24, 48$

Lesson 6.2.2

6-61. **a:** ii

b: 4 touchdowns and 9 field goals

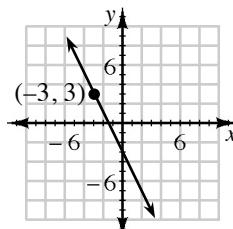
6-62. **a:** See answers in bold in table and line on graph.

b: Yes; $(-3, 3)$ and $(-2, 1)$ both make this equation true.

6-63. **a:** geometric

b: curved

c: $t(n) = \frac{2}{5}(5)^n$



x	y
-3	3
-2	1
-1	-1
0	-3
1	-5
2	-7
3	-9

6-64. Katy is correct; the $6x - 1$ should be substituted for y because they are equal.

6-65. **a:** $\frac{1}{8}$

b: b^4

c: 9.66×10^{-1}

d: 1.225×10^7

6-66. **a:** Calculate the output for the input that is 6 times w .

b: Calculate the output for the input that is 2 less than h .

c: 10 more than 4 times the output of f when the input is a .

Lesson 6.2.3

6-73. From the graph, $x \approx 3.7$ and $y \approx 6.3$, when students look at the table of values they can justify that since $f(3) = 5.5$ and $g(3) = 4.95$ and then $f(4) = 6.6$ and $g(4) = 6.85$ that the two functions must have the same value between $x = 3$ and $x = 4$ and that value must be between 5.5 and 6.6.

6-74. **a:** $h = 2c - 3$ **b:** $3h + 1.5c = 201$ **c:** 28 corndogs were sold

6-75. Yes; adding equal values to both sides of an equality preserves the equality.

6-76. **a:** $x = 2.2$ **b:** $x = 6$ **c:** $x = -10.5$ **d:** $x = 0$

6-77. $a_n = t(n) = 32\left(\frac{1}{2}\right)^n$

6-78. **a:** $y = -3x + 7$ **b:** $y = -x - \frac{2}{5}$

Lesson 6.3.1

6-84. **a:** $(5, 3)$ **b:** $(2, -6)$

6-85. **a:** You end up with $10 = 10$. Some students may conclude that it is all real numbers or infinite solutions.

b: The two lines are the same.

c: Since the equations represent the same line when graphed, any coordinate pair (x, y) will solve both equations.

6-86. **a:** Let p represent the number of pizza slices and b represent the number of burritos sold. Then $2.50p + 3b = 358$ and $p = 2b - 20$.

b: 82 pizza slices were sold.

6-87. **a:** 1.05

b: $20(1.05)^5 = \$25.52$

c: $t(n) = 20(1.05)^n$; 20 represents the current (initial) cost and 1.05 represents the percent increase.

6-88. **a:** $\frac{90 \text{ mi}}{1.5 \text{ h}} = \frac{330 \text{ mi}}{x}$; $x = 5.5$ hours

b: $90 = 1.5r$, $r = 60$ mph, $330 = 60t$, $t = 5.5$ hours

c: yes

6-89. **a:** $\frac{8}{25}$ **b:** xy^6 **c:** 1.2×10^9 **d:** 8×10^3

Lesson 6.3.2

6-95. **a:** $(3, 1)$

b: $(0, 4)$

c: $(10, 2)$

d: $(-4, 5)$

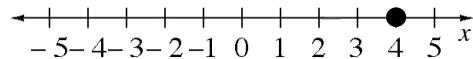
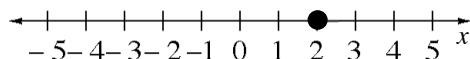
- 6-96.** They are both correct. The equations represent the same line, and so both coordinate pairs are solutions to both equations.

6-97. 3 hours

6-98. $a_n = t(n) = 4 \cdot 3^n$

6-99. **a:** $x = 2$

b: $x = 4$



6-100. a: $b = y - mx$

b: $x = \frac{y-b}{m}$

c: $t = \frac{I}{pr}$

d: $t = \frac{A-p}{pr}$

Lesson 6.3.3

6-106. a: $6x^2 - x - 2$

b: $6x^3 - x^2 - 12x - 5$

6-107. a: $(-5, 1)$

b: $(3, 1)$

c: no solution

- 6-108. a:** not a function, D: $-3 \leq x \leq 3$, and R: $-3 \leq y \leq 3$

b: a function, D: $-2 \leq x \leq 3$, and R: $-2 \leq y \leq 2$

- 6-109.** $r \approx 0$; Answers will vary for LSRL, but the average number of pairs appears to be about 3.8, which is an LSRL of $y = 3.8$.

6-110. a: $3x - 18^\circ = 74^\circ$; $x = 30.67^\circ$

b: $3x - 9^\circ = x + 25^\circ$; $x = 17^\circ$; $m\angle 2 = 3(17^\circ) - 9^\circ = 42^\circ$

6-111. a: $m = -12$

b: $x = -24$

c: $x = \frac{16}{5}$

Lesson 6.4.1

6-116. **a:** $(0, \frac{1}{3})$

b: $(-6, 2)$

c: no solution

d: $(11, -5)$

6-117. $2n = p$ and $n + p = 168$; 56 nectarines are needed.

6-118. **a:** Yes, because these expressions are equal.

b: $5(3y) + y = 32$, $y = 2$, $x = 3.5$

6-119. $a_n = t(n) = 6n - 2$

6-120. $y = -\frac{3}{2}x + 6$

6-121. **a:** $2x^2 + 6x$

b: $3x^2 - 7x - 6$

c: $y = 3$

d: $x = 2$

Lesson 6.4.2 (Day 1)

6-134. **a:** infinitely many solutions

b: $(\frac{1}{3}, -\frac{3}{2})$

c: $(1, 2)$

d: $(8, 7)$

6-135. **a:** It is a line. It can be written in $y = mx + b$ form.

b: Answers will vary. Possible solutions: $(0, 2), (1, 5), (2, 8), \dots$

c: $y = 3x + 2$; Yes, because the points are the same.

6-136. **a:** $p: y = 2x + 8$; $q: y = -\frac{1}{2}x + 3$

b: Yes, because $(-2, 4)$ is the point of intersection.

c: The slopes indicate that the lines are perpendicular.

d: $(-2, 4)$

6-137. **a:** $5, -10, 20, -40, 80$

b: $a_n = -\frac{5}{2}(-2)^n$

6-138. **a:** $x^2 + 9x + 20$

b: $2y^2 + 6y$

6-139. **a:** $M'(-3, 3), J'(-1, 1), N'(-1, 6)$

b: $M''(3, 3), J''(1, 1), N''(1, 6)$

c: 5 square units

Lesson 6.4.2 (Day 2)

6-140. $n + d = 30$ and $0.05n + 0.10d = 2.60$, so $n = 8$. There are 8 nickels.

6-141. C

6-142. **a:** no solution **b:** $x = 5$, $y = 2$

6-143. **a:** $x = -5$ **b:** $y = 2x - 3$ **c:** no solution **d:** $y = -3x + 5$

6-144. **a:** 0.85 **b:** $1500(0.85)^4 \approx \$783$

c: $a_n = 1500(0.85)^n$; 1500 represents the current (initial) cost.
0.85 represents a 15% decrease.

6-145. Let s = number of slices on an extra-large pizza; $4s + 3 = 51$.
An extra-large pizza has 12 slices.

Lesson 7.1.1

7-6. Answers vary. One triangle may be obtained from the other by reflection of $\triangle UVW$ over line UV , followed by a translation of V' to Z , and then a rotation about V'' so that the sides coincide. A possible congruence statement is $\triangle UVW \cong \triangle XZY$.

7-7. Yes, the triangles are congruent. By the Pythagorean Theorem, the three side lengths are equivalent, and by the Triangle Angle Sum Theorem, the three angle measures are equivalent. The left triangle may be mapped onto the right triangle with a translation and a rotation.

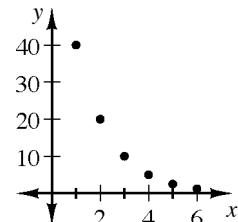
7-8. **a:** $\frac{5}{2}$ or 2.5 **b:** $x = 17.5$ mm, because $7 \cdot \frac{5}{2} = 17.5$.

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

7-10. **a:** It can be geometric, because if each term is multiplied by $\frac{1}{2}$, the next term is generated.

b: See graph at right.

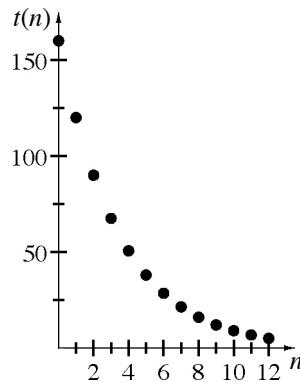
c: No, because the half of a positive number is still positive.



7-11. **a:** (4, 12) **b:** infinitely many solutions

Lesson 7.1.2 (Day 1)

- 7-19.** Scale factor is $\frac{2}{3} \approx 0.67$. $x = 9$ ft, $y = 8$ ft, $z = 3.8$ ft
- 7-20.** Answers vary; a possible congruence statement is $\Delta HAN \cong \Delta JOE$. Reflection across \overleftrightarrow{AN} and translation of A' to O (possibly followed by a rotation) maps ΔHAN to ΔJOE .
- 7-21.** The lines are parallel, so they do not intersect. Therefore, there is no solution.
- 7-22.** **a:** $A'(-2, -7), B'(-5, -8), C'(-3, -1)$
b: $A''(2, 7), B''(5, 8), C''(3, 1)$
c: Reflection across the y-axis.
- 7-23.** If Nina has n nickels, then $5n + 9 + 5(2n) = 84$, and $n = 5$ nickels.
- 7-24.** **a:** $x = 0, 1, 2$ and $y = -2, 0, 1$ **b:** $-1 \leq x \leq 1$ and $-1 \leq y \leq 2$
c: $x \leq 2$ and $y \geq -2$ **d:** D: all real numbers and $y \geq -1$
- 7-25.** They are not congruent. Although by the Triangle Angle Sum Theorem all the corresponding angles are congruent, the 44-cm sides are not corresponding sides.
- 7-26.** No. AAA is not a congruence condition.
- 7-27.** **a:** no solution **b:** $(7, 2)$ **c:** $(-1, -2)$ **d:** $(3, 1)$
- 7-28.** **a:** 90 cm **b:** 37.97 cm **c:** $t(n) = 160(0.75)^n$
- 7-29.** See graph at right.
- 7-30.** $d = 55t$ and $(325 - d) = 70t$ or $325 = 55t + 70t$, where d = distance Esther traveled (miles) and t = time Esther traveled (hours). 2 hours 36 minutes



Lesson 7.1.3

7-36. **a:** They are congruent by ASA \cong or AAS \cong .

b: $DF = 20$ feet

7-37. $\frac{x}{8} = \frac{8}{18}$, $x = \frac{32}{9} = 3\frac{5}{9}$

7-38. **a:** no solution

b: $b = -3, c = -8$

7-39. **a:** 6.6×10^7

b: $-27x^6y^6$

c: $12xy - 3x + 16y - 4$

d: $x^2 - 4x + 6$

7-40. **a:** On average student backpacks get 0.55 pounds lighter with each quarter of high school completed.

b: About 44% of the variability in student backpack weight can be explained by a linear relationship with the number of quarters of high school completed.

c: The “largest” residual value is about 6.2 pounds and it belongs to the student who has completed 3 quarters of high school.

d: $13.84 - 0.55(10) = 8.34$ lbs

e: A different model would be better because it looks like there is a curved pattern in the residual plot.

7-41. $\frac{x}{20} = \frac{x+2}{24}; x = 10$

Lesson 7.1.4

7-46. **a:** ΔADC ; AAS \cong ; Reflection across \overleftrightarrow{AC} .

b: not enough information

c: ΔTZY ; AAS \cong or ASA \cong ; Rotate 180° about point Y .

