Selected Answers for
Core Connections Algebra
Lesson 1.1.1

1-4.  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 \( x = 6 \).

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

1-6. a: [Diagram]

b: It grows by two tiles each time.

c: 1

Figure 4  Figure 5

1-7.  a: \(-59\)  b: 17  c: \(-72\)  d: 6  e: \(-24\)

f: \(-25\)  g: 25  h: \(-25\)  i: 7

1-8.  a: 5  b: 3  c: 4

Lesson 1.1.2 (Day 1)

1-13. a: \( 24 + 1 = 24 \) minutes; \( 24 + 2 = 12 \) minutes

b:

<table>
<thead>
<tr>
<th>Speed (in blocks per minute)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to Get to Friend’s House (in minutes)</td>
<td>24</td>
<td>12</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>2.4</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

c: The time decreases:

1-14. a: 11  b: \( \frac{5}{2} \)  c: 22  d: 27

1-15. a: [Diagram]
b: [Diagram]  c: [Diagram]  d: [Diagram]  e: [Diagram]

1-16. a: \( x = 0 \)  b: \( x = \) any number  c: \( x = 14 \)  d: no solution

1-17. a: \( -\frac{5}{18} \)  b: \( -\frac{51}{35} \)  c: \( -\frac{3}{5} \)  d: \( \frac{7}{8} \)
Lesson 1.1.2 (Day 2)

1-18. a: $18  
       b: 8.4 gallons  
       c: The line would get steeper.

1-19. a: $x = -3$  
       b: $x = 5$  
       c: $x = \frac{2}{3}$

1-20. a: $-8$  
       b: $-56$  
       c: 3  
       d: 6

1-21. a:  
       b:  
       c:  
       d:  

1-22. a: Function A = 84, Function B = no solution  
       b: He cannot get an output of 0 with Function A.  
       He can get an output of 0 by putting a 4 in Function B.

Lesson 1.1.3

1-25. See graph at right. The graph is a parabola opening up. There is a vertical line of symmetry through (0, 3). (0, 3) is the vertex and a minimum. There are no x-intercepts. The y-intercept is (0, 3).

1-26. a:  
       b:  
       c:  
       d:  

1-27. There is only one line of symmetry: horizontal through the middle.

1-28. a: $x = 3$  
       b: $x = 1$  
       c: $x = -1.5$  
       d: $x = -1$

1-29. Either 15 or −15; yes
Lesson 1.2.1

1-33. a: \[
\begin{array}{ccc}
7 & -14 \\
-7 & & \\
\end{array}
\]
   
   b: \[
\begin{array}{ccc}
\frac{9}{4} & 3 \\
\frac{3}{2} & \frac{3}{2} \\
\end{array}
\]
   
   c: \[
\begin{array}{ccc}
\frac{5}{4} & \frac{5}{2} \\
-3 & & \\
\end{array}
\]
   
   d: \[
\begin{array}{ccc}
\frac{-100}{10} & 0 \\
10 & & \\
\end{array}
\]

1-34. a: 2       b: 30       c: 13       d: 7

1-35. a: 4       b: 2       c: -2       d: 5

1-36. a: \(x = -\frac{2}{9}\)       b: no solution       c: \(x = \frac{3}{11}\)       d: \(x = 0\)

1-37. a: 
   b: 51 tiles. Add 5 tiles to get the next figure.

1-38. a: 
   b: The graph is a curve, going up. As \(x\) increases, \(y\) increases.
   c: Answers will vary.
   d: Exponential

1-39. a: 1       b: 0       c: 2       d: 7

1-40. a: \(x = 2\)       b: \(x = -7\)       c: \(x = -3\)       d: \(x = 1\)

1-41. a: \(y = 5\)       b: \(y = -3\)       c: \(y = 11\)

1-42. The graph is a parabola opening up. The vertex is at \((-4, -9)\) and is a minimum. It has a vertical line of symmetry through the vertex. The \(x\)-intercepts are \((-7, 0)\) and \((-1, 0)\). The \(y\)-intercept is \((0, 7)\).
Lesson 1.2.2

1-47. V-shaped graph, opening upward. As $x$ increases, $y$ decreases left to right until $x = -2$, then $y$ increases. $x$-intercepts: $(-3, 0)$ and $(-1, 0)$. $y$-intercept: $(0, 1)$. Minimum output of $-1$. Special point (vertex) at $(-2, -1)$. Symmetric across the line $x = -2$.

1-48. a: 1  b: 2  c: -11  d: 28

1-49. a: $x = -2$  b: $x = 1 \frac{1}{2}$  c: $x = 0$  d: no solution

1-50. Answers will vary.

1-51. a:  
\[
\begin{array}{c}
\frac{1}{2} \\
\frac{1}{4} \\
\frac{1}{2} \\
1 \\
\end{array}
\]

b:  
\[
\begin{array}{c}
\frac{1}{3} \\
\frac{1}{4} \\
\frac{3}{4} \\
\frac{13}{12} \\
\end{array}
\]

c:  
\[
\begin{array}{c}
x^2 \\
x \\
x \\
2x \\
\end{array}
\]

d:  
\[
\begin{array}{c}
a \\
b \\
a+b \\
\end{array}
\]

Lesson 1.2.3

1-57. a: 1  b: 9  c: $t^2$

1-58. a: 3  b: 12  c: 3  d: 2

1-59. See table and graph below. The graph is flat S-shaped and increasing everywhere (left to right); $x$-intercept is $(8, 0)$; $y$-intercept is $(0, -2)$; any value can be input, and any value can be the output; there is no maximum or minimum; $(0, -2)$ is a special point because that is where the “S” turns direction; there are no lines of symmetry.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-8</td>
<td>-4</td>
</tr>
<tr>
<td>-1</td>
<td>-3</td>
</tr>
<tr>
<td>0</td>
<td>-2</td>
</tr>
<tr>
<td>1</td>
<td>-1</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
</tr>
</tbody>
</table>

1-60. No

1-61. a: 0.75  b: 99  c: 2  d: $\pi$
Lesson 1.2.4

1-66. \(1, 5, \approx 8.54\)

1-67. \(a: x = -7\) \(b: x = -1\) \(c: x = 9\) \(d: x = 34\)

1-68. \(a: 7\) \(b: -20\) \(c: 3\) \(d: -5\)

1-69. See graph at right. It is a parabola opening down. The vertex and maximum are at \((0, 3)\). The \(x\)-intercepts are approximately \((-1.75, 0)\) and \((1.75, 0)\). There is a vertical line of symmetry through \((0, 3)\).

1-70. \(a: 8\) \(b: 1\) \(c: -2\) \(d: \text{no solution}\)

Lesson 1.2.5

1-78. \(a: \) Not a function because more than one \(y\)-value is assigned for \(x\) between \(-1\) and \(1\) inclusive.

\(b: \) Appears to be a function

\(c: \) Not a function because there are two different \(y\)-values for \(x = 7\).

\(d: \) Function

1-79. \(a: \) \(x\)-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 \((0, -1)\)

1-80. \(a: 2\) \(b: 53\)

1-81. \(a: \) yes \(b: -6 \leq x \leq 6\) \(c: -4 \leq y \leq 4\)

1-82. \(a: x = -8\) \(b: x = 144\) \(c: x = 3\) or \(x = -5\)
Lesson 2.1.1

2-6. \( y = 7x + 5 \)

2-7. \( a: 5 \quad b: -1 \quad c: 132 \quad d: -2 \)

2-8. \( a: 2 \quad b: -4 \quad c: -5, -2, 0, 2, 4 \quad d: -2 \quad e: 13 \)

2-9. \( a \) and \( b \): They are functions because each only has one output for each input.

\( c \): Not a function.

\( d \): (a) \( D: \) all real numbers, \( R: 1 \leq y \leq 3 \); (b) \( D: \) all real numbers, \( R: y \geq 0 \);

\( c \): \( x \geq -2 \), \( R: \) all real numbers

2-10. All graphs have lines of symmetry. Graph (a) has multiple vertical lines of symmetry, one at each maximum and minimum; graph (b) has one line of symmetry at \( x = 1 \); graph (c) has one line of symmetry at \( y = 1 \).

Lesson 2.1.2

2-19. Answers will vary. See graph at right.

2-20. \( a: -10 \quad b: -3 \quad c: -3 \quad d: -2\frac{2}{3} \)

2-21. Answers will vary.

2-22. \( y = 3x \)

2-23. No solution; you cannot divide by zero.

2-24. \( m = \frac{1}{3} \)
Lesson 2.1.3

2-31. \( f(x) = 4x + 4 \)

2-32. a: Line \( a: y = 2x - 2 \), Line \( b: y = 2x + 3 \)

2-33. See graph at right. \( y = \frac{4}{3} x - 4 \)

2-34. Answers will vary.

2-35. \( x \neq -5 \) because of the denominator cannot be 0.

Lesson 2.1.4

2-41. a: \( m = \frac{1}{2} \) \hspace{1cm} b: \( (0, -4) \) \hspace{1cm} c: \hspace{1cm} d: \hspace{1cm}

2-42. a: \( m = -2 \) \hspace{1cm} b: \( m = 0.5 \) \hspace{1cm} c: Undefined \hspace{1cm} d: \( m = 0 \)

2-43. No; when \( x = 12 \), \( y = 102 \), so it would have 102 tiles.

2-44. a: \( m = \frac{5}{3} \), \( b = (0, -4) \) \hspace{1cm} b: \( m = -\frac{4}{7} \), \( b = (0, 3) \) \hspace{1cm} c: \( m = 0 \), \( b = (0, -5) \)

2-45. a: \(-18\) \hspace{1cm} b: \(-4\) \hspace{1cm} c: undefined \hspace{1cm} d: \(-5\)

Lesson 2.2.1

2-48. a: \( 4 \) \hspace{1cm} b: \( 16 \) \hspace{1cm} c: \( y = 4x + 6 \) \hspace{1cm} d: It would get steeper.

2-49. a: \( -\frac{4}{3} \) \hspace{1cm} b: \( (0, -5) \) \hspace{1cm} c: \( y = -\frac{4}{3}x - 5 \)

2-50. a: \( x = 12 \) \hspace{1cm} b: \( w = 0 \) \hspace{1cm} c: \( x = -8 \) \hspace{1cm} d: no solution

2-51. \( y = -4x - 3 \)

2-52. Graphs (a) and (b) have a domain of all numbers, while graphs (a) and (c) have a range of all numbers. Graphs (a) and (b) are functions.
Lesson 2.2.2

2-59. \( y = 2x + 3 \)

2-60. 
- a: 
- b: 
- c: 
- d: 

2-61. 
- a: The dependent variable is distance in meters and the independent variable is 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.

2-62. \( x \)-intercept: (2, 0), \( y \)-intercept: (0, -10)

2-63. \( m = 3 \)

2-64. 

2-65. 
- a: \( y = -2x + 1 \)
- b: \( x: (0.5, 0), y: (0, 1) \)

2-66. 
- a: 1
- b: 0
- c: 2
- d: 7

2-67. 
- a: \( GF = 5, Fig \ 0 = 3 \)
- b: \( GF = -2, Fig \ 0 = 3 \)
- c: \( GF = 3, Fig \ 0 = -14 \)
- d: \( GF = -5, Fig \ 0 = 3 \)
Lesson 2.2.3

2-70.  a: (4, 0) and (0, -2)     b: (8, 0) and (0, 4)

2-71.  a: -1             b: -\( \frac{1}{2} \)     c: \( \frac{3}{2} \)     d: -\( \frac{1}{5} \)
        e: The line travels downward from the left to right, so \( m = -1 \).

2-72.  a: 2 \( \frac{38}{65} \)     b: -37 \( \frac{1}{8} \)     c: -5 \( \frac{1}{8} \)     d: -6 \( \frac{1}{3} \)

2-73.  \( y = -5x + 3 \)

<table>
<thead>
<tr>
<th>IN (x)</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT (y)</td>
<td>-7</td>
<td>-17</td>
<td>-27</td>
<td>-32</td>
<td>-37</td>
<td>-47</td>
</tr>
</tbody>
</table>

2-74.  a: 4             b: 3             c: 1             d: 2

Lesson 2.3.1

2-82.  a: \( y = 1.5x + 0.5 \)     b: Answers will vary.

2-83.  a:  \[ \begin{array}{l} -11 \\ 11 \\ 10 \end{array} \]  \[ \begin{array}{l} -1 \end{array} \]     b: \[ \begin{array}{l} -15 \\ -3 \\ 2 \end{array} \]  \[ \begin{array}{l} 2 \end{array} \]     c: \[ \begin{array}{l} 2 \\ \frac{1}{3} \\ \frac{5}{6} \end{array} \]  \[ \begin{array}{l} 2 \\ \frac{2}{3} \end{array} \]     d: \[ \begin{array}{l} -14 \\ -7 \\ -5 \end{array} \]  \[ \begin{array}{l} 2 \end{array} \]

2-84.  a: (3.5, 0) and (0, -2.23)     b: \( y = \frac{13}{3} \approx 4.33 \)

2-85.  a: 3, (0, 5)     b: -\( \frac{5}{4} \), (0, 0)     c: 0, (0, 3)     d: 4, (0, 7)

2-86.  

\[ \begin{array}{c}
\begin{array}{c}
\bullet \\
\bullet
\end{array}
\end{array} \]
Lesson 2.3.2

2-90. a: The slope represents the change in height of a candle per minute, \( m = 0 \text{ cm per minute} \).
   b: The slope represents the gallons per month of water being removed from a storage tank, \( m = -900 \text{ gallons per month} \).

2-91. \( y = -3x + 25 \)


2-93. \( A = 50w + 100, A = (50)(52) + 100 = 2700 \)

2-94. a:

<table>
<thead>
<tr>
<th>Days (x)</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height cm (y)</td>
<td>30</td>
<td>27</td>
<td>24</td>
<td>21</td>
<td>18</td>
</tr>
</tbody>
</table>

b: \( \frac{-3 \text{ cm}}{2 \text{ days}} \) or \(-1.5 \text{ cm/day}\)

c: \( y = -\frac{3}{2}x + 30 \)

Extension Activity

2-96. The equation in part (b) has no solution. There are the same number of \( x \)-terms on each side of the equation.

2-97. Rena is correct.

2-98. a: \( \frac{-5 \text{ pounds}}{2 \text{ months}} \) or \(-2.5 \text{ pounds/month}\)

b: \( y = -\frac{5}{2}x + 120 \)

2-99.

2-100. \( y = 7x + 9 \)
Lesson 3.1.1

3-6.  a: \( \frac{1}{h^2} \)      b: \( x^7 \)      c: \( 9k^{10} \)
      d: \( n^8 \)      e: \( 8y^3 \)      f: \( 28x^3y^6 \)

3-7.  a: incorrect, \( x^{100} \)      b: correct      c: incorrect, \( 8m^6n^{45} \)

3-8. 

3-9.  Let \( x = \) number of weeks.  \( 150 + 10x \)

3-10. a: 9      b: -4      c: -1      d: \( \frac{1}{2} \)

3-11. a: \( -\frac{7}{10} \)      b: \( -2\frac{2}{3} \)      c: 3\( \frac{1}{3} \)      d: -3

Lesson 3.1.2

3-19.  b, c, d, f

3-20.  a: \( \frac{1}{4} \)      b: 1      c: \( \frac{1}{5^2} = \frac{1}{25} \)      d: \( \frac{1}{x^2} \)

3-21.  a: \( x = 3 \)      b: \( x = 6 \)      c: \( x = 2 \)      d: \( x = 4 \)

3-22.  a: \( m = -\frac{1}{3} \)      b: \( y = -\frac{1}{3}x - 2 \)

3-23.  Let \( x = \) number of weeks.  \( 1500 - 35x = 915; \ x = 17 \) weeks

3-24.  \( y = 3x - 1 \)
Lesson 3.2.1

3-33. a: $4x^2 + 6x + 13$  
   b: $5y^2 + 8x + 19$
   c: $9x^2 + x + 44$  
   d: $5y^2 + 6xy + 30$

3-34. a: $x = -8$  
   b: $x = 1$

3-35. A pair of parallel lines.

3-36. Let $x =$ the number of votes for candidate B, $x + (x - 15,000) = 109,000$. 62,000 votes

3-37. a: $1\frac{1}{6}$  
   b: $-13\frac{3}{10}$  
   c: $-14\frac{17}{20}$  
   d: $-7\frac{1}{6}$

3-38. $y = \frac{1}{2}x + 1$

3-39. a: $4x + 2y + 6$  
   b: $2x + 4$  
   c: $4y + 2x + 6$  
   d: $2y + 2x + 6$

3-40. Possible equation: $2 + (-2x) - (4 - x) = 2 + (-3) - (x - 2)$ or $2 + (-2x) - (-x) - 4 = 2 + -3 - x - (-2)$

3-41. a: $x = 8$

   b: 
   
   \[
   \begin{array}{|c|c|c|c|c|c|c|}
   \hline
   x & -2 & 0 & 2 & 4 & 6 & 8 & 10 \\
   y & -5 & -4 & -3 & -2 & -1 & 0 & 1 \\
   \hline
   \end{array}
   
   
   c: It is the point where the lines intersects the x-axis on the graph. It is the x-value when y = 0 in the table.