7-47. **a:** The 90° angle is reflected, so $m\angle XZY = 90^\circ$. Then $m\angle YZY' = 180^\circ$.

b: They must be congruent, because rigid transformations (such as reflection) preserve angles measures and side lengths.

c: $\overline{XY} \cong \overline{XY'}$, $\overline{XZ} \cong \overline{XZ'}$, $\overline{YZ} \cong \overline{Y'Z}$, $\angle Y \cong \angle Y'$, $\angle YXZ \cong \angle Y'XZ$, and $\angle YZX \cong \angle Y'ZX$

7-48. **a:** $a_1 = 108$, $a_{n+1} = a_n + 12$

b: $a_1 = \frac{2}{5}$, $a_{n+1} = 2a_n$

c: $t(n) = 3780 - 39n$

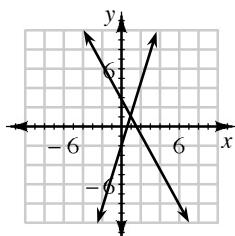
d: $t(n) = 585(0.2)^n$

7-49. **a:** 15°

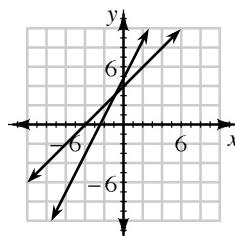
b: $x = 12^\circ$; $m\angle D = 4(12^\circ) + 2^\circ = 50^\circ$

c: It is equilateral.

7-50. **a:** $(1, 1)$



b: $(-1, 3)$



7-51. D

Lesson 7.1.5

7-59. a: ΔCED ; ASA \cong

b: ΔEFG ; AAS \cong

c: Not necessarily \cong , the congruent sides are not corresponding.

d: Not necessarily \cong , AAA is not a congruence condition.

7-60. a: $(-1, -7)$

b: $(\frac{1}{2}, 2)$

7-61. 0.87

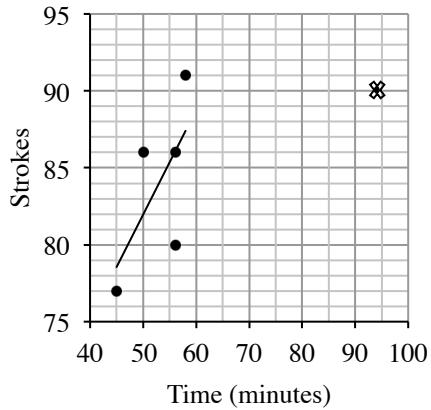
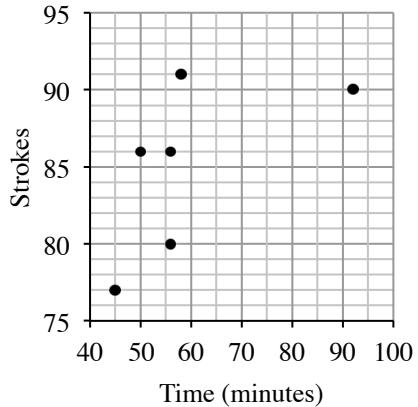
7-62. a: See scatterplot at right. Best score is 45 minutes + 77 strokes = 122 points.

b: There is a weak to moderate positive linear association between Diego's run time and the strokes taken for each match. There looks to be an outlier at 92 minutes.

c: See graph below right.

d: $m \approx 0.7$; Every minute of increase in time is predicted to increase the number of strokes by about 0.7.

e: The variables are moderately associated, but that does not mean that one variable causes the other. It does seem reasonable that training for conditioning could improve Diego's aim and confidence in his golf swing, however the potential exists that a better more accurate swing could also reduce the amount of running required on the course. It is not clear what causes what, or if there is a third, lurking, variable.



7-63. a: $W = \frac{V}{LH}$

b: $x = 2(y - 3)$

c: $R = \frac{E}{I}$

d: $y = \frac{1}{3-2x}$

7-64. $d = (8 + 2)(t - 1)$ and $d = (8 - 2)t$, where d = one-way distance of trip (miles) and t = time to travel upstream (hours); 30 total miles.

Lesson 7.1.6

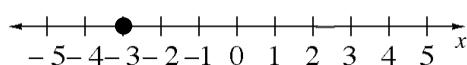
7-68. **a:** The triangles are congruent by SSS \cong .

b: Not enough information is provided.

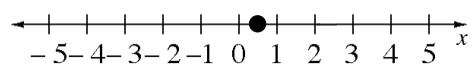
c: Not enough information is provided.

d: The triangles are congruent by AAS \cong or ASA \cong .

7-69. **a:** $x = -3$



b: $x = \frac{1}{2}$



7-70. (2, -4)

7-71. **a:** 6

b: 3

c: -6.5

7-72. These triangles are not congruent. Corresponding sides \overline{AT} and \overline{GI} are not congruent.

7-73. **a:** $120,000 = 16,000M + 14,500J$

b: $\frac{\$650}{2200} \cdot 16,000M + \frac{\$700}{2200} \cdot 14,500J = \$1,070,000$ or
 $\$4727.27M + \$4613.64J = \$1,070,000$

Lesson 7.1.7

- 7-78.** Possible responses include:

Right triangle: right angle, Pythagorean Theorem for side lengths;
Equilateral Triangle: all sides and angles same measure;
Rectangle: all right angles, opposite sides equal;
Parallelogram: opposite sides parallel and equal, opposite angles equal;
Kite: adjacent sides equal;
Trapezoid: one pair of parallel lines;
Square: all right angles, all sides equal;
Rhombus: all sides equal, opposite angles equal.

- 7-79.** Yes, the triangles are congruent by SAS \cong . The left triangle may be mapped onto the right triangle with a translation up and to the right.

- 7-80. a:** 10 units

b: $(-1, 4)$

c: 5 units; it must be half of AB because C is the midpoint of \overline{AB} .

- 7-81. a:** The two equations should have the same slope and y -intercept.

b: When solving a system of equations that has an infinite number of solutions, the equations combine to create an equality, that is always true as $3 = 3$. This is the result when the two lines coincide, creating infinite points of intersection.

- 7-82.** Let x = number of months; $2x + 75 = -3x + 130$; 11 months; Yes it does.

- 7-83. a:** There is a strong positive linear association between the high temperatures on consecutive days in Mitchell's area. The random scatter in the residual plot confirms the appropriateness of using a linear model. An increase of one degree on any day is expected to increase the temperature the following day by 0.85°F . 86% of the variation in tomorrow's high temperature is explained by a linear relationship with today's high temperature. There are no apparent outliers.

b: The largest residual value is about 17°F and it belongs to the day after the 69.8°F day.

c: $13.17 + 0.85(55) = 60.0^{\circ}\text{F}$

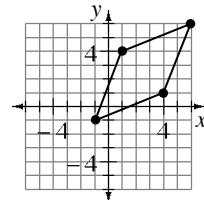
d: The upper bound is given by $y = 30.17 + 0.85x$, and the lower bound is given by $y = -3.83 + 0.85x$. Mitchell predicts tomorrow's temperature will fall between 42.9°F and 76.9°F . Despite the strong relationship between the variables, Mitchell's model is not very useful.

Lesson 7.2.1

7-87. **a:** Yes, each side has the same length ($\sqrt{29}$ units). See graph at right.

b: \overline{BD} is $y = x$; \overline{AC} is $y = 5 - x$

c: The slopes are 1 and -1 . Therefore the diagonals are perpendicular.



7-88. **a:** $(4.5, 3)$ **b:** $(-3, 1.5)$ **c:** $(1.5, -2)$

7-89. **a:** $y = \frac{1}{3}x + 15$

b: No, the coordinates are not solutions to the equation of the line.

7-90. **a:** $x = 8$ **b:** $x = 4$

7-91. **a:** not necessarily congruent **b:** congruent (ASA \cong or AAS \cong)

c: congruent (HL \cong or SSS \cong) **d:** not necessarily congruent

7-92. **a:** The two equations should have the same slope but a different y -intercept. This forces the lines to be parallel and not intersect.

b: When solving a system of equations that has no solution, the equations combine to create an impossible equality, such as $3 = 0$. However, if students claim that “ x and y disappear” when combining the two equations, you may want to point out that another special case occurs when the resulting equality is always true, such as $2 = 2$. This is the result when the two lines coincide, creating infinite points of intersection.

Lesson 7.2.2

7-99. **a:** $E(1, 3)$ and $F(7, 3)$; $AB = 9$, $DC = 3$, $EF = 6$; EF seems to be the average of AB and CD .

b: $EF = 4$, while $AB = 6$, and $CD = 2$

c: Sample response: The midsegment of a trapezoid is parallel to the bases and has a length that is the average of the lengths of the bases.

7-100. It is a parallelogram; the slopes of the pairs of opposite sides are 2 and 0.

7-101. (2, 5)

7-102. $5b + 3h = 339$, $b = h + 15$; 48 bouquets and 33 hearts

7-103. **a:** arithmetic, $t(n) = 3n - 2$

b: neither

c: geometric, $r = 2$

d: arithmetic, $t(n) = 7n - 2$

e: arithmetic, $t(n) = n + (x - 1)$

f: geometric, $r = 4$

7-104. Write all equations in $y = mx + b$ form and compare the slopes. (a) and (d) are parallel, (b) and (c) are perpendicular.

Lesson 7.2.3

7-106. **a:** (8, 8) **b:** (6.5, 6)

7-107. **a:** AAA; Not necessarily congruent.

b: Congruent by SSS \cong .

c: $\Delta FED \cong \Delta BUG$ by HL \cong or SSS \cong .

7-108. **a:** X **b:** Y and Z

7-109. **a:** It is a right triangle because the slopes of \overline{AB} and \overline{AC} ($\frac{3}{4}$ and $-\frac{4}{3}$, respectively) are opposite reciprocals.

b: B' is at $(-2, 0)$. It is an isosceles triangle because $\angle B'AB$ must be a straight angle (since it is composed of two adjacent right angles) and because $\overline{BC} \cong \overline{B'C}$ (since reflections preserve length).

7-110. Let $b = \#$ boys, $g = \#$ girls. $5b + 3g = 175$, $b + g = 45$. 25 girls came to the dance.

7-111. **a:** $p = 3.97v + 109.61$, where p is power (watts) and v is VO_2max (ml/kg/min).

b: 280 watts. The measurements are rounded to the nearest whole number.

c: $293 - 280 = 13$ watts

d: $r = 0.51$; The linear association is positive and weak.

e: There is a weak positive linear association between power and VO_2max , with no apparent outliers. An increase of one ml/kg/min in VO_2max is predicted to increase power by 3.97 watts. 26.7% of the variability in the power can be explained by a linear relationship with VO_2max .

Lesson 8.1.1 (Day 1)

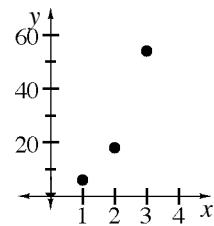
8-7. **a:** 1.25 **b:** 0.82 **c:** 1.39 **d:** 0.06

8-8. **a:** 6, 18, 54

b: See graph shown above right. domain: positive integers

c: See graph shown below right.

d: They have the same shape, but (b) is discrete and (c) is continuous and they have different domains.

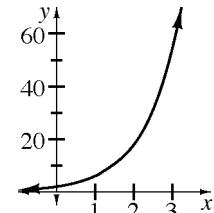


8-9. **a:** $x = \frac{y-2}{3}$

b: $b = ac$

c: $x = \frac{2y}{3} + 14$

d: $t^2 = \frac{2g}{a}$



8-10. **a:** It is a square. Students should demonstrate that each side is the same length and that two adjacent sides are perpendicular (slopes are opposite reciprocals).

b: C' is at $(-5, -8)$ and D'' is at $(-7, 4)$.

c: $P = 4\sqrt{20} = 8\sqrt{5} \approx 17.889$ units, $A = 20$ sq. units

8-11. **a:** ΔSQR ; HL \cong

b: ΔGFE ; ASA \cong

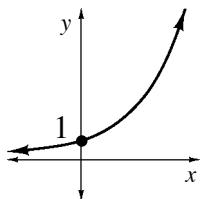
c: ΔDEF ; SSS \cong

8-12. $m = 13, b = 17$

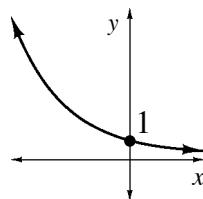
8-13. If t represents time traveled (in hours) and r represents the rate of the freight train, $49.5 = rt$ and $61.5 = (r + 16)(t)$; $t = 0.75$ hours, so, the time is 4:10 p.m.

Lesson 8.1.1 (Day 2)

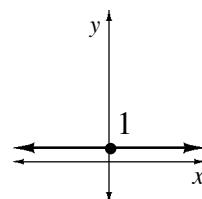
8-14. a:



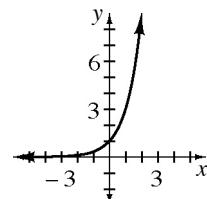
b:



c:



- 8-15. See graph at right. The graph is a curve with a y -intercept at $(0, 1)$. There are no x -intercepts. The function is continuous and increasing. The domain is all real numbers. The range is $y > 0$. There is an asymptote at $y = 0$.



- 8-16. a: There is a strong negative linear association between the pressure and volume of these three gasses. There are no apparent outliers. The residual plot indicates a curved model might be better than the linear model. About 82% of the variation in the volume of the gasses is explained by a linear relationship with pressure. On average for every increase of one atmosphere (at a constant temperature) the volume decreases by 1.65 liters.

b: 2.3 liters and it belongs to oxygen at 2 atmospheres of pressure.

c: 9.40 liters, 6.10 liters, and 2.82 liters

d: The model would not work well. There is a curved pattern in the residual plot. In fact, by the ideal gas law, pressure and volume have an inverse relationship. After 8.19 atmospheres of pressure the linear model will start predicting negative volumes. Students may know at some point the gasses will condense into liquids and have much different physical characteristics.

8-17. $\frac{150}{4.5} = \frac{90}{x}$; 2.7 pounds

- 8-18. These polygons are congruent by a rotation and translation. $z = 15$ units and $y = 3$ units

8-19. a: $x = -\frac{10}{23}$ b: all real numbers c: $c = 0$

8-20. 45, 46, 47; $x + (x + 1) + (x + 2) = 138$

Lesson 8.1.2

8-25. a: $y = 1.2(3.3)^x$

x	y
0	1.2
1	3.96
2	13.068
3	43.1244
4	≈ 142.31

b: $y = 5 \cdot 6^x$

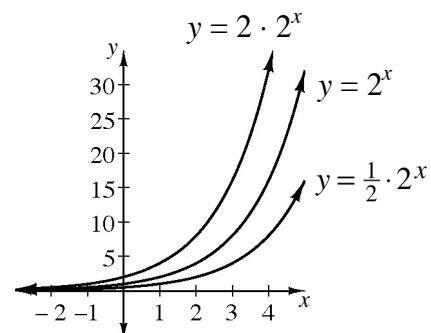
x	y
0	5
1	30
2	180
3	1080
4	6480

8-26. a: 2

b: All three graphs are increasing curves that are the same shape. All three graphs have an asymptote at the x -axis, but they have different y -intercepts. It would be *incorrect* to say they have different steepness or different growths. See solution graph at right.

8-27. a: See table below. The two sequences are the same.

t	1	2	3	4
$t(n)$	12	36	108	324



t	1	2	3	4
$t(n)$	10.3	11.5	12.7	13.9

c: The coefficient is the first term of the sequence, and the exponent is $n - 1$.

c: See table above right. Yes, both forms create the same sequence.

d: Because he is using the first term of the sequence instead of the zeroth term. Dwayne subtracts one because his equation starts one term later in the sequence, so he needs to multiply or add one less time.

8-28. a: Typical response: The distance between points A and D ($\sqrt{10}$ units) equals the distance between points B and D (also $\sqrt{10}$ units).

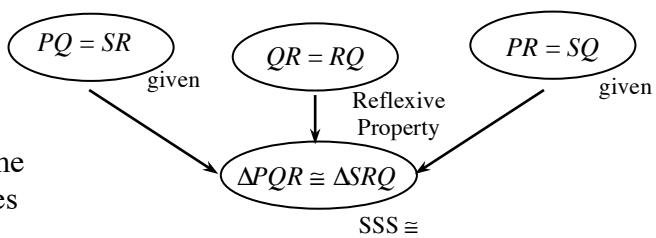
b: $y = -\frac{1}{3}x + 8$

c: Yes, the slope of \overline{BD} is $-\frac{1}{3}$ while the slope of \overline{AC} is 3. Since the slopes are opposite reciprocals, \overline{BD} is perpendicular to \overline{AC} .

d: $P = \sqrt{40} + 2\sqrt{50} \approx 20.467$ units. If \overline{AC} is used as the base, then $A = 20$ sq. units

8-29. Congruent by SSS \cong .

See flowchart at right.



8-30. $d = 2(t + 5)$ and $d = 6t$; where

d = distance traveled (miles) and t = time
Jan biked (miles per hour); $d = 15$ miles

8-31. a: $(2, -4)$

b: $(3, -\frac{3}{2})$

Lesson 8.1.3

8-40. **a:** $t(n) = 125000(1.0625)^n$ **b:** \$504,052.30

8-41. Answers vary, but should include a table, a graph, and a situation.

8-42. **a:** Each of the sides is 5 units in length.

b: $A = 20$ sq. units, $P = 20$ units

c: The slopes are -2 and $\frac{1}{2}$. They are perpendicular because the slopes are opposite reciprocals.

d: The point of intersection is $(0, 2)$. It is the midpoint of the diagonal.

8-43. **a:** Michelle is correct. One way to view this is graphically: The x -intercept always has a y -coordinate of 0 because it lies on the x -axis.

b: $(-4, 0)$

8-44. **a:** congruent ($SAS \cong$), $x = 79^\circ$

b: cannot be determined

c: congruent ($AAS \cong$), $x \approx 5.86$ units

d: congruent ($SAS \cong$), x cannot be determined

8-45. **a:** no solution **b:** $(0, 2)$

8-46. 3 ounces, no it does not make sense because the blue blocks weigh -2 ounces, which is not possible.

8-47. See graph at right.

8-48. **a:** 2.424×10^4 **b:** 5×10^{-3} **c:** 6.46×10^{23}

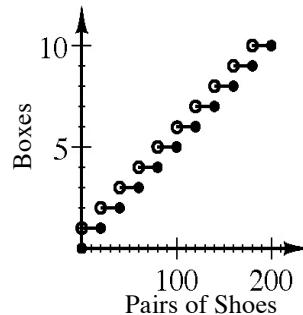
8-49. **a:** $\sqrt{8}$ units **b:** $(-6, 1), (x, y) \rightarrow (x, -y)$

8-50. **a:** 3 **b:** 3 **c:** -4 **d:** 1

8-51. **a:** -1 **b:** 2 **c:** -2 **d:** -1

8-52. **a:** 228 shoppers **b:** 58 people per hour **c:** at 3:00 p.m.

8-53. $(2x - 3)(x + 2y - 4) = 2x^2 + 4xy - 11x - 6y + 12$



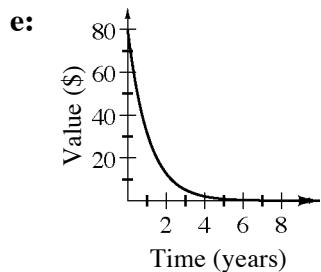
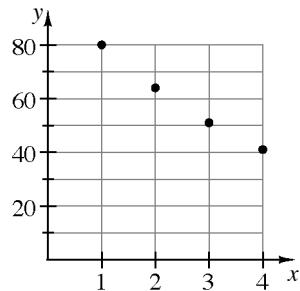
Lesson 8.1.4

8-59. rebound ratio is $\approx 80\%$; $t(n) = 100(0.8)^n$; See graph at right.

8-60. **a:** 0.40 **b:** \$32, \$2.05

c: $V(t) = 80(0.4)^t$

d: According to this model, it never will; in reality, a DVD player would have no value if it breaks.



8-61. **a:** -4 **b:** 2 **c:** 3 **d:** 10

8-62. 9 weeks

8-63. Yes, she is correct. The lengths on both sides of the midpoint are equal and that $(2, 4)$ lies on the line that connects $(-3, 5)$ and $(7, 3)$.

8-64. **a:** congruent ($SSS \cong$) **b:** not enough information
c: congruent ($ASA \cong$) **d:** congruent ($HL \cong$)

8-65. **a:** 8%; 1.08

b: cost = $162(1.08)^7 = \$277.64$

c: \$55.15 (An answer of \$50.41 means 0.92 was incorrectly used as the multiplier.)

d: \$475.83; Probably not, because the model assumption that the percent increase is constant would probably not be true for this long.

Lesson 8.1.5

8-70. $y = 4(1.75)^x$

8-71. **a:** $t(n) = 500 + 1500(n - 1)$ **b:** $t(n) = 30 \cdot 5^{n-1}$

8-72. $d = r(5)$ and $(d + 225) = 2r(5)$, where d = distance of slower car (km) and r = speed of slower car. The slower car is going 45 kilometers per hour, while the other car is going 90 kilometers per hour.

8-73. Sometimes true; true only when $x = 0$

8-74. **a:** $y = \frac{3x-10}{5} = \frac{3}{5}x - 2$ **b:** $x = \frac{y-b}{m}$ **c:** $r^2 = \frac{A}{\pi}$

8-75. $AC = BC$ and \overline{AC} is perpendicular to \overline{BC} .

8-76. **a:** yes **b:** no; most inputs have two outputs
c: no; $x = -1$ has two outputs

Lesson 8.1.6

8-83. **a:** $y = 281.4(1.02)^5$, 310.7 million people

b: 343.0 million people

c: -34 million people. Population growth has slowed.

- 8-84.** Note that students are not expected to have a particular method developed to solve these yet. Rather, they are expected to devise a method that works. They will most likely use some form of substitution.

a: $a = 6, b = 2$

b: $a = 2, b = 4$

8-85. **a:** $l = \frac{P-2w}{2}$

b: $\pi = \frac{C}{2r}$

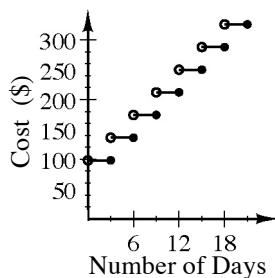
c: $r = \sqrt[3]{\frac{3V}{4\pi}}$

- 8-86.** **a:** The data appears randomly scattered. There is apparently no association between time running a mile and heart rate. Only 1% of the variation in heart rate can be explained by a linear association with time running a mile. The LSRL is nearly horizontal. There are no outliers.

b: Answers will vary. Example responses:

- D: Ran a fast mile but seemed to be giving little effort. This athlete might already be in outstanding physical condition or have an attitude problem.
- F: Strong run and strong effort. Keep this player.
- N, O: Ran slowly and gave little effort. Along with player M, we do not know these players' potential or motivation. Cut?
- P: The slowest of the group but with the highest effort. This player may improve substantially over time.

8-87.



8-88. $AC = \sqrt{58}$ units; the midpoint is at $(3.5, 2.5)$

8-89. **a:** sometimes true (when $x = 0$)

b: always true

c: sometimes true (for all values of x and for all y except $y = 0$)

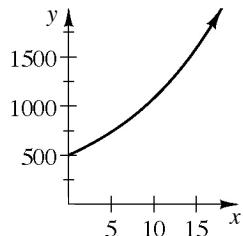
d: never true

Lesson 8.2.1

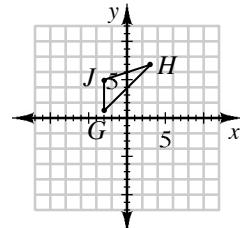
8-96. **a:** $y = 2 \cdot 4^x$ **b:** $y = 4(0.5)^x$

8-97. **a:** $a = 3, b = 5$ **b:** $a = 2, b = 3$

8-98. **a:** $y = 500(1.08)^x$ **b:** \$1712.97
c: $x \geq 0, y \geq 500$ **d:** See answer graph above right.



8-99. See graph at right. Length of base = $GJ = 4$ units;
height = 6 units. Area of triangle = 12 square units.



8-100. **a:** Let s = price of a can of soup and let b = cost of a loaf of bread, then Khalil's purchase can be represented by $4s + 3b = \$11.67$ and Ronda's by $8s + b = \$12.89$.

b: soup = \$1.35, bread = \$2.09

8-101. **a:** true **b:** false **c:** true
d: true **e:** false **f:** false

8-102. **a:** The triangles should be \cong by SSS \cong but $80^\circ \neq 50^\circ$.

b: The triangles should be \cong by SAS \cong but $80^\circ \neq 90^\circ$.

c: The triangles should be \cong by SAS \cong but $10 \neq 12$.