3-42. a: 16  
   b: 2  
   c: undefined  
   d: 0

3-43. B

3-44. a: $15x^2$  
   b: $8x$  
   c: $6x^2$  
   d: $7x$
Lesson 3.2.2

3-48. \(77 + 56 + 33 + 24 = 190\) square units

3-49. \((2x + 4)(x + 2) = 2x^2 + 8x + 8\)

3-50. a: Multiply by 6. b: \(x = 15\) c: \(x = 4\)

3-51. a: \(m = 3\) b: \((0, -2)\) c: \(y = 3x - 2\)

3-52. \(10,000 + 1500x = 18,000 + 1300x\), \(x = 40\) months

3-53. The \(x\)-intercepts are \((1.5, 0)\) and \((-1, 0)\); the \(y\)-intercept is \((0, -3)\).

<table>
<thead>
<tr>
<th>(x)</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>(y)</td>
<td>7</td>
<td>0</td>
<td>-3</td>
<td>-2</td>
<td>3</td>
<td>12</td>
</tr>
</tbody>
</table>

Lesson 3.2.3

3-58. a: \((x + 1)(x + 3) = x^2 + 4x + 3\) b: \((2x + 1)(x + 2) = 2x^2 + 5x + 2\)

3-59. a: 238 square units b: 112 square units

3-60. a: \(x = 6\) b: \(x = 16\) c: \(x = 15\) d: \(x = 8\)

3-61. 30 ounces

3-62. \(y = \frac{2}{3}x - 3\)

3-63. a: \(-15 \frac{1}{12}\) b: \(-5 \frac{1}{4}\) c: 17 d: \(-10 \frac{5}{8}\)

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Lesson 3.2.4

3-70.  a: $2x^2 + 17x + 30$  
    b: $3m^2 - 4m - 15$  
    c: $12x^3 + x^2 - 60x - 5$  
    d: $6 - 7y - 5y^2$  

3-71.  $y = -2x + 13$  

3-72.  a: After 3 hours  
    b: 8  

3-73.  $(-2, -1)$ See graph at right.  

3-74.  They are not. An odd number added to an odd number is an even number.  

3-75.  a: $-15x$  
    b: $64p^6q^3$  
    c: $3m^8$  

Lesson 3.3.1

3-81.  a: $-20xy - 32y^2$  
    b: $-36x + 90xy$  
    c: $x^4 + 3x^3 + 3x^2 - 6x - 10$  

3-82.  Yes, for even numbers. On a number line, if you start at any multiple of two and add a multiple of two (an even number), you will always be stepping up the number line in multiples of two; you will always land on an even number. No for odd numbers. For example, $3 + 5 = 8$; the sum of two odd numbers is not always odd.  

3-83.  $(x - 5)(x + 3) = x^2 - 2x - 15$  

3-84.  a: $x = 8$ or $x = -2$  
    b: $x = \pm 7$  
    c: $x = 1$ or $x = -3$  
    d: no solution  

3-85.  a:  
    b:  
    c:  
    d:  

3-86.  a: 12  
    b: 59  
    c: 7  
    d: 9  
    e: $-13$  
    f: $-5$
Lesson 3.3.2

3-93. a: \( x = \pm 7 \)  
       b: \( x = \pm 16 \)  
       c: \( x = 3, -17 \)  
       d: \( x = \pm 53.1 \)

3-94. a: \( x = 6 + \frac{2}{3} y \)  
       b: \( y = \frac{3}{2} x - 9 \)  
       c: \( r = \frac{d}{\pi} \)  
       d: \( r = \frac{C}{2\pi} \)

3-95. a: \( 5 \frac{5}{9} \)  
       b: \( -11 \frac{17}{35} \)  
       c: \( 6 \frac{30}{49} \)  
       d: \( 1 \frac{163}{550} \)

3-96. a: \( y = -11 \)  
       b: \( y = -\frac{3}{4} x + 21 \)

3-97. See graph at right. \( (2, -5) \)

3-98. a: \( x^4 y^3 \)  
       b: \( xy \)  
       c: \( -6x^6 \)  
       d: \( 8x^3 \)

3-99. a: \( x = 10 \) or \( x = -16 \)  
       b: \( x = \frac{9}{2}, -\frac{11}{2} \)  
       c: \( x = -\frac{1}{3} \) or \( x = -\frac{1}{3} \)  
       d: no solution

3-100. a: \( 5x^2 - 30x \)  
        b: \( -54y^2 + 27y^2 \)

3-101. a: \( 2x(x + 5) = 2x^2 + 10x \)  
        b: \( (2x + 3)(x + 5) = 2x^2 + 13x + 15 \)

3-102. a: \( x = 5 \)  
        b: \( x = 2 \)  
        c: \( y = 0 \)  
        d: \( x = 38 \)

3-103. a: \( 4x^2 + 17x + 15 \)  
        b: \( -6x^3 - 20x^2 - 16x \)  
        c: \( -3xy + 3y^2 8x - 8y \)  
        d: \( 3xy + 5y^2 - 22y - 12x + 8 \)

3-104. a: \( x = \frac{x + 5}{2} \)  
        b: \( w = \frac{n - 9}{-3} \)  
        c: \( m = \frac{(4n + 10)}{2} \)  
        d: \( y = -3x \)
Lesson 3.3.3

3-107. a: x = 0    b: x = 8    c: x = 1    d: x = -3, 13

3-108. y = 3x - 5

3-109. y = \frac{1}{5}x + 7

3-110. a: -\frac{19}{24}    b: 4\frac{5}{6}    c: \frac{7}{3} = 1\frac{2}{3}
       d: -\frac{8}{3} = -2\frac{2}{3}    e: -3\frac{7}{12}    f: 2\frac{2}{7}

3-111. 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

3-112. a: 15x^3y    b: y    c: x^5    d: \frac{8}{x^3}

Lesson 4.1.1 (Day 1)

4-8. Approximately \( f = 58 + 7a \) where \( f \) is the final exam score (in percent) and \( a \) is the AP score; about 79%. See graph at right.

4-9. a: no solution    b: x = 13

4-10. (-1, 3)

4-11. 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.

4-12. a: 3y(y - 4) = 3y^2 - 12y    b: (3y + 5)(y - 4) = 3y^2 - 7y - 20

4-13. No; 2 is a prime number and it is even.
Lesson 4.1.1 (Day 2)

4-14. If $x =$ the length, $2(x) + 2(3x - 1) = 30,$ width is 4 in., length is 11 in.

4-15. Lakeisha, Samantha, Carly, Barbara, and Kendra.

4-16. She combined terms from opposite sides of the equation. Instead, line 4 should read $2x = 14,$ so $x = 7$ is the solution.

4-17. This statement is sometimes true. It is true when $x = 0,$ but otherwise it is false because the Distributive Property states that $a(b + c) = ab + ac.$

4-18. $y = \frac{1}{2} x + \frac{5}{2}$

4-19. a: $6x^2 - x - 2$  b: $6x^3 - x^2 - 12x - 5$

Lesson 4.1.2

4-25. a: $r - 4; \ 2(t - 4)$ b: $150 - c$ c: $14.95c + 39.99v$

4-26. If Nina has $n$ nickels, then $5n + 9 + 5(2n) = 84,$ and $n = 5$ nickels.

4-27. See table and graph below. $x$-intercepts $(−2, 0)$ and $(5, 0)$ and $y$-intercept $(0, 10)$.

<table>
<thead>
<tr>
<th>$x$</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y$</td>
<td>-8</td>
<td>0</td>
<td>6</td>
<td>10</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>6</td>
<td>0</td>
<td>-8</td>
</tr>
</tbody>
</table>

4-28. a: not a function, D: $−3 ≤ x ≤ 3,$ R: $−3 ≤ y ≤ 3$
   b: a function, D: $−2 ≤ x ≤ 3,$ R: $−2 ≤ x ≤ 2$

4-29. $x = 1;$ It will create a fraction with a denominator of zero, which is undefined.

4-30. a: $−15$ b: $−4$ c: 3 d: $−m^3$
Lesson 4.2.1

4-36. A very strong positive non-linear association with no apparent outliers.