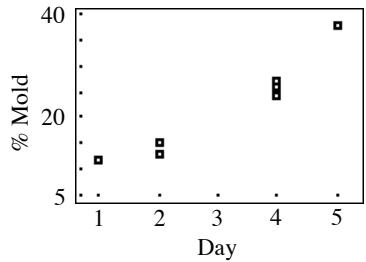
d: Triangle is isosceles but the base angles are not equal.

e: The large triangle is isosceles but base angles are not equal.

f: The triangles should be \cong by SAS \cong but sides $13 \neq 14$.

Lesson 8.2.2

8-108. **a:** No; by observation, a curved regression line may be better. See scatterplot at right.



b: Exponential. The growth is similar to the flu outbreak in Chapter 1 (Lesson 1.1.2).

c: $m = 8.187 \cdot 1.338^d$, where m is the percentage of mold and d is the number of days. Hannah predicted the mold covered 20% of a sandwich on Wednesday. Hannah measured to the nearest percent.

8-109. $18 + \sqrt{34} + \sqrt{82} \approx 32.886$ units

8-110. a: false

b: true

c: true

d: true

e: true

f: false

g: true

h: false

8-111. $y = (0.5)^x$

8-112. a: $y = 15 \cdot 5^x$

x	$f(x)$
-1	3
0	15
1	75
2	375
3	1875

b: $y = 151(0.8)^x$

x	$f(x)$
0	151
1	120.8
2	96.64
3	77.312
4	≈ 61.85

8-113. Relationships used will vary, but may include alternate interior angles, Triangle Angle Sum Theorem, etc.; $a = 26^\circ, b = 65^\circ, c = 26^\circ, d = 117^\circ$

8-114. a: Let $y =$ youngest child, $y + (y + 5) + 2y = 57$; The children are 13, 18, and 26 years

b: Let $x =$ months, $y =$ insects, $y = 2x + 105, y = 175 - 3x$; 14 months

c: Let $x =$ amount paid, $\frac{8}{5} = \frac{x}{3}$; \$4.80

d: Let $a =$ # adult tickets, $s =$ # student tickets, $3s + 5a = 1770, s = a + 30$; 210 adult and 240 student

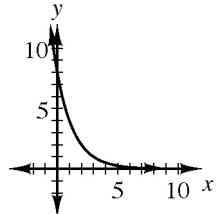
Lesson 8.2.3

8-119. ≈ 1.088 ; 8.8% monthly increase; $y = 1000(1.088)^x$

8-120. $CD = 22$, $BC = 7$, and $ED = 6$; the perimeter is $22 + 14 + 12 = 48$ units

8-121. a: $f(x) = 8\left(\frac{1}{2}\right)^x$

b: See graph at right.



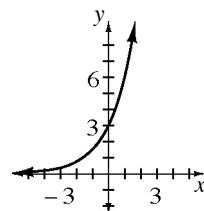
8-122. a: $x = 28.5^\circ$; Triangle Angle Sum Theorem

b: $x = 23^\circ$; relationships used varies

c: $x = 68^\circ$; relationships used varies

8-123. a: $\frac{3}{2}$ **b:** 3 **c:** 6 **d:** 2

b: never; $(0, 3)$; See graph at right.



8-124. a: 12, 7, 2, -3 , -8 ; $t(n) = 17 - 5n$

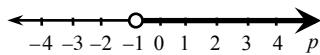
b: 32, 16, 8, 4, 2; $a_n = 64\left(\frac{1}{2}\right)^n$

8-125. Let x represent the amount of money the youngest child receives.

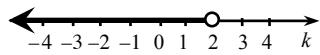
Then $x + 2x + x + 35 = 775$; \$185, \$370, and \$220.

Lesson 9.1.1

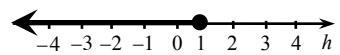
9-7. **a:** $p > -1$



b: $k < 2$



c: $h \leq 1$



9-8. **a:** always

b: sometimes

c: never

d: sometimes

e: always

f: never

9-9. **a:** $(-8, 2)$

b: $(\frac{5}{3}, -1)$

9-10. $y = 7.68(2.5)^x$

9-11. **a:** See graph top right. $y = -628 + 5.44x$

b: See graph at right. The U-shaped residual plot indicates a nonlinear model may be better.

c: $y = 23.76(1.01)^x$

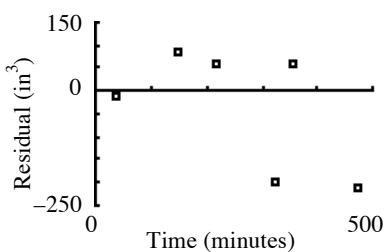
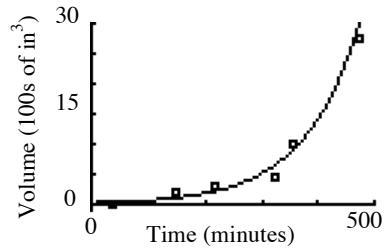
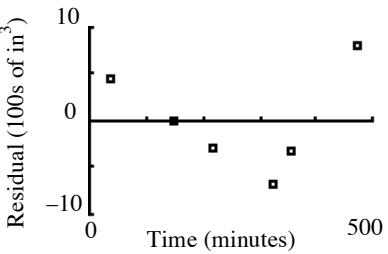
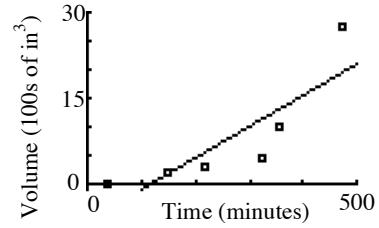
d: See plot below right. The residual plot shows no apparent pattern, so the exponential model is appropriate.

9-12. **a:** Congruent ($SAS \cong$) and $x = 2$

b: Congruent ($HL \cong$) and $x = 32$

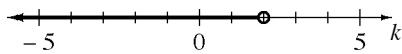
9-13. **a:** $\frac{25b^{36}}{a^{22}}$

b: $\frac{5y^5}{3x^9}$

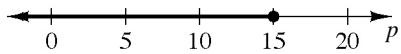


Lesson 9.1.2

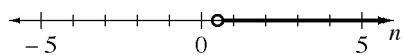
9-17. **a:** $k < 2$



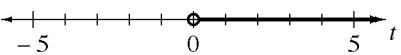
b: $p \leq 15$



c: $n > \frac{1}{2}$



d: $t > 0$



9-18. d

9-19. Either 15 or -15; yes

9-20. $y = 3\left(\frac{1}{3}\right)^x$

9-21. Let t = number of Turks and k = number of Kurds. Then $t + k = 66,000,000$ and $t = 4k$. $t = 52,800,000$ and $k = 13,200,000$. There are 13,200,000 Kurds.

9-22. 140.8 times; 141 times considering precision of measurement.

9-23. **a:** $3y + 5 = 14$, $y = 3$

b: $3y + 5 = 32$, $y = 9$

Lesson 9.1.3

9-33. **a:** $x = -7$ or 7

b: $x = -16$ or 16

c: $x = 3, -17$

d: $x = -7$ or 7

9-34. **a:** false

b: false

c: true

d: false

9-35. **a:** $(4, -1)$

b: $(-1, -2)$

c: part (b)

d: part (a)

9-36. $y = 27\left(\frac{1}{3}\right)^x$

9-37. \$4.00

9-38. **a:** ≈ 22.72 units or 23 units using appropriate precision

b: $-\frac{1}{6}$

9-39. **a:** \$0.16 per year; \$4.85 **b:** The multiplier is ≈ 1.04 or 4% per year; \$4.93

Lesson 9.2.1

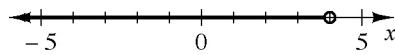
9-45. **a:** 3

b: 1

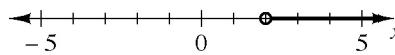
c: 4

d: 2

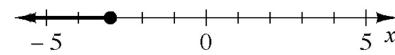
9-46. **a:** $x < 4$



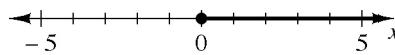
c: $x > 2$



b: $x \leq -3$



d: $x \geq 0$



9-47. $|S - \$24,000| \leq \1575 ; $\$22,425 \leq S \leq \$25,575$

9-48. $f(x) = 0.2(8)^x$

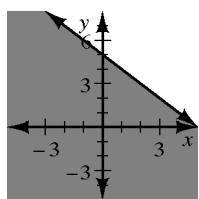
9-49. $y = \frac{3}{4}x - 3$

9-50. AAS \cong or ASA \cong , $\Delta ABC \cong \Delta DCB$

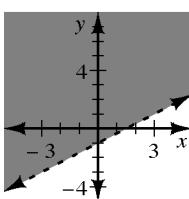
9-51. Coryn: $a_n = t(n) = n + 2$; Leah: $a_n = t(n) = -\frac{1}{3}n + 3$

Lesson 9.2.2

9-58. a:



b:



9-59. a: $x = 10$ or $x = -16$

b: $x = -\frac{1}{3}$ or $x = 6\frac{1}{3}$

c: no solution

9-60. $1200 + 300x \leq 2700$, so $x \leq 5$. Algeria can order an advertisement up to 5 inches high.

9-61. $f(x) = 3(2)^x$

9-62. a: See graph at right. Weight is very strongly positively associated with time in a nonlinear manner with no apparent outliers.

b: An exponential function is often useful for describing increasing change over the course of time.

c: See graph at right. $y = 0.0793(1.679)^x$; the y -intercept of $\approx (0, 0.08)$ seems reasonable since a mushroom with no time to grow will weigh almost nothing.

d: 5.02 g

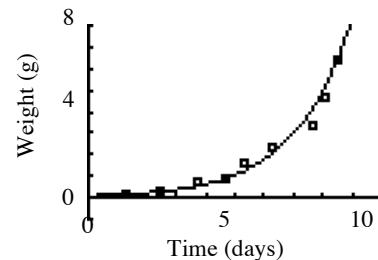
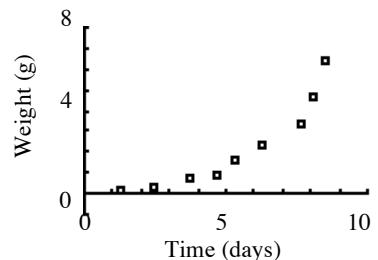
9-63. a: $2\sqrt{2}$ units

b: $(-1, 6)$. The function would change the y -coordinate to $-y$, or more formally, $(x, y) \rightarrow (x, -y)$.

c: $(8, 5)$

d: The translation is a movement 10 units along any line parallel to $y = \frac{3}{4}x$.

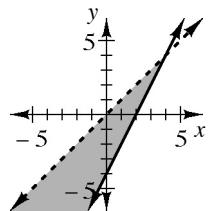
9-64. Line L: $y = -\frac{1}{6}x + 6$; line M: $y = \frac{2}{3}x + 1$; point of intersection: $(6, 5)$



Lesson 9.3.1

9-70. **a:** See graph at right.

b: No, it is not; it lies on the boundary to $y < x$, but the boundary is not part of the solution.

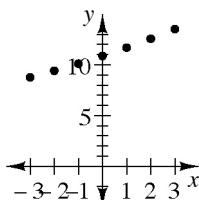


9-71. b

9-72. $1.25 + 0.75g \leq 20$; $g \leq 25$, so ≤ 25 games

9-73. $(-3, -6)$

9-74. 1.075; 7.5% increase;
See graph and example table at right.



Time (years)	Price (\$)
-3	8.75
-2	9.41
-1	10.11
0	10.87
1	11.69
2	12.56
3	13.50

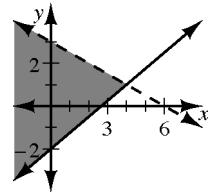
9-75. **a:** $x = 1.5y + 5$ **b:** $x = 24$
c: $x = 2.5$ **d:** $x = 0$ or 3

9-76. $ABD \cong CDB$ by SAS \cong . Rotate ΔABD by 180° and then translate. Other sequences exist, but reflection is not an option unless it is followed by another reflection.

Lesson 9.3.2

9-81. See solution at right.

9-82. **a:** $-32 < b < 40$ **b:** $x \leq -33$ or $x \geq 27$



9-83. Let x = amount of trash for each household (pounds);
 $3280x + 1500 < 50,000$; $x < 14.8$; less than 14.8 pounds

9-84. $y = 2.75(1.05)^x$; \$4.48

9-85. No; $3(7 - 2) = 15$ and $15 > 4$

9-86. No; Bernie would pass Wendel after 36 seconds, when each was 81 meters from the starting line. Since the race was only 70 meters, that would occur after the race was over.