4-37. a: $a = 0$  
        b: $m = -2$  
        c: $x = 10$  
        d: $t = 2$

4-38. a: $ii$  
        b: 4 touchdowns and 9 field goals

4-39. a: 

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>3</td>
</tr>
<tr>
<td>-2</td>
<td>1</td>
</tr>
<tr>
<td>-1</td>
<td>-1</td>
</tr>
<tr>
<td>0</td>
<td>-3</td>
</tr>
<tr>
<td>1</td>
<td>-5</td>
</tr>
<tr>
<td>2</td>
<td>-7</td>
</tr>
<tr>
<td>3</td>
<td>-9</td>
</tr>
</tbody>
</table>

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

4-40. Katy is correct; the $6x - 1$ should be substituted for $y$ because they are equal.

4-41. a: $\frac{1}{8}$  
        b: $b^4$  
        c: $9.66 \times 10^{-1}$  
        d: $1.225 \times 10^7$

Lesson 4.2.2

4-49. Yes; each point makes the equation true.

4-50. a: $(3, 5)$  
        b: Answers will vary.

4-51. a: $h = 2c - 3$  
        b: $3h + 1.5c = 201$  
        c: 28 corndogs were sold.

4-52. a: 

b: 

<table>
<thead>
<tr>
<th>6</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

c: 

<table>
<thead>
<tr>
<th>5</th>
<th>-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>-6</td>
</tr>
</tbody>
</table>

d: 

<table>
<thead>
<tr>
<th>-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
</tr>
<tr>
<td>-2</td>
</tr>
</tbody>
</table>

4-53. Yes; adding equal values to both sides of an equality preserves the equality.

4-54. a: $x = 2.2$  
        b: $x = 6$  
        c: $x = -10.5$  
        d: $x = 0$
Lesson 4.2.3

4-60.  a: \((-5, 1)\)  b: \((3, 1)\)  c: no solution

4-61.  a: There are infinite solutions.
        b: The two lines coincide.
        c: Since the two lines coincide, they will have an infinite number of points of
           intersection. Thus, the system has infinite solutions.

4-62.  a: Let \(p\) represent the number of pizza slices and \(b\) represent the number of burritos
        sold. Then \(2.50p + 3b = 358\) and \(p = 2b - 20\).

4-63.  $36.88

4-64.  a: \(x^2 - 3x - 10\)  b: \(y^2 + 5xy + 6x^2\)
        c: \(-3xy + 3y^2 + 8x - 8y\)  d: \(x^2 - 9y^2\)

4-65.  a: Moderately strong negative linear association with no apparent outliers.
        b: About 25mpg

Lesson 4.2.4

4-71.  a: \((3, 1)\)  b: \((0, 4)\)  c: \((10, 2)\)  d: \((-4, 5)\)

4-72.  These lines coincide. There are infinite points of intersection.

4-73.  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 \(x = -6\frac{6}{7}\)

4-74.  They are both correct. The lines coincide.

4-75.  \(y = 2x + 5\), 105 tiles

4-76.  a: \(b = y - mx\)  b: \(x = \frac{y-b}{m}\)  c: \(t = \frac{1}{pr}\)  d: \(t = \frac{A-p}{pr}\)
Lesson 4.2.5

4-81.  a: \(0, \frac{1}{3}\)  b: \((-6, 2)\)  c: no solution  d: \((11, -5)\)

4-82.  \(2n = p\) and \(n + p = 168\); 56 nectarines are needed.

4-83.  a: Yes, because these expressions are equal.

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

4-84.  a: \(-127\)  b: 10  c: \(-4\)  d: \(-24\)

4-85.  a: See graph at right.  \(u = 37 - 13.7p\) where \(p\) is the price in dollars and \(u\) is the number of un popped kernels.

b: \(\approx 21\) kernels

4-86.  a: \(m = -12\)  b: \(x = -24\)  c: \(x = \frac{16}{5}\)

Lesson 4.3.1 (Day 1)

4-98.  a: all numbers  b: \(\left(\frac{1}{3}, \frac{3}{2}\right)\)  c: \((1, 2)\)  d: \((8, 7)\)

4-99.  a: It is a line.

b: Answers will vary.

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

4-100.  \(y = 2x + 6\); 206 tiles

4-101.  See graph above right.  \((-1, 0)\) and \((2, 0)\)

4-102.  Mr. Greer distributed incorrectly.

The correct solution is \(x = 2\).

4-103.  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: \(\approx 61\)
Lesson 4.3.1 (Day 2)

4-104. \( n + d = 30 \) and \( 0.05n + 0.10d = 2.60 \), so \( n = 8 \). There are 8 nickels.

4-105. (a), (b), and (d)

4-106. \( y = -5x + 3 \)

<table>
<thead>
<tr>
<th>IN (x)</th>
<th>2</th>
<th>10</th>
<th>6</th>
<th>7</th>
<th>-3</th>
<th>0</th>
<th>-10</th>
<th>100</th>
<th>( x )</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT (y)</td>
<td>-7</td>
<td>-47</td>
<td>-27</td>
<td>-32</td>
<td>18</td>
<td>3</td>
<td>53</td>
<td>-497</td>
<td>-5x + 3</td>
</tr>
</tbody>
</table>

4-107. a: \( \frac{8}{23} \)  
   b: \( xy^6 \)  
   c: \( 1.2 \times 10^9 \)  
   d: \( 8 \times 10^3 \)

4-108. Answers will vary.

4-109. a: -2  
   b: 9  
   c: 3  
   d: 1  
   e: 3  
   f: 5

Lesson 4.3.1 (Day 3)

4-110. C

4-111. a: no solution  
   b: \( x = 5, y = 2 \)

4-112. These expressions are equivalent because of the Commutative Properties of Addition and Multiplication.

4-113. a: \( x^2 + 9x + 20 \)  
   b: \( 2y^2 + 6y \)

4-114. a: \( x = -5 \)  
   b: \( y = 2x - 3 \)
   c: no solution  
   d: \( y = -3x + 5 \)

4-115. 17, 18, and 19
Lesson 5.1.1

5-6.  a: Rabbits-108; 324  b: Rabbits-12; 48

5-7.  a: (1, 2)  b: (-3, 2)

5-8.  a: -6  b: -2  c: -\( \frac{2}{3} \)  d: undefined  e: \( x = 2.25 \)

5-9.  \( \frac{27b^3}{a^6} \)

5-10. a: \( x \)  b: \( y^7 \)  c: \( \frac{1}{4} \)  d: \( 64x^6 \)

5-11. a: Answers will vary.  b: \( y = -1 \)  c: \( x = 0 \)

5-12. a: curved  b:

<table>
<thead>
<tr>
<th>Time (days)</th>
<th>Number of cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1000</td>
</tr>
<tr>
<td>1</td>
<td>2000</td>
</tr>
<tr>
<td>2</td>
<td>4000</td>
</tr>
<tr>
<td>3</td>
<td>8000</td>
</tr>
<tr>
<td>4</td>
<td>16,000</td>
</tr>
</tbody>
</table>

5-13. a: \( 5^2 = 25 \)  b: \( 3^{51} \)

c: 1  d: \( 1.6 \times 10^{11} \)

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: \( m = 5 \)  b: \( a = \frac{4\pi}{7} \approx 1.80 \)

5-16. a: \( y = -2x + 7 \)  b: \( y = -\frac{3}{2}x + 6 \)

5-17. a: \( \frac{1}{4} \)  b: \( \frac{3}{4} \)
Lesson 5.1.2

5-22.  a: \((-1, -2)\)  b: \((3, 1)\)

5-23.  a: \(b = t - an\)  b: \(y = 3(b + a)\)  c: \(y = mx\)  d: \(x = \frac{y}{m}\)

5-24.  a: \(2xy^2\)  b: \(-m^3n^3\)  c: \(\frac{1}{3^0}\)  d: \(4 \times 10^{-6}\)

5-25.  a: domain: all numbers, range: \(y \leq 1\)  b: domain: all numbers, range: \(y \geq -1\)
        c: domain: all numbers, range: \(y \leq 0\)  d: domain: all numbers, range: \(y \geq -1\)

5-26.  There is no association between number of pets and age.

5-27.  a: \(y = -\frac{5}{2}x + 10\)  b: 12.5 inches

Lesson 5.1.3

5-34.  a: Answers will vary,  
        b: Approximately 228 cm. Since DeShawna measured to the nearest centimeter, a 
           prediction rounded to the nearest centimeter would be reasonable.  
        c: Approximately 72 cm.  
        d: Approximately 166 meters.  
        e: Approximately 138 meters, approximately 14 meters.

5-35.  a: \(10(0.555) = 5.55\) ft  b: \(10(0.555)(0.555) = 3.08\) ft  c: \(10(0.555)^5 = 0.527\) ft

5-36.  a: \((1, 1)\)  b: \((-1, 3)\)

5-37.  a: 144, 156, 168, 180  b: 264 stamps  c: \(f(n) = 12n + 120\)
        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.

5-38.  They are not on the same line; \(m_{AB} = -\frac{1}{5}\), \(m_{BC} = -\frac{1}{3}\), \(m_{AC} = -\frac{1}{4}\)

5-39.  a: \(y = -3x + 7\)  b: \(y = -x - \frac{2}{5}\)
Lesson 5.2.1

5-44. a: \( m = 3 \)  
      b: \( m = 6 \)  
      c: \( m = -5 \)  
      d: \( m = 1.5 \)

5-45. a: \(-3\)  
      b: \( y = -3x - 5 \)

5-46. 43 ounces

5-47. a: 15 cm  
      b: \( 15\sqrt{2} \approx 21.21 \) cm

5-48. a and b: Answers will vary.

5-49. a: Exponential, because the ratio of one rebound to the next is roughly constant \( \approx 0.6 \).  
      b: Roughly geometric, because it has a multiplier.

5-50. a: 1  
      b: 5  
      c: \( \sqrt{10} \approx 3.16 \)  
      d: undefined

5-51. a: \( 1.03y \)  
      b: \( 0.8z \)  
      c: 1.002x

5-52. a: 500 liters  
      b: 31.25 liters

5-53. \((-1, -7)\)  
      b: \( \left( \frac{1}{2}, 2 \right) \)

5-54. \( y = -10x + 170 \)

5-55. a: \( 4^7 \)  
      b: 1  
      c: \( x^{-2} = \frac{1}{x^2} \)  
      d: \( \frac{6}{x^3} \)  
      e: \( 1.28 \times 10^4 \)  
      f: \( 8 \times 10^{-3} \)
Lesson 5.2.2

5-65.  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.

5-66.  Answers will vary.

5-67.  a: \( m = 3, \ t(n) = 3n + 1 \)       b: \( m = 5, \ t(n) = 5n - 2 \)
       c: \( m = -5, \ t(n) = -5n + 29 \)       d: \( m = 2.5, \ t(n) = 2.5n + 4.5 \)

5-68.  a: Answers will vary.       b: $88.58$

5-69.  \( m = 13, b = 17 \)

5-70.  \( 5b + 3h = 339, \ b = h + 15; \) 48 bouquets and 33 hearts

Lesson 5.2.3

5-76.  a: \(-3.5, 1, 5.5, 10\)       b: Evaluate the equation for \( n = 15 \).

5-77.  \( t(n) = 3n + 2; \ t(n+1) = t(n) + 3; t(1) = 5 \)

5-78.  \( y = \frac{7}{2} x + 2 \)

5-79.  a: \( 16x^2 - 25 \)       b: \( 16x^2 + 40x + 25 \)

5-80.  Let \( x = \) number of months; \( 2x + 105 = -3x + 130; \) 5 months

5-81.  a: no solution       b: \((7, 2)\)
Lesson 5.3.1

5-85. a: exponential, multiply by 12  
    b: linear, add 5  
    c: other (quadratic)  
    d: exponential, multiply by 1.5

5-86. (2, −4)

5-87. a: −3, 6, −12, 24, −48  
    b: 8, 3, −2, −7, −12  
    c: 2, 1/2, 2, 1/2, 2

5-88. Moderate negative linear association with no outliers. The data appear to be in two clusters, probably indicating two classes of vehicles.

5-89. a: (4x + 1)(4x + 1) = 16x^2 + 8x + 1  
    b: (4x + 5)(2y − 3) = 8xy − 12x + 10y − 15

5-90. a: y = 2x − 3  
    b: y = −3x − 1  
    c: y = 2/3 x − 2  
    d: y = 5/2 x + 9

Lesson 5.3.2 (Day 1)

5-101. a: y = 2 · 4^x

\[
\begin{array}{c|ccccccc}
\text{Month (x)} & 0 & 1 & 2 & 3 & 4 & 5 & 6 \\ 
\hline
\text{Population (y)} & 2 & 8 & 32 & 128 & 512 & 2048 & 8192 \\
\end{array}
\]

b: y = 5 · (1.2)^x

\[
\begin{array}{c|ccccccc}
\text{Year (x)} & 0 & 1 & 2 & 3 & 4 & 5 & 6 \\ 
\hline
\text{Population (y)} & 5 & 6 & 7.2 & ~8.6 & ~10.4 & ~12.4 & ~14.9 \\
\end{array}
\]

5-102. a: 1.03  
    b: 0.75  
    c: 0.87  
    d: 1.0208

5-103. 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 (in meters) from the door.

5-104. a: 8m^5  
    b: 2y^3  
    c: \frac{-2}{3}y^5  
    d: −8x^6

5-105. 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 \( \frac{1}{2} \)
Lesson 5.3.2 (Day 2)

5-106.  a: $-3, -1, 1, 3, 5$  
        b: $3, -6, 12, -24, 48$

5-107.  a: $x = 2\frac{16}{5}$  
        b: no solution  
        c: $x = -4$ or $5$  
        d: $x = 2$

5-108.  a: $12, 7, 2, -3, -8; t(n) = 17 - 5n$  
        b: $32, 16, 8, 4, 2; a_n = 64(\frac{1}{2})^n$

5-109.  B

5-110.  a: $y = x + 2$  
        b: 28 grams

Lesson 5.3.3

5-117.  No; the 5th term is 160, and the 6th term is 320. Justifications will vary.

5-118.  Yes; $x = 5.322$

5-119.  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.

5-120.  a: $-4$  
        b: 6  
        c: 8  
        d: 1040

5-121.  a: $y = 23500(0.85)^x$, worth $2052.82$
        b: $y = 14365112(1.12)^x$, population 138,570,081

5-122.  $t(n) = -188n + 2560$

5-123.  a: all numbers  
        b: 1, 2, 3, ...  
        c: $x \neq 0$  
        d: 1, 2, 3, 4, ...
Lesson 6.1.1

6-4.  a: Strong positive linear association with one apparent outlier at 2.3cm.  
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: \(1.4 + 0.25(11.5) \approx 4.3g\)  
e: We predict that when the pencil is so short there is no paint left, the pencil is expected to weigh 1.4g.

6-5.  a: arithmetic  
b: \(t(n) = 3 + 4n\)  
c: \(n = 26.5\), so no.

6-6.  a: (15, 2)  
b: (−3, 4)

6-7.  a: \(-6,xy^4\)  
b: \(x\)  
c: \(\frac{2}{x^4}\)  
d: \(-\frac{1}{8x^3}\)

6-8.  a: \(x = \frac{y^2}{3}\)  
b: \(b = ac\)  
c: \(x = \frac{2y}{3} + 14\)  
d: \(t^2 = \frac{2g}{a}\)

6-9.  a: −43  
b: 58.32

Lesson 6.1.2

6-16. 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.

6-17.  a: geometric  
b: \(5^5 = 3125\)  
c: \(a_n = 5^n\)

6-18.  \(a_n = t(n) = -2 + 6n\)

6-19.  7 ounces

6-20.  a: \(W = \frac{V}{LH}\)  
b: \(x = 2(y - 3)\)  
c: \(R = \frac{E}{I}\)  
d: \(y = \frac{1}{3 - 2x}\)

6-21.  (3, −2)
Lesson 6.1.3

6-24. a: The form is linear, the direction is negative, the strength is moderate, and there are no apparent outliers.
   b: About $5 - 1.6x$; 2.6 days
   c: $3.3 - 2.6 = 0.7$ days. The cold actually lasted 0.7 days longer than was predicted by the linear model.
   d: 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.

6-25. \[ a_n = f(n) = 4 \cdot 3^n \]

6-26. a: \[ y = -\frac{2}{3}x + 8 \]  \hspace{1cm} b: (12, 0).

6-27. a: \[ y(x + 3 + y) = xy + 3y + y^2 \]  \hspace{1cm} b: \((x + 8)(x + 3) = x^2 + 11x + 24\)

6-28. See graph at right. \((-2, 0), (0, \sqrt{2}), x \geq -2, y \geq 0\)

6-29. a: \[ y = \frac{3x - 10}{5} = \frac{3}{5}x - 2 \]
Lesson 6.1.4 (Day 1)

6-35. 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 that 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.

6-36. a: 1.05 \hspace{1cm} b: 20(1.05)^5 = $25.52 \hspace{1cm} c: t(n) = 20(1.05)^n$

6-37. a: (2, −4) \hspace{1cm} b: \left(3, -\frac{3}{2}\right)$

6-38. a: 1 \hspace{1cm} b: 2 \hspace{1cm} c: undefined \hspace{1cm} d: −1.8

6-39. $m = -\frac{2}{3}$, (3, 0), (0, 2); See graph at right.