9-87. a: $f(x) = 2 \cdot 4^x$

Month (x)	0	1	2	3	4	5	6
Population ($f(x)$)	2	8	32	128	512	2048	8192

b: $f(x) = 5 \cdot 1.2^x$

Year (x)	0	1	2	3	4	5	6
Population ($f(x)$)	5	6	7.2	≈ 8.6	≈ 10.4	≈ 12.4	≈ 14.9

c: The function in part (a) is growing faster, the outputs in the table are larger for the same inputs, its multiplier is larger.

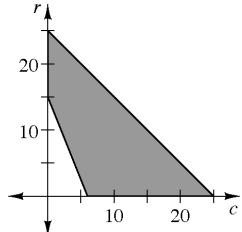
Lesson 9.3.3

- 9-91.** **a:** Let r = the number of rulers sold and let c = the number of compasses sold;
 $\$1r + \$2.50c \geq \$15$

b: $r + c \leq 25$

c: See graph at right. No, the club cannot sell a negative number of items.

d: See graph at right. The points represent the possible sales of rulers and compasses that would allow the club to break even or make a profit while falling within the sales limit. Not all of the points in the solution region can be possible answers as you can only have whole number amounts of rulers and compasses.



9-92. **a:** $x \leq 6$

b: $x > 1$

c: $2 \leq x < 7$

d: $x \leq -3$ or $x > 1$

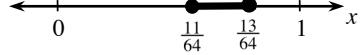
9-93. **a:** $x = 0$

b: $x = 1$

c: $x = 11$ or $x = -6$

d: $x = 12.6$

9-94. $\left| x - \frac{3}{16} \right| \leq \frac{1}{64}$; $\frac{11}{64} \leq x \leq \frac{13}{64}$ inches



9-95. **a:** $(-2, 5)$

b: $(1, 5)$

c: $(-12, 14)$

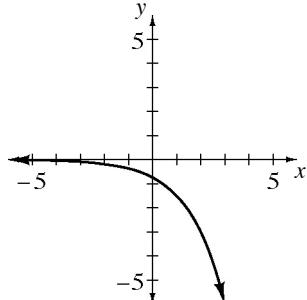
d: $(2, 2)$

9-96. See graph at right.

9-97. **a:** explicit

b: $t(n) = -3 + 4(n - 1)$ or $a_n = -3 + 4(n - 1)$

c: $t(50) = a_{50} = 193$



Lesson 10.1.1

10-10. a: Subscribe to Sunday paper and subscribe to local paper. See table at right.

b: 77%

c: 84.4%

10-11. No, because -1 is not greater than -1 .

Subscribes to
weekly local paper

Subscribes to Sunday
paper

	yes	no	
yes	0.25	0.12	0.37
no	0.40	0.23	0.63
	0.65	0.35	

10-12. $|3.433 - x| \leq 0.05x$; $3.27 \leq x \leq 3.61$ or the time is between approximately 3:16 and 3:37.

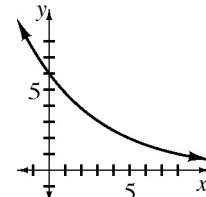
10-13. $(-5, 1)$, $(-3, 7)$, and $(-6, 2)$

10-14. $y = 6(0.8)^x$; See graph at right.

10-15. a: $d = \frac{4(I-18)}{3m}$

b: $q = S - 25p$

c: $n = \frac{PV}{RT}$



10-16. $m = \frac{1}{2}$; $(0, 4)$

10-17. a: See table at right. $\frac{44+44+20}{177} \approx 61\%$

b: $\frac{44}{88} = 50\%$

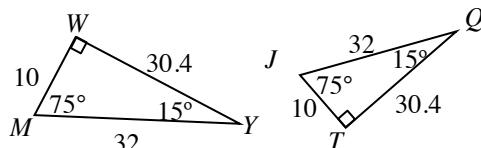
10-18. See graph at right below.

purchased dryer
did not purchase dryer

	purchased washer	did not purchase washer	
purchased dryer	44	20	64
did not purchase dryer	44	69	113
	88	89	177

10-19. $|m - 31| \leq 5$; $26 \leq m \leq 36$

10-20.



10-21. a: Since the colony doubles every day and it would be covered on February 21, then it is half covered on February 20.

b: $t(n) = a \cdot 2^n$

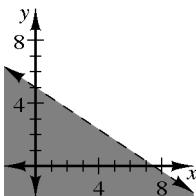
c: $100 = a \cdot 2^{12}$; $a = \frac{100}{2^{12}} \approx 0.0244\%$

d: $n = 5$, so $t(5) \approx 0.78\%$

10-22. a: $3, 15, 75, 375$

b: $10, -50, 250, -1250$

10-23. Denali has 18 pieces of candy.



Lesson 10.1.2

10-26. (46.4, 48.5, 50.4, 52.5, 55.9)

10-27. **a:** $x = 8$ **b:** $x = \frac{9}{2}, -\frac{11}{2}$ **c:** no solution

10-28. **a:** If c = number of cars and t = number of trucks, $2c + 3t \geq 500$, $c + t \leq 200$

b: Yes, if they make no more than 100 cars.

10-29. The team president is using the mean, and the fans are using the median. A few large outliers, such as superstar players, have very high salaries.

10-30. $y = \frac{1}{2}(10)^x$

10-31. 36,910,080 beats per year

10-32. They are not on the same line; $m_{AB} = -\frac{1}{5}$, $m_{BC} = -\frac{1}{3}$, $m_{AC} = -\frac{1}{4}$.

10-33. **a:** 1.58, 2.50, 2.91, 3.49, 4.29)

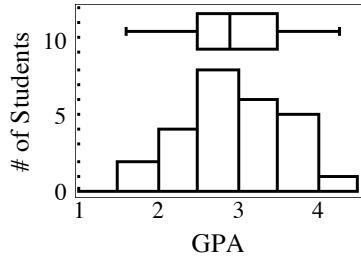
b: See solution graph at right.

c: The median (center) is 2.91 points.

The shape is symmetric.

The IQR (spread) is $Q_3 - Q_1 = 3.49 - 2.50 = 0.99$ points.

There are no apparent outliers.



10-34. **a:** See diagram below right.

b: $P(\text{Senior given OceanView}) = \frac{0.06}{0.24} = 25\%$

10-35. Let h = number of hats and
let t = number of T-shirts; $5h + 8t \leq 475$.

	OceanView	Not OceanView	
Senior	$(0.60)(0.10) = 0.06$	0.04	0.10
Not senior	$(0.20)(0.90) = 0.18$	0.72	0.90
	0.24	0.76	1.00

10-36. In both cases, the account that pays 2% interest is better.

10-37. **a:** $2xy^2$

b: $-m^3n^3$

c: $\frac{1}{m^3n^3}$

d: 4×10^{-6}

10-38. **a:** $P \approx 40.32$ mm, $A = 72$ sq mm

b: $P = 30$ feet, $A = 36$ square feet

10-39. A

Lesson 10.1.3 (Day 1)

10-46. **a:** See solution graph at right.

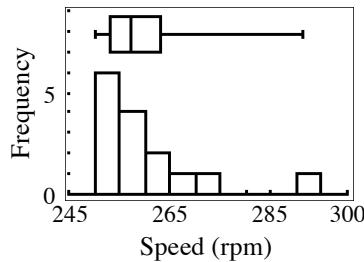
b: The median is 257 rpm.

The graph is single-peaked and skewed.

The IQR is $Q_3 - Q_1 = 263 - 253 = 10$ rpm.

291 rpm is apparently an outlier.

c: The median. Because the data is not symmetric and has an outlier, the mean is not an appropriate measure of center.



10-47. $y < -\frac{2}{3}x + 2$

10-48. Yes, by AAS \cong . Reflection on any line, then rotation and translation.

10-49. If she deposits the money for 5 years, the simple 2.5% interest is better; if she deposits the money for 25 years, the 2% compounded interest account is better.

10-50. **a:** $m = 3$

b: $m = 6$

c: $m = -5$

d: $m = 1.5$

10-51. **a:** $x = 3$ or -11

b: $x = 14$

c: $x = 2$

d: $x = 2$

10-52. **a:** $(\frac{1}{3}, -2)$

b: $(4, -9)$

Lesson 10.1.3 (Day 2)

10-53. **a:** See sketch at right. The medians of the two groups are virtually identical. Both groups have uniform distributions of ages. Neither group has any outliers. However, the ages in Group 7B are much more widely distributed (have much more variability) than the ages in Group 7A. The IQR for 7A is only $70 - 53 = 17$ years, while the IQR for 7B is more than twice as wide at $77 - 39.5 \approx 38$ years. The minimum for 7A is 20 years older than the minimum for 7B, and the maximum for 7A is 22 years younger than the maximum for 7B. Note that the small number of data points does not allow for bin widths on the histogram much narrower than 20 years; it is not appropriate to create bin widths of 10 years.

b: Either. Since the data distributions are symmetric and there are no outliers, either measure of center is appropriate.

10-54. a: $x = 4$ or $x = -4$

b: $x = 7.9$ or $x = -1.5$

c: $x = -\frac{5}{6}$ or $x = -2\frac{1}{6}$

d: $x = -1\frac{1}{7}$ or $x = -\frac{6}{7}$

10-55. See graph at right.

10-56. a

10-57. See graph at right. The graph is a continuous curve. It is decreasing with a domain of all real numbers and a range of $y > 0$. The y -intercept is $(0, 1)$. There are no x -intercepts. It is a function with an asymptote of $y = 0$.

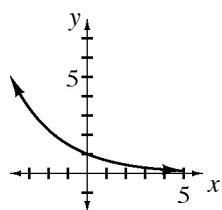
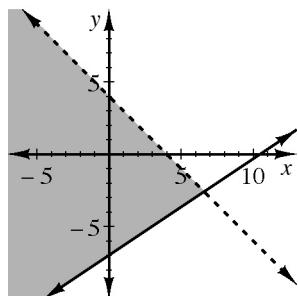
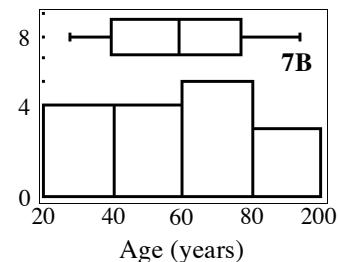
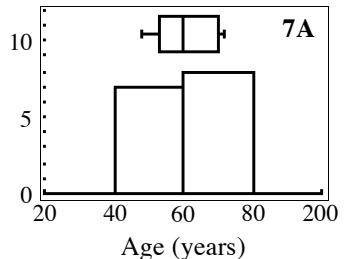
10-58. a: $9x^2$

b: $\frac{1}{9x^2}$

c: $\frac{6}{x}$

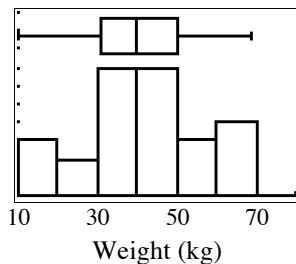
d: $162x^4$

10-59. Let g = ground speed (mph) and w = wind speed (mph). $1809 = (g - w)3.6$ and $1809 = (g + w)3$. Considering the precision of measurement, $g = 553$ miles per hour and $w = 50$ miles per hour.

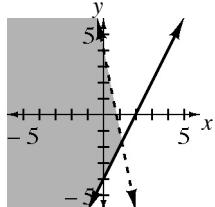


Lesson 10.1.4

- 10-67.** See graph at right. The distribution of weights is symmetric with no outliers (as determined by the modified boxplot). The mean is 40 kg with a standard deviation of 16 kg. The weights are rounded to the nearest whole number.



- 10-68.** See solution graph at right.



- 10-69.** **a:** $x = 20^\circ$, sum of angles is 180°
b: $x = 60^\circ$, sum of angles is 180°

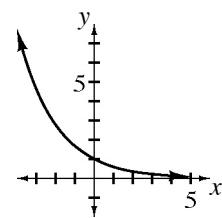
- 10-70.** $y = 0.6^x$; See graph at right.

10-71. **a:** $x^2 - 3x - 10$

b: $y^2 + 5xy + 6x^2$

c: $-3xy + 3y^2 + 8x - 8y$

d: $x^2 - 9y^2$



- 10-72.** Let x = time spent delivering the *Times* (minutes); Let y = time spent delivering the *Star* (minutes); $x + y = 60$ and $2x + y = 91$; $x = 31$ and $y = 29$. He delivers 62 *Times* papers and 29 *Star* papers.

- 10-73.** Let a = # of adult tickets and s = # of student tickets, then $7a + 5s \geq 5000$

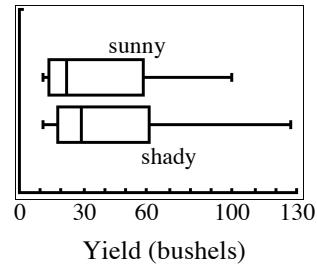
Lesson 10.2.1

- 10-79.** **a:** Shifted down 7 units
c: Shifted up 13 units

- b:** Shifted up 15 units
d: Shifted down 4 units

- 10-80.** **a:** Not necessarily congruent because SSA is not a congruence condition.
b: Not necessarily congruent because AAA is not a congruence condition, and there is not complete information for any side.

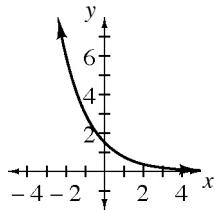
- 10-81.** **a:** See boxplots at right. Unequivocally, the farmer should plant in shade. The median crop is about 7 bushels higher in shade. The minimum, maximum, first quartile, and third quartile are all higher in shade. Both distributions are skewed in the same direction. The spread in data (IQR) is almost the same for both types of trees—the middle box is the same size for both boxplots. The maximum of 127 bushels from one of the shady trees is almost certainly an outlier.



- b:** No. Neither of the boxplots is symmetric; the distributions are skewed. The maximum on the shady plot may be an outlier.

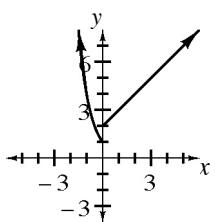
- 10-82.** **a:** 3 **b:** 1
c: 4 **d:** 2

- 10-83.** See graph at right. The graph is a continuous curve. It is decreasing with a domain of all real numbers and a range of $y > 0$. The y -intercept is $(0, 1.5)$. There are no x -intercepts. It is a function with an asymptote of $y = 0$.



- 10-84.** See graph at right.

- 10-85.** Let x = time of Marisol; Marisol: $y = 2x$, Mimi: $y = 3(x - 1)$; solution: $x = 3$ hours, so 6 miles

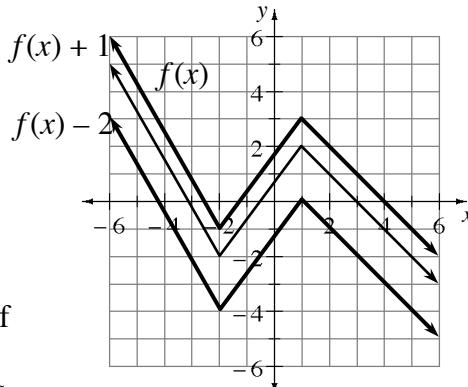


Lesson 10.2.2

10-90. $f(x) - 5 = 3^x - 2x^5 + 12$

10-91. See graph at right.

10-92. a: Team 2 works, on average, a little faster—the median number of widgets per team member is slightly higher. The distributions for both teams are similarly symmetric. However, the members of Team 1 are much more consistent than those of Team 2. The variability (IQR) of Team 1 is almost half that of Team 2, and Team 1's range is less too. Neither team had outliers.

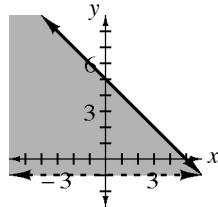


b: Since both distributions are nearly symmetric with no outliers, it is appropriate to compare standard deviations. Since Team 1 had both IQR and range smaller than Team 2, we would expect that Team 1 has a smaller standard deviation.

10-93. $|w - 10| > 0.13$; $w < 9.87$ or $w > 10.13$

10-94. See graph at right.

10-95. $2(4x - 3) = 3x + 14$, so $x = 4$ and $GH = 4(4) - 3 = 13$ units.



10-96. a: $x = 13$

b: $x = 4$ or 8

c: $x = 3$

d: no solution

Lesson 10.2.3

10-104. **a:** The 72 represents the temperature of the room. It is the horizontal asymptote.

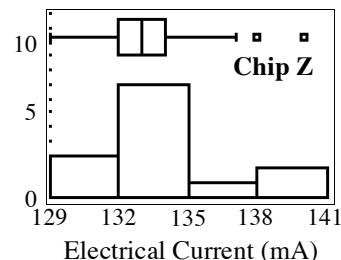
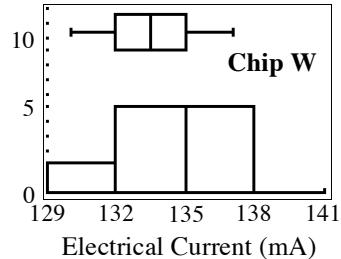
b: The equation would then be $f(t) = 140(0.5)^t + 68$ as the horizontal asymptote would at $y = 68$. It is the coolest the tea can get.

10-105. **a:** 3

b: 1

c: 2

10-106. **a:** The IQR for W is more than for Z because the middle of the boxplot for W is wider. The standard deviation for Z is greater because overall, including the outliers, the data for Z is spread out more than for W. Since mean is impacted by outliers more than median, the standard deviation (which is based on mean) is impacted by more by the outliers in chip Z. Mean and standard deviation are not appropriate for chip Z because the shape is skewed and there are outliers.



b: Chip Z appears to be the more energy efficient. It has a lower median use of current. Also, for most of the data sets tested, chip Z uses the same or slightly less current than chip W. Chip Z has smaller IQR: it is more consistent in current usage. However, all these benefits may be offset by the two high outliers belonging to chip Z that might indicate a reliability problem.

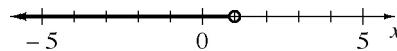
10-107. **a:** $3x - 4$, shift down 1 units

b: $3x + 5$, shift up 8 units

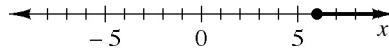
c: $3x - 25$, shift down 22 units

d: $3x$, shift up 3 units

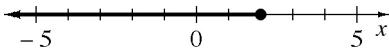
10-108. **a:** $x < 1$



b: $x \geq 6$



c: $m \leq 2$



d: no solution

10-109. **a:** SAS \cong ; 90°-clockwise rotation followed by a translation, $\Delta JKH \cong \Delta NLM$

b: SSS \cong ; reflect on line AC , then 180°-rotation, then translate; $\Delta ABC \cong \Delta FDE$

c: Not necessarily congruent

d: AAS \cong ; 180°-rotation about point R ; $\Delta PRQ \cong \Delta SRT$

10-110. **a:** $\frac{Y}{R+G+B+Y}$

b: $\frac{G+B}{R+G+B+Y}$

c: $\frac{0}{R+G+B+Y}$ or 0

Lesson 11.1.1

11-4. Possible response: Construct a circle of any radius. Then choose a point on the circle and mark off two radius lengths in each direction along the circle circumference. Connect the original point to each of the other two points.

11-5. **a:** \$4.10

b: \$1.90

11-6. **a:** $\frac{3+6+14+16}{100} = 39\%$

b: $\frac{18}{32} \approx 56\%$

c: $\frac{14+16}{3+6+14+16} \approx 77\%$

d: See the conditional relative frequency table below. Yes, the juniors and seniors are much less likely to be carrying a backpack.

	Freshmen	Sophomore	Junior	Senior
Backpack	$\approx 73\%$	$\approx 73\%$	$\approx 56\%$	$\approx 54\%$
No Backpack	$\approx 27\%$	$\approx 27\%$	$\approx 44\%$	$\approx 46\%$

11-7. 12.6

11-8. **a:** $a = 0$

b: $m = \frac{16}{17}$

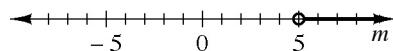
c: $x = 10$

d: $x = 9, -3$

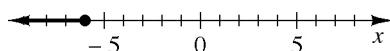
11-9. **a:** Room temperature. The hot water will approach room temperature but will never cool more than that.

b: The asymptote would be lower, but still parallel to the x -axis. If the temperature outside was below zero, the asymptote would be below the x -axis.

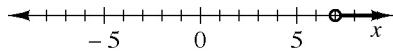
11-10. a: $m > 5$



b: $x \leq -6$



c: $x > 7$



d: no solution

11-11. a: $(1, -1)$

b: $(-2, \frac{1}{2})$

11-12. $t(n) = -188n + 2560$; $t(5) = 1620$

Lesson 11.1.2

11-17. She should construct an arc centered at P with radius k so that it intersects n and m each once (call these intersections R and S). She should then construct two more circles with radius k , centered at R and S . The fourth vertex lies where these two circles intersect.

11-18. a: 3

b: One third of the students will have heard the rumor at 2 p.m. since each hour the number that have heard the rumor triples.

c: $t(n) = a \cdot 3^n$

d: $t(7) = a \cdot 3^7 = 1; a = \frac{1}{2187} \approx 4.57 \times 10^{-4}$

e: $\frac{1}{2187} = \frac{3}{s}$, where s is the total number of students in the school; $s = 6561$ students

11-19. a: Making percentages based on the column totals for comparison will help Kenny see past the variation that comes with the overall popularity of having cupcakes at various types of celebrations.

b: The row and column totals are shown below. The column percentages are also shown below. Comparing across each row, the birthday and wedding celebrations seem very similar in the types of cupcakes ordered. Halloween and the 4th of July celebrations seem substantially different from the other celebrations, with a stronger preference for Fudgy Fantasy on Halloween and an inclination toward Fruity Fun on the 4th of July.

	Birthday	Wedding	Halloween	4 th of July	
Fudgy Fantasy	5883	2771	672	519	9845
FluffyFetti	3591	1447	188	311	5537
Fruity Fun	2766	1228	125	472	4591
	12,240	5446	985	1302	19,973

	Birthday	Wedding	Halloween	4 th of July
Fudgy Fantasy	$\approx 48\%$	$\approx 51\%$	$\approx 68\%$	$\approx 40\%$
FluffyFetti	$\approx 29\%$	$\approx 27\%$	$\approx 19\%$	$\approx 24\%$
Fruity Fun	$\approx 23\%$	$\approx 23\%$	$\approx 13\%$	$\approx 36\%$
	100%	100%	100%	100%

11-20. a: $8(x - 3) + 2$; shifted down 2 units

b: $8(x - 3) + 3.5$; shifted down 0.5 units

c: $8(x - 3) + 12$; shifted up 8 units

d: $8(x - 3) + 3.5$; shifted up $\frac{3}{4}$ units

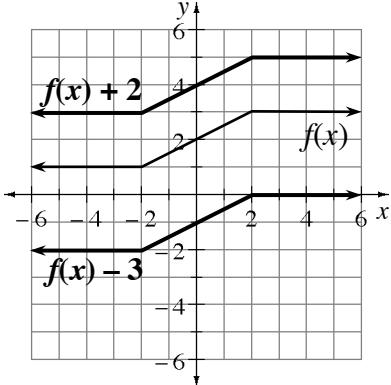
11-21. a: $x \geq 2$

b: $x > -1$

c: $x \leq 9$

d: $x > 10$

11-22.



11-23. a: $x = \frac{11}{3}$

b: $x = -7$

11-24. Let a = the number of apples; Let p = the numbers of pears; $a + p = 11$,
 $0.60a + 0.35p = \$5.60$; 7 apples and 4 pears

11-25. Answers vary, but likely answers are $6(m - 2)$, $2(3m - 6)$, $3(2m - 4)$, and $1(6m - 12)$.