6-40. 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.
Lesson 6.1.4 (Day 2)

6-41. a: Answers will vary.
   b: The y-intercept is halfway between 11.27 and 7.67, so the 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

6-42. a: See scatterplot at right. \( y = 1.6568 + 0.1336x \)
   b: See table below; sum of the squares is 0.5881 in\(^2\).

<table>
<thead>
<tr>
<th>Distance from wall (in)</th>
<th>Residual (in)</th>
</tr>
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<tbody>
<tr>
<td>144</td>
<td>-0.198</td>
</tr>
<tr>
<td>132</td>
<td>0.305</td>
</tr>
<tr>
<td>120</td>
<td>-0.391</td>
</tr>
<tr>
<td>96</td>
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</tr>
<tr>
<td>72</td>
<td>0.123</td>
</tr>
<tr>
<td>60</td>
<td>-0.374</td>
</tr>
</tbody>
</table>

6-43. a: \( x = 2 \)          b: \( x = 4 \)

6-44. a: 0.85              b: 1500(0.85)\(^4\) = $783
   c: \( a_n = 1500(0.85)^n \)

6-45. a: D: \(-2 \leq x \leq 2\), R: \(-3 \leq y \leq 2\)
   b: D: \( x = 2 \), R: all numbers
   c: D: \( x \geq -2 \), R: all numbers
   d: Only graph (a).

6-46. a: \( a_n = 20 - 3n \)
       b: \( a_n = 40 \left( \frac{1}{2} \right)^n \)
Lesson 6.2.1

6-55. a: \( y = 5.37 - 1.58x \)
   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: Answers will vary.
   f: A negative residual is desirable because it means the actual cold was shorter than was predicted by the model.

6-56. \( a_n = t(n) = 32(\frac{1}{2})^n \)

6-57. a: \(-\frac{3}{4}\)  
   b: 10

6-58. The graph is a parabola opening upward. From left to right the graph decreases until \( x = 2 \) and then increases. The vertex is at \((2, -1)\).  
   The \( x \)-intercepts are at \((1, 0)\) and \((3, 0)\). The \( y \)-intercept is at \((0, 3)\). 
   The line of symmetry is at \( x = 2 \). The domain is all real numbers and the range is \( y \geq -1 \).

6-59. a: \((5x - 3)(2x - 4y + 5) = 10x^2 - 20xy + 19x + 12y - 15\)
   b: Answers will vary.

6-60. a:  
   b:  
   c:  
   d: 

6-61. a: \( x = -7 \)  
   b: \( x = -1 \)  
   c: \( x = 9 \)  
   d: \( x = 34 \)

6-62. \( a + p = 11, \ 0.60a + 0.35p = 5.60 \): 7 apples and 4 pears

6-63. \( -\frac{4}{3} \)  
   a: \( y = -\frac{4}{3}x \)  
   b: Yes; Substitute \(-3\) for \( x \) and \( 4 \) for \( y \).

6-64. She should add 1 first, since the addition is placed inside the absolute value symbol, which acts as a grouping symbol.

6-65. a: There is no solution, so the lines do not intersect.
   b: \( y = \frac{3}{5}x - \frac{10}{3} \)
   c: Yes; both lines have the same slope.

6-66. \( y = 2x - 1 \)
Lesson 6.2.2

6-73. a: \[ \text{Graph showing data points and a line.} \]
   b: \[ y = 1.300 + 0.248x. \]

c: \[ \text{Graph showing a residual plot.} \]
   d: Yes, the residual plot appears randomly scattered with no apparent pattern.

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

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

6-74. a: \( x = 0.2 \)
   b: \( x = -\frac{1}{2} \)

6-75. a: \( \frac{9x^2}{y^4} \)
   b: \( \frac{2x^2}{y} \)
   c: \( \frac{x}{2} \)

6-76. Multiplier of 1.03, 3% increase

6-77. 9 employees

6-78. a: \(-\frac{1}{60}\)
   b: \(-7\frac{5}{9}\)
   c: \(\frac{1}{24}\)
   d: \(-12\)
Lesson 6.2.3

6-85.  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: $r = 0.998$ a very strong positive linear association.

6-86.  a: With each additional degree of temperature, 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. The predictions from the model may be too low.

       c: The residual is about 17 thousand people; the LSRL predicts 24.95 thousand people. 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.

       e: Answers will vary.

6-87.  a: $a_4 = a_3 + 6 = 23$  b: $a_5 = a_4 + 6 = 29$  c: 5, 11, 17, 23, 29

6-88.  a: $2a^2 - 5ab - 3b^2$  b: $x^2 + x + 10$

6-89.  a: $x = \frac{12}{7}$  b: $x = 15$
Lesson 6.2.4

6-99. \( r \approx 0; \) Answers will vary.

6-100. 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 which can afford the considerable expense of bottled water can also afford better nutrition and better health care.

6-101. \( u = 4, v = -3 \)

6-102. \( y = -\frac{4}{3} x + 12 \)

6-103. a: 9  b: 11  c: \( x = -2 \) or 8

6-104. a: \( 2x^2 + 6x \)  b: \( 3x^2 - 7x - 6 \)  c: \( y = 3 \)  d: \( x = 2 \)

Lesson 6.2.5 (Day 1)

6-110. a: 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.

6-111. a: Answers will vary.  b: Answers will vary.

6-112. a: 5, -10, 20, -40, 80  b: \( a_n = -\frac{5}{2} (-2)^n \)

6-113. \( a_n = t(n) = n + 2, \ a_n = t(n) = -\frac{1}{3} n + 3 \)

6-114. See graph at right. The graph is cubic. From left to right the graph is always increasing. The “middle” of graph is at (6, 0). The \( x \)-intercept is at (6, 0) and the \( y \)-intercept is at (0, -27). There is no line of symmetry. The domain and range are both all numbers.

6-115. \( 718 - 14x = 212 + 32x, x = 11 \) months
Lesson 6.2.5 (Day 2)

6-116. a: \( m = -\frac{2}{3}, b = 2 \)  
       b: \( m = -\frac{1}{3}, b = 6 \)  
       c: \( m = 5, b = -1 \)  
       d: \( m = 3, b = 0 \)

6-117. All equations are equivalent and have the same solution: \( x = 4 \).

6-118. Answers will vary.

6-119. a: 3  
       b: 2  
       c: \( \approx 3.24 \)  
       d: There is no real solution because you cannot take the square root of a negative number.

6-120. a: 1  
       b: 3  
       c: 2

6-121. \( x: (0, 0) \) and \( (4, 0) \), \( y: (0, 0) \), vertex: \( (2, 4) \)
Lesson 7.1.1 (Day 1)

7-7. a: If $s$ is the price of a can of soup and $b$ is the 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 $= 2.09$

7-8. Sometimes true; true only when $x = 0$

7-9. 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 sequence approaches zero, and half of a positive number is still positive.

7-10. a: 90 cm b: 37.97 cm c: $t(n) = 160(0.75)^n$

7-11. 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 supplements. d: Answers will vary.

7-12. a: $9x^4y^2z^8$ b: $\frac{3}{6\sqrt{3}}$ c: $6m^2 + 11m - 7$ d: $x^2 - 6x + 9$

7-13. $\frac{150}{4.5} = \frac{90}{x}$; 2.7 pounds
Lesson 7.1.1 (Day 2)

7-14.  
\[ a: y = x^2 \]  
\[ b: y = \frac{1}{x} \]  
\[ c: y = e^x \]

7-15.  
\[ a: a_1 = 108, \quad a_{n+1} = a_n + 12 \]  
\[ b: a_1 = \frac{2}{3}, \quad a_{n+1} = 2a_n \]  
\[ c: t(n) = 3780 - 39n \]  
\[ d: t(n) = 585(0.2)^n \]

7-16.  
\[ a: 1.25 \]  
\[ b: 0.82 \]  
\[ c: 1.39 \]  
\[ d: 0.06 \]

7-17.  
\[ a: \text{No, by observation a curved regression line may be better. See graph at right.} \]
\[ b: \text{Exponential growth.} \]
\[ c: m = 8.187 \cdot 1.338^d, \text{ where } m \text{ is the percentage of mold, and } d \text{ is the number of days. Hannah predicted the mold covered 20\% of a sandwich on Wednesday. Hannah measured to the nearest percent.} \]

7-18.  
\[ a: 94 \text{ years} \]
\[ b: \text{From 1966 to 1999, 429 marbles were added, which means there were 13 marbles added per year.} \]
\[ c: 17 \]
\[ d: t(n) = 17 + 13n \]
\[ e: \text{In the year 2058, when the marble collection is 153 years old, it will contain more than 2000 marbles.} \]

7-19.  
\[ a: \left( \begin{array}{ccc} \frac{7}{4} & \frac{1}{2} & \frac{3}{2} \\ 4 & 1 & 1 \end{array} \right) \]  
\[ b: \left( \begin{array}{ccc} -28 & 7 & -4 \\ -3 & 7 & 3 \end{array} \right) \]  
\[ c: \left( \begin{array}{ccc} 56 & -7 & -8 \\ -15 & 3 \end{array} \right) \]  
\[ d: \left( \begin{array}{ccc} 10 & 2 & 5 \\ 7 & 3 \end{array} \right) \]
Lesson 7.1.2

7-24. \( y = 1.2(3.3)^x \)  \( b: y = 5 \cdot 6^x \)  

7-25. Answers will vary.

7-26. They are all parabolas, with \( y = 2x^2 \) rising most rapidly and \( y = \frac{1}{2}x^2 \) most slowly. See solution graph at right.

7-27. 9 weeks

7-28. \( a: \) 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, \( r = 4 \)

7-29. 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.

Lesson 7.1.3

7-35. Simple interest at 20\%, let \( x = \) years, \( y = \) amount in the account, \( y = 500 + 100x \).

7-36. \( a: y = 15 \cdot 5^x \)  \( b: y = 151(0.8)^x \)

7-37. \( a: 8\%, 1.08 \)  \( b: \) cost \( = 150(1.08)^8 = \$277.64 \)  \( c: \$55.15 \)

7-38. \( a: y = 125000(1.0625)^t \)  \( b: \) \$504,052.30

7-39. \( a: \) Sample solution at right. Answers will vary.  
    \( b: \) The model made predictions that were closer to the actual values for taller swimmers.

7-40. \( a: (4, -1) \)  \( b: (-1, -2) \)  \( c: \) Part (b)  \( d: \) Part (a)

7-41. \( P(\text{heads}) = \frac{1}{2}; P(\text{tails}) = \frac{1}{2} \)
Lesson 7.1.4 (Day 1)

7-47. See graph at right.

7-48. a: 0.40  b: $32, $2.05  c: V(t) = 80(0.4)^t

d: It never will  e: See graph below right.

7-49. 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

7-50. a: \( x^2 - 6x + 9 \)  b: \( 4m^2 + 4m + 1 \)

c: \( x^3 - 2x^2 - 3x \)  d: \( 2y^3 - y^2 + 14y - 7 \)

7-51. a: \( 3y + 5 = 14, y = 3 \)  b: \( 3y + 5 = 32, y = 9 \)

7-52. a:  4  b:  0.06  c:  1

d:  3  17  8

0.3  0.2  11  11

0.5  12

-3  -1

-4
Lesson 7.1.4 (Day 2)

7-53. \textbf{a:} -3 \hspace{1cm} \textbf{b:} \frac{1}{2}

7-54. 0.8\%; \hspace{0.2cm} y = 500(1.008)^x

7-55. \textbf{a:} (-8, 2) \hspace{0.5cm} \textbf{b:} \left(\frac{5}{3}, -1\right)

7-56. \hspace{0.5cm} y = \frac{9}{4}x + 9

7-57. \textbf{a:} See graph at right. \hspace{0.2cm} y = -132 + 2.29x

\hspace{1cm} \textbf{b:} See at right graph below. The U-shaped residual plot indicates a non-linear model may be better.

\hspace{1cm} \textbf{c:} See plots below. The residual plot shows no apparent pattern, so the power model is appropriate.

\hspace{1cm} \textbf{d:} \hspace{0.2cm} y = 0.118x^{1.467}

7-58. \textbf{a:} sometimes true (when \(x = 0\))

\hspace{1cm} \textbf{b:} always true.

\hspace{1cm} \textbf{c:} sometimes true (for all values of \(x\) and for all \(y\) except \(y = 0\))

\hspace{1cm} \textbf{d:} never true.
Lesson 7.1.5

7-61. See graph at right.

7-62. \( y = 4(1.75)^x \)

7-63. \( a: y = 500(1.08)^x \quad b: \$1712.97 \quad c: x \geq 0, y \geq 500 \)

7-64. Both have the same shape as \( y = x^2 \), but one is shifted up 3 units and the other is shifted left 3 units. See graphs at right.

7-65. \( a: -10 \quad b: \frac{1}{2} \quad c: -5 \quad d: 3 \)

7-66. \( a: a = 0 \quad b: m = \frac{16}{17} \quad c: x = 10 \quad d: x = 9, -3 \)
Lesson 7.1.6

7-73.  a: \( y = 281.4(1.02)^5 \), 310.7 million people    b: 343.0 million people
        c: -34 million people. Population growth has slowed.

7-74.  a: \( a = 6, b = 2 \)    b: \( a = 2, b = 4 \)

7-75.  a: \( \frac{3x^3}{y^5} \)    b: \( \frac{m^4}{4q^4} \)

7-76.  a: 2, 6, 18, 54
        b: See graph shown above right. domain: non-negative integers
        c: See graph shown below right.
        d: They have the same shape, but (b) is discrete and (c) is continuous.

7-77.  (-3, -6)

7-78.  a: See graph shown at right. Weight is very strongly positively associated with radius in a non-linear manner with no apparent outliers.
        b: A good model is representative of the physical situation. A quadratic regression (or a power regression with an exponent of \( \approx 2 \)) makes a good model since weight is a function of \( \pi r^2 \).
        c: See graph at right. \( w = 0.056r^{2.01} \). The \( y \)-intercept of (0, 0) makes sense since a disk with zero radius will not weigh anything.
        d: 2.8 g

Lesson 7.2.1

7-87.  a: \( y = 2 \cdot 4^x \)    b: \( y = 4(0.5)^x \)

7-88.  a: \( a = 3, b = 5 \)    b: \( a = 2, b = 3 \)

7-89.  a: -4    b: 2    c: -2    d: 10

7-90.  Answers will vary.

7-91.  Equation: \( y = 4x - 12 \); intercepts: (3, 0) and (0, -12)
Lesson 7.2.2

7-96.  a: \( y = 5 \cdot 1.5^x \)   \hspace{1cm} b: \( y = 0.5(0.4)^x \)

7-97.  a: 2, 4, 8, 16   \hspace{1cm} b: \( 2^n \) \hspace{1cm} c: \( \frac{1}{a^n} = a^{-n} \)

7-98.  a: \( x = 0, 1, 2 \) and \( y = -2, 0, 1 \) \hspace{1cm} b: \(-1 \leq x \leq 1 \) and \(-1 \leq y \leq 2 \)
\hspace{1cm} c: \( x \leq 2 \) and \( y \geq -2 \) \hspace{1cm} d: \( x: \) all real numbers and \( y \geq -1 \)

7-99.  a: \( \frac{3}{2} \)  \hspace{1cm} b: 3  \hspace{1cm} c: 6  \hspace{1cm} d: 2  \
\hspace{1cm} e: Never; (0.3) \hspace{1cm} f: \( \frac{2^x}{x} \)

7-100.  a: 16  \hspace{1cm} b: 3125  \hspace{1cm} c: 2187

7-101.  a: \[
\begin{array}{ccc}
28 & -12 & -8 \\
-4 & 6 & \frac{1}{2} \\
-7 & -2 & -16 \\
-11 & 4 & -15.5
\end{array}
\]  \hspace{1cm} b: \[
\begin{array}{ccc}
\frac{1}{10} & \frac{1}{5} \\
\frac{1}{2} & \frac{1}{10}
\end{array}
\]
Lesson 7.2.3

7-106. \( y = 7.68(2.5)^t \)

7-107. **a:** 228 shoppers \hspace{1cm} **b:** 58 people per hour \hspace{1cm} **c:** at 3:00 p.m.

7-108. **a:** See table at right. The two sequences are the same.

**b:** The coefficient is the first term of the sequence, and the exponent is \( n - 1 \).

**c:** See table at right.

Yes, both forms create the same sequence.

**d:** Because the coefficient is 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 \( n \) one less time.

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<th>2</th>
<th>3</th>
<th>4</th>
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<td>10.3</td>
<td>11.5</td>
<td>12.7</td>
<td>13.9</td>
</tr>
</tbody>
</table>

7-109. \( (3x - 2)^2 = 9x^2 - 12x + 4 \)

7-110. **a:** Answers will vary.