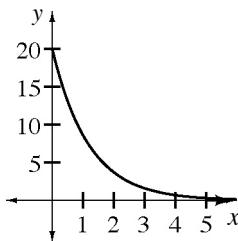
Lesson 11.1.3

11-30. b

11-31. a: ≈ 0.463 , 53.7% decrease

b: $f(x) = 20(0.463)^x$

c: See graph and table at right.



x	$f(x)$
0	20
1	9.26
2	≈ 4.29
3	≈ 1.99
4	≈ 0.92
5	≈ 0.43

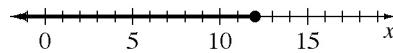
11-32. a: $(1.5, 5)$

b: $y = \frac{4}{3}x + 3$

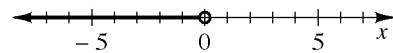
c: $\sqrt{4.5^2 + 6^2} = \sqrt{56.25} = 7.5$ units

11-33. 31 terms

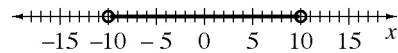
11-34. a: $x \leq 12$



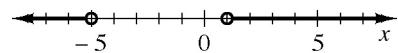
c: $x < 0$



b: $-10 < x < 10$



d: $x < -5, x > 1$



11-35. a: $2^x - 5$, shifted down 2 units

b: $2^x - 3.5$, shifted down 0.5 units

b: $2^x + 5$, shifted up 8 units

d: $2^x - 2.25$, shifted up $\frac{3}{4}$ units

11-36. a: $x = 4$ or 2

b: $x = 7$

c: $x = \frac{1}{3}$

11-37. a: There is no solution, so the lines do not intersect.

b: $y = \frac{2}{3}x - \frac{10}{3}$

c: Yes; both lines have the same slope (are parallel).

11-38. a: $y = 23500(0.85)^x$; \$2052.82

b: $y = 14365112(1.12)^x$; 138,570,081

Lesson 11.2.1

11-47. Let s = the amount of money invested in stocks (dollars); Let b = the amount of money invested in bonds (dollars); $0.03s + 0.05b = 430$ and $s + b = 10,000$; Marius invested \$3500 in stocks and \$6500 in bonds.

11-48. $6x + 12 = 4.75(x + 3)$; $\frac{9}{5}$ pounds

11-49. **a:** $f(x) = 5(1.5)^x$ **b:** $f(x) = 0.5(0.4)^x$

11-50. A

11-51. $y > 2x - 1$

11-52. **a:** x -intercepts $(-2, 0)$ and $(0, 0)$; y -intercept $(0, 0)$

b: x -intercepts $(-3, 0)$ and $(5, 0)$; y -intercept $(0, 3)$

c: x -intercepts $(-1, 0)$ and $(1, 0)$; y -intercept $(0, -1)$

11-53. **a:** $-2 < x < 2$ **b:** $x \geq 2.5$ **c:** $x = \frac{1}{4}$

d: no solution

e: $x = -12$

f: $-5 \leq x \leq 3$

11-54. Let t = number of toppings; $1.19(3) + 0.49t = 4.55$; $t = 2$

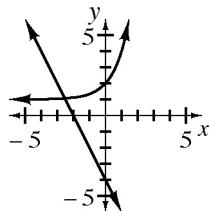
11-55. **a:** $2a^2 - 5ab - 3b^2$ **b:** $x^3 + x + 10$

Lesson 11.2.2

11-61. a: See graph at right.

b: $\approx (-2.5, 1.1)$

c: $x = -2.5$



x	$f(x)$	$g(x)$
-3.5	≈ 1.02	3
-3	≈ 1.04	2
-2.5	≈ 1.06	1
-2	≈ 1.11	0
-1.5	≈ 1.19	-1

11-62. a: annual multiplier = 0.944 which is a 5.6% decrease

b: $f(x) = 60(0.944)^x$

c: $f(15) = 25.28$

11-63. a: iv

b: ii

c: v

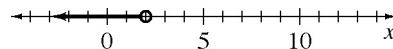
d: i

e: iii

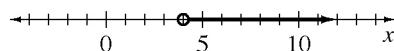
(b) is the only histogram with a narrow range, so it matches to ii. The two skewed histograms are straightforward to match. (c) has a uniform distribution, so the quartiles on the boxplot must be of even length, as in v. (d) has a lot of data at the two edges, and the data in the middle is more spread out, so the “whiskers” of the boxplot must be narrow, and the box must be wide, as in i.

11-64. 9 employees

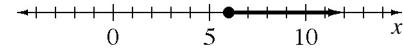
11-65. a: $x < 2$



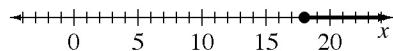
c: $x > 4$



b: $x \geq 6$



d: $x \geq 18$



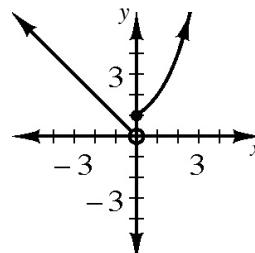
11-66. See graph at right.

11-67. a: $x = 1.5$

b: $x = 8$

11-68. 45 miles

11-69. width = 60 mm; area = 660 mm²



Lesson 11.2.3 (Day 1)

- 11-71.** **a:** There is a strong positive linear association between the depth of a water well and the cost to install it. There are no apparent outliers.
- b:** On average, every foot deeper you drill the well, the cost increases by \$14.65.
- c:** The coefficient of correlation is 0.929, R -squared = 0.864. About 86% of the variation in the cost of drilling a water well can be explained by a linear association with its depth.
- d:** \$1395 represents the cost of a well that has no depth. It would be roughly the cost of the pump.
- e:** $1395 + 14.65(80) = \$2567$, $1395 + 14.65(150) = \$3593$, $1395 + 14.65(200) = \$4325$
- f:** From part (e), the predicted cost is \$2567. Actual – \$2567 = \$363; actual cost was \$2930.
- g:** A linear model looks the most appropriate because there is no pattern in the residual plot.

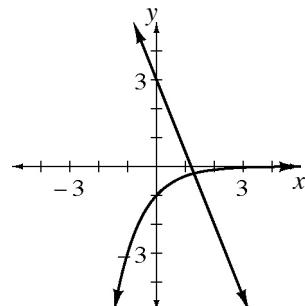
11-72. C

11-73. Yes, by HL \cong .

11-74. $|2.5 - x| \leq 0.03x$; $2.425 \leq x \leq 2.57$ grams; the coin is significantly less than this range, so its legitimacy could be questioned, though there may be reasons that it has lost weight since 1924.

11-75. See graph at right. $x \approx 1.30$

11-76. $\frac{1}{2} + \frac{1}{3} = \frac{1}{x}$ or $\frac{1}{2}x + \frac{1}{3}x = 1$;
 $x = \frac{6}{5}$ hours = $1\frac{1}{5}$ hours = 1 hour and 12 minutes



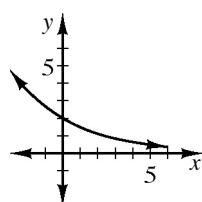
11-77. Mr. Greer distributed incorrectly. The correct solution is $x = 2$.

11-78. **a:** See graph at right.

b: $f(x) = 10(2.3)^x$

c: $y = 42,000(0.75)^5 = 9967$

d: $60 = 25(b)^{10}$; $b = 1.09$, 9% increase



11-79. $s = a + 150$, $3s + 5a = 4730$; 685 students

Lesson 11.2.3 (Day 2)

11-80. $FG = 3.5$ cm, $BC = 14$ cm

11-81. 18 minutes

11-82. a: Congruent (SAS \cong), $\Delta ABD \cong \Delta CBD$

b: Congruent (ASA \cong or AAS \cong), $\Delta ABC \cong \Delta DEF$

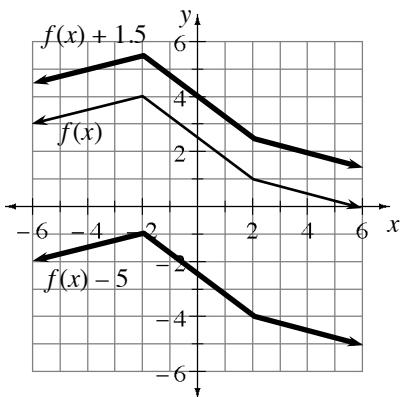
11-83. a: $t(n) = -3n + 10$ or $t(n) = 7 - 3(n - 1)$ **b:** $t(n) = \frac{2000}{3} \cdot 3^{n-1}$ or $t(n) = \frac{2000}{9} (3)^n$

11-84. $1980 + 30m + 2590 + 20m = 5000$; $m = 8.6$; It will be full after 8 months; there will not be enough room for songs in the 9th month.

11-85. a and d

11-86. a: $y = -6 \cdot 3^x$ **b:** $y = 7 \left(\frac{1}{2}\right)^x$

11-87.



11-88. a: $(-1, -2)$

b: $(4, -4)$

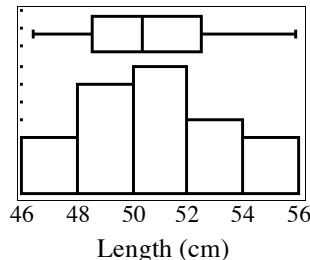
c: $(3, 4)$

Lesson 11.2.4

11-91. $f(x) = 3(0.2)^x$

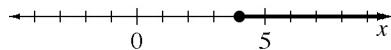
- 11-92.** See graph at right. The distribution is symmetric with no outliers. The mean is 50.7 cm and the standard deviation is 2.6 cm. The lengths were measured to the nearest tenth of a centimeter.

11-93. $2(12x + 7) = 30x - 4$, so $x = 3$

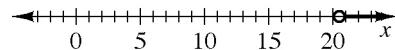


- 11-94.** Let p = amount of powder blue and s = amount of spring blue. Then $0.02p + 0.1s = 0.04(1)$ and $p + s = 1$, so $p = 0.75$ gallons and $s = 0.25$ gallons.

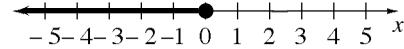
11-95. a: $x \geq 4$



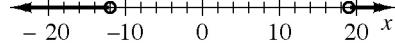
b: $x > 20.5$



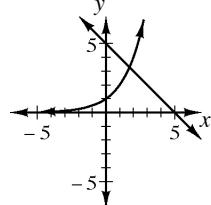
c: $x \leq 0$



d: $x > 19$ or $x < -12$



- 11-96.** See graph at right. $x \approx 1.8$



- 11-97.** Let x = time (months); $718 - 14x = 212 + 32x$; $x = 11$ months

11-98. $y = -\frac{3}{2}x - 1$

11-99. $y = 2x + 5$; 105 tiles

Lesson 11.2.5

- 11-104.** A conditional relative frequency table is below. There is almost no difference between the amount of cheese at Taco Shack and at the competitor. Any difference can easily be explained by natural sample-to-sample variability. No association. The Taco Shack owner does not need to adjust the amount of cheese, and should consider other reasons for the difference in perception.

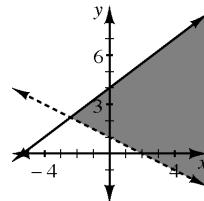
NUMBER OF TACOS	Taco Shack	competitor
<15 grams cheese	≈ 11%	≈ 10%
between 15 g and 25 g cheese	≈ 60%	≈ 61%
>25 grams cheese	≈ 29%	≈ 29%

- 11-105.** 15.24 minutes

- 11-106.** Both (a) and (d) are equivalent. One way to test is to check that the solution to $4(3x - 1) + 3x = 9x + 5$ makes the equation true (the solution is $\frac{3}{2}$).

11-107. **a:** $t(n) = \frac{1}{2} \left(\frac{1}{2}\right)^{n-1}$ **b:** $t(n) = -7.5 - 2(n - 1)$

- 11-108.** See graph at right.



- 11-109.** **a:** 3 **b:** 2 **c:** 1
d: 0 **e:** 1 **f:** does not exist
g: 2

- 11-110.** **a:** $x > 3$ or $x < -3$ **b:** $0 \leq x \leq \frac{4}{3}$
c: $x = -2$ or 3 **d:** $x = 3$

- 11-111.** $u = 4, v = -3$

- 11-112.** **a:** $\frac{9x^2}{y^4}$ **b:** $\frac{2x^2}{y}$ **c:** $\frac{x}{2}$

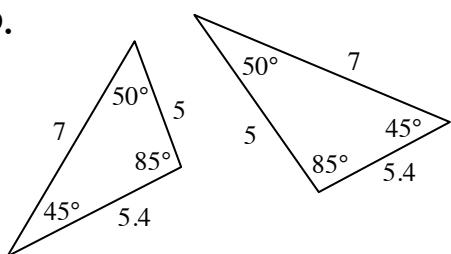
Lesson 11.2.6 (Day 1)

11-117. **a:** The slope of the line of best fit is -75.907 . Jeremiah had been giving coins away at a rate of about 76 coins a year.

b: In 2010 he had 1295 coins. If c is the number of coins, and y is the number of years since 2010, then $c = 1295 - 76y$. When $c = 0$ coins, $y \approx 17$ years from now. In 2027 he will have only 3 coins left.

11-118. 9.33 minutes; Given precision of measurement, Roger Robot would take approximately 9 minutes working alone.

11-119.



11-120. **a:** 4, 8, 12, 16; $t(n) = 4 + 4(n - 1)$

b: 4, 8, 16, 32; $t(n) = 4(2)^{n-1}$

c: Answers vary.

11-121. $0.50c + 0.75b \geq 100$

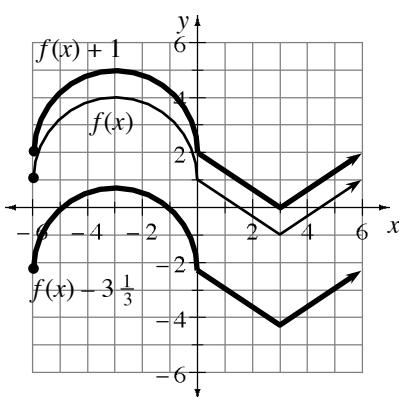
11-122. Let a = the number of adult tickets; Let c = the number of children tickets.

$$2a + 3c = 27.75, 3a + 2c = 32.25, a = \$8.25, c = \$3.75$$

11-123. Yes, they will intersect; top line: $y = -\frac{1}{4}x + 10$, bottom line: $y = \frac{1}{3}x + 3$; they will cross at $(12, 7)$.

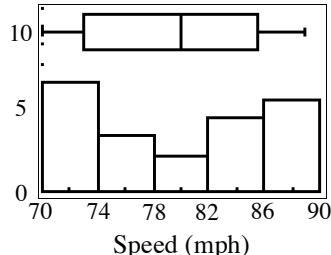
11-124. top line: x -intercept $(40, 0)$ and y -intercept $(0, 10)$
bottom line: x -intercept $(-9, 0)$ and y -intercept $(0, 3)$

11-125.



Lesson 11.2.6 (Day 2)

- 11-126.** See solution graph at right. The shape is double-peaked and symmetric. There are no outliers. The mean speed is 79.5 mph with a standard deviation of 6.8 mph.



- 11-127.** Let $x =$ the amount of candy (pounds);
 $8x + 10(6) = 8.5(x + 6)$, 18 pounds

- 11-128.** These triangles are congruent by ASA \cong . Translate point T to point A , then rotate $\triangle T'P'Q'$ about point T' so that \overline{AB} and $\overline{T'P''}$ coincide.

- 11-129.** **a:** 9 **b:** 10 **c:** $x = -2$ or 8

- 11-130.** $(-2.9, 2.1)$ and $(3.8, 15.5)$

- 11-131.** **a:** $x = 13$ **b:** $x = 3$ **c:** $x < -\frac{2}{3}$ or $x > 2$

- 11-132.** **a:** 94 years

b: From 1966 to 1999, 429 marbles were added, which means there were 13 marbles added per year.

c: 17

d: $t(n) = 17 + 13n$

e: In the year 2058, when the marble collection is 153 years old, it will contain more than 2000 marbles.

- 11-133.** **a:** $x = 1$ **b:** $x = -1$ **c:** $p = \frac{3}{2}$ **d:** $w = \frac{v+2}{u}$

- 11-134.** $y = 6x - 2$

Lesson A.1.1

A-7. $6x^2 + 4x + 3xy + 6y + y^2$

A-8. **a:** Five terms. $y^2 + 6y + 5$

b: Six terms. No terms alike.

c: Six terms. $3xy + 6x + 3y + 6$

d: Five terms. $4m^2 + 5m + 2mn$

A-9. **a:** 7 **b:** 14

c: -2 **d:** 74

A-10. **a:** $\frac{1}{4}$ **b:** $-\frac{1}{2}$

c: -8 **d:** 8

A-11. Possible points include: $(-7, 7), (5, -2), (9, -5)$

A-12. $435 = 107 + b + 3b$

Lesson A.1.2

A-20. **a:** $2x - 3 - (x + 1) = x - 4$

b: $y + 3 - y - 1 = 2$

c: $-x - (x + 2) = -2x - 2$

A-21. **a:** Six terms. $4x^2 + 7$

b: Seven terms. $-3y^2 - 2x + 1$

c: Six terms. $9x^2 + 29y - x$

d: Seven terms. $4y^2 - 4xy - y - 10$

A-22. **a:** -7 **b:** 2

c: 11 **d:** -1

A-23. **a:** 17 **b:** 9

c: 45 **d:** 10

e: -22 **f:** 4

A-24. **a:** perimeter = 120 units, area = 647 sq. units

b: perimeter = 70 units, area = 192 sq. units

A-25. 1.05175×10^{35} ; The calculator may show an E35 or EE35 in place of the 10^{35} .

Lesson A.1.3

A-30. **a:** $2x - 1$

b: 4

c: $x^2 - y - 4$

A-31. **a:** $4x^2 + 3x - 3$

b: $5x^2 - 23x$

c: $4x + 3y$

d: $2y^2 + 3xy + 27$

A-32. **a:** 11

b: -3

c: 30

d: 10

A-33. **a:** right, because $-6 < -2$

b: right, because $-4 < 0$

A-34. **a:** Yes, if you use twice the amount of gas, you will have traveled twice as many miles and if you use no gasoline then you traveled 0 miles.

b: $\frac{4 \text{ gallons}}{90 \text{ miles}} = \frac{18 \text{ gallons}}{m \text{ miles}}$; $m = 405$ miles

A-35. **a:** The steeper line is B.

b: Not proportional, because the graph does not go through the origin.

c: ≈ 3 years

d: $\approx \$65,000$

e: Company B's profits are, because its line is steeper.

Lesson A.1.4

A-41. **a:** left, because $-2 > -8$

b: right, because $-6 < 0$

A-42. **a:** 14

b: 6.5

c: 74

d: 12

e: 11

A-43. $1220 = x + (150 + x)$

A-44. Not quite. She correctly removed $2x$ from both sides and also flipped a 1 from the “-” region to the “+” region and removed a zero pair. However, on the left side, the -1 in the “+” region and the 1 in the “-” region do not make a zero pair, so this is not a legal move.

A-45. **a:** Yes, because if Sam read 0 pages it would take 0 hours and if he doubled the time, he would double the number of pages.

b: $\frac{75 \text{ pages}}{2 \text{ hours}} = \frac{350 \text{ pages}}{h \text{ hours}}$; $h = 9\frac{1}{3}$ hours

A-46. **a:** 52 units

b: 168 sq. units

Lesson A.1.5

A-51. a: right, because $1 < 3$

b: right, because $-2 < -1$

A-52. One possible equation is: $x + (x - 14) = 40$. The numbers are 13 and 27.

A-53. a: $2y - 2x + 3$

b: $2x^2 + 3x + 6$

c: 0

d: $x - y$

A-54. a: $\frac{2}{15}$

b: $1\frac{5}{8}$

c: -6

d: $-\frac{1}{3}$

A-55. a: 4

b: 1

c: 7

d: 2

e: 5

f: 6

g: 3

A-56. a: $y = -23.8$

b: $g(9) = 144$

c: $x = 5.5$

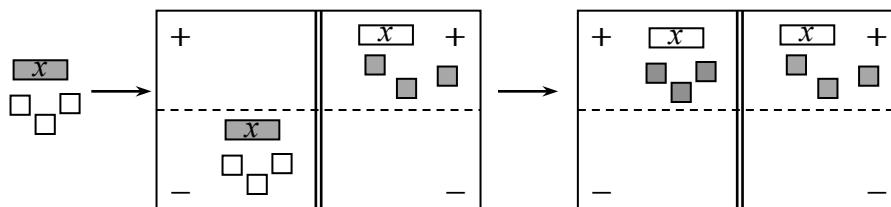
d: $y = 16$

Lesson A.1.6

A-61. a: $x = 5$

b: $x = -2$

c: Possible explanation below.



$$(x - 3)$$

$$-(x - 3) \stackrel{?}{=} -x + 3$$

$$-(x - 3) \stackrel{\checkmark}{=} -x + 3$$

A-62. a: right

b: equal

A-63. a: 60

b: -32

c: 3598

d: -6

A-64. a: $2x + 6$

b: $4x + 6$

c: $4x + 4y$

d: $6y - 2x + 4$

A-65. a: $\frac{12 \text{ gallons}}{\$39.48} = \frac{1 \text{ gallon}}{d}; d = \3.29

b: $\frac{1 \text{ gallon}}{\$3.29} = \frac{15 \text{ gallons}}{d}; d = \49.35

c: $\frac{1 \text{ gallon}}{\$3.29} = \frac{g \text{ gallons}}{\$13.16}; g = 4 \text{ gallons}$

A-66. a: Figure 4 is a 5-by-5 square, and Figure 5 is a 6-by-6 square.

b: An 11-by-11 square, a 101-by-101 square.

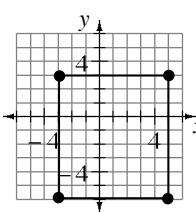
c: Figure 5 would have 21 tiles; Figure 8 would have 33 tiles; each figure has 4 more tiles than the figure before it.

Lesson A.1.7

- A-71.** **a:** $x + 4 = 3x - 2$; $x = 3$
- b:** $x + 2 = -x - 1$; $x = -\frac{3}{2}$
- c:** $c = 2$
- d:** no solution
- A-72.** **a:** yes
- b:** no
- c:** no
- d:** yes
- A-73.** **a:** $\frac{10 \text{ lbs}}{\$27.50} = \frac{25 \text{ lbs}}{d}$; $d = \$68.75$
- b:** $\frac{10 \text{ lbs}}{\$27.50} = \frac{p \text{ lbs}}{\$50.00}$; $p = 20$ pounds
- A-74.** **a:** 7' by 9'
- b:** 318 sq ft
- A-75.** **a:** $A = 2$, $B = 4$, $C = 3$, $D = 1$; 5 is not matched
- b:** base = 6 units, height = 4 units, area = 24 square units
- c:** The area of the rectangle represented by the point (6, 4) is 24 square units, not 36 square units.
- d:** 10-by-3.6, 15-by-2.4, 12-by-3, etc.
- e:** It is a curve that is decreasing from left to right. There is no x -intercept and no y -intercept. The domain is $0 < x \leq 36$ and the range is $0 < y \leq 36$. If you allow non-integer lengths, then connect the points.

- A-76.** **a:** x
- b:** y^7
- c:** $\frac{1}{4}$
- d:** $64x^6$

Lesson A.1.8

- A-82.** **a:** $x = 3$
- b:** no solution
- A-83.** **a:** all real numbers
- b:** $m = 9$
- c:** $x = 4$
- d:** $p = -10$
- A-84.** Let x represent the number of students at East High School; $x + 2x - 250 = 2858$; 1036 students
- A-85.** **a:** $x = 3$
- b:** $x = 1$
- c:** $x = -1.5$
- d:** $x = -1$
- A-86.** **a:** $\frac{20}{7} = 2\frac{6}{7}$
- b:** $-\frac{50}{143}$
- c:** $-\frac{189}{220}$
- d:** $\frac{144}{15} = \frac{48}{5} = 9\frac{3}{5}$
- A-87.** See graph at right.
- a:** a square
- b:** 9 units
- c:** 81 square units
- d:** 36 units
- 

Lesson A.1.9

A-95. **a:** no solution

b: $x = 3.5$

c: all real numbers

d: $x = 0$

A-96. **a:** $x = -\frac{3}{4}$

b: $y = 0$

c: all real numbers

A-97. $x = 0$

Left Expression	Right Expression	Explanation
$3x^2 - (2x - 4)$	$3 + 3x^2 + 1$	Starting expressions.
$3x^2 + (-2x) + 4$	$3 + 3x^2 + 1$	Flip tiles from “–” region to “+” region.
$-2x + 4$	$3 + 1$	Remove $3x^2$ from both sides.
$-2x$	0	Remove 4 unit tiles from both sides.
x	0	Divide both sides by -2 .

A-98. **a:** 42

b: 3

c: 12

d: 3

A-99. Let x represent the width of the rectangle, $2x + 2(2x + 3) = 78$, 27 cm and 12 cm

A-100. 20 Schnauzers