**b:** See graphs at right. \( y = 49.50 - 1.60x \). Answers will vary.

7-111. **a:** \((-2, 5)\) \hspace{1cm} **b:** \((1, 5)\)

**c:** \((-12, 14)\) \hspace{1cm} **d:** \((2, 2)\)
Lesson 8.1.1

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

8-7. a: \( 12x^2 + 17x - 5 \)  
   b: \( 4x^2 - 28x + 49 \)

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

8-9. a: \[
\begin{array}{cc}
10 & -8 \\
-2 & -8 \\
\end{array}
\]
   b: \[
\begin{array}{cc}
12 & 0 \\
-3 & -4 \\
-7 & 7 \\
\end{array}
\]
   c: \[
\begin{array}{cc}
7 & 0 \\
7 & -7 \\
\end{array}
\]
   d: \[
\begin{array}{cc}
9 & -9 \\
0 & -81 \\
\end{array}
\]
   e: \[
\begin{array}{cc}
6x^2 & -7x^2 \\
2x & -6x \\
3x & x \\
5x & -7x \\
\end{array}
\]
   f: \[
\begin{array}{cc}
-7x^2 & x \\
\end{array}
\]

8-10. a: \( 4(x + 2) \)  
   b: \( 5(2x + 5y + 1) \)  
   c: \( 2x(x - 4) \)  
   d: \( 3x(3xy + 4 + y) \)

8-11. a: \( (0, -8) \); It is the constant in the equation.
   
   b: \( (-2, 0) \) and \( (4, 0) \); Students may notice that the product of the \( x \)-intercepts equals the constant term.
   
   c: \( (1, -9) \); Its \( x \)-coordinate is midway between the \( x \)-intercepts.

8-12. a: \( -1 \)  
   b: \( \approx 7.24 \)  
   c: \( \approx -4.24 \)
Lesson 8.1.2

8-17. a: \((x - 6)(x + 2)\)  
   b: \((2x + 1)^2\)  
   c: \((x - 5)(2x + 1)\)  
   d: \((x + 4)(3x - 2)\)

8-18. a: \(x\)-intercepts \((-1, 0)\) and \((3, 0)\), \(y\)-intercept: \((0, -3)\)  
   b: \(x\)-intercept \((2, 0)\), no \(y\)-intercept  
   c: \(x\)-intercepts \((-3, 0), (-1, 0)\), and \((1, 0)\), \(y\)-intercept \((0, 2)\)  
   d: \(x\)-intercept \((8, 0)\), \(y\)-intercept \((0, -20)\)

8-19. a: \(t(n) = \frac{1}{2} \left(\frac{1}{2}\right)^{n-1}\)  
   b: \(t(n) = -7.5 - 2(n - 1)\)

8-20. \(50(0.92)^5 \approx \$32.95\)

8-21. a: \((6, 9)\)  
   b: \((0, 2)\)

8-22. a: \(x = -\frac{10}{23}\)  
   b: all real numbers  
   c: \(c = 0\)

8-23. \(y = \frac{1}{4}x + 400\)
Lesson 8.1.3

8-29. If $x$ represents time traveled (in hours) and $y$ represents distance between the two trains, then $82x + 66x = y$. When $y = 111$, $x = 0.75$ hours, which is 45 minutes. So, the time when the trains are 111 miles apart is 4:10 p.m.

8-30. a: 9 units                       b: 15 units                       c: $\sqrt{10}$ units                       d: 121 square units

8-31. a: $(k - 2)(k - 10)$           b: $(2x + 7)(3x - 2)$      c: $(x - 4)^2$                       d: $(3m + 1)(3m - 1)$
   e: The largest exponent in each expression is 2.

8-32. a: $\sqrt[3]{125^2} = 25$       b: $\sqrt{16} = 4$           c: $\frac{1}{\sqrt{16}} = \frac{1}{4}$    d: $\sqrt[7]{81} = \frac{1}{3}$

8-33. a: $x = 5$                     b: $x = -6$                    c: $x = 5$ or $-6$
   d: $x = -\frac{1}{4}$               e: $x = 8$                     f: $x = -\frac{1}{4}$ or 8

8-34. a: On average student backpacks get 0.55 pounds lighter with each quarter of high school completed.
   b: About 44% of the variation in student backpack weight can be explained by a linear relationship with the length of time spent in high school.
   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.
Lesson 8.1.4

8-39.  a: \((2x + 5)(x - 1)\)   b: \((x - 3)(x + 2)\)   c: \((3x + 1)(x + 4)\)

   d: It is not factorable because no integers have a product of 14 and a sum of 5.

8-40.  a: explicit   b: \(t(n) = -3 + 4(n - 1)\) or \(a_n = -3 + 4(n - 1)\)
   
   c: \(t(50) = a_{50} = 193\)   d: \(t(n) = 3 - \frac{1}{3}(n - 1)\) or \(a_n = 3 - \frac{1}{3}(n - 1)\)

8-41.  a: In 7 weeks
   
   b: Joman will score more with 1170 points, while Jhalil will have 970.

8-42.  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: \((-4, 0)\)

8-43.  45, 46, 47; \(x + (x + 1) + (x + 2) = 138\)

8-44.  a: 2   b: 3   c: 1

Lesson 8.1.5

8-49.  a: \((x + 8)(x - 8)\)   b: \((y - 3)^2\)   c: \((2x + 1)^2\)   d: \(5(x + 3)(x - 3)\)

8-50.  a: 1   b: \(\frac{20}{x}\)   c: \(\frac{5}{x^3}\)   d: \(x^2y\)

8-51.  a: \((-3, -7)\)   b: \((5, -1)\)

8-52.  a: 4, 8, 12, 16; \(t(n) = 4 + 4(n - 1)\)   b: 4, 8, 16, 32; \(t(n) = 4(2)^{n-1}\)

   c: Answers will vary.

8-53.  a: \(x = 1.5y + 5\)   b: \(x = 24\)   c: \(x = 2.5\)   d: \(x = 0\) or 3

8-54.  a: Answers will vary.

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

   c: \(13.17 + 0.85(55) = 60.0°F\)

   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 8.2.1

8-58. Vertex: (4, -9), x-intercepts: (1, 0) and (7, 0), y-intercept: (0, 7)

8-59. a: 3; -7; 6; -2  
    b: ...it does not change the value of the number 
    c: It tells us that a = 0.  
    d: All equal 0.  
    e: ...the result is always 0.

8-60. a: x-intercepts (2, 0), (-4, 0), and (3, 0), y-intercept: (0, 18);  
    b: x-intercepts (3, 0) and (8, 0), y-intercept: (0, -3)  
    c: x-intercept (1, 0) and y-intercept (0, -4)

8-61. a: See scatterplot at right.  
        45 minutes + 77 strokes = 122  
    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 shown below right.  
    d: Every minute of improvement in time reduces the number of strokes by 0.7 on average.  
    e: Answers will vary.

8-62. a: no solution  
    b: (7, 2)

8-63. a: The symbol “≥” represents “greater than or equal to” and the symbol “>” represents “greater than.”
    b: 5 > 3  
    c: x ≤ 9  
    d: -2 is less than 7.
Lesson 8.2.2

8-69. This parabola should have x-intercepts \((-3, 0)\) and \((2, 0)\) and y-intercept \((0, -6)\).

8-70. a: One is a product and the other is a sum.
     b: first: \(x = -2\) or \(x = 1\); second: \(x = -\frac{1}{2}\)

8-71. a: \(x = 2\) or \(x = -8\)                       b: \(x = 3\) or \(x = 1\)
     c: \(x = -10\) or \(x = 2.5\)                    d: \(x = 7\)

8-72. a: The line \(x = 0\) is the y-axis, so this system is actually finding where the line
      \(5x - 2y = 4\) crosses the y-axis.
     b: \((0, -2)\)

8-73. a: 4; Since the vertex lies on the line of symmetry, it must lie halfway between the
      x-intercepts.
     b: \((4, -2)\)

8-74. a: \(2(x - 2)(x + 1)\)                       b: \(4(x - 3)^2\)

8-75. a: \((3x)^{3/2}\)                       b: \(81^{1/x}\)                    c: \(17^{x/3}\)

Lesson 8.2.3

8-83. a: \(x = 1\) or \(\frac{4}{3}\)                       b: \(x = 0\) or \(-6\)
     c: \(x = -5\) or \(\frac{3}{2}\)

8-84. The result must be the original expression because multiplying and factoring are opposite
      processes; \(65x^2 + 212x - 133\).

8-85. a: \(x = 3\) or \(-\frac{2}{3}\)                       b: \(x = 2\) or \(5\)
     c: \(x = -3\) or \(2\)                       d: \(x = \frac{1}{2}\) or \(-\frac{1}{2}\)

8-86. See graphs at right.

8-87. a: true                       b: false
     d: true                           e: false

8-88. a: \(-1\)                       b: \(-1.6\)
     c: \(-3\)
Lesson 8.2.4

8-92. a: \( y = x^2 + 2x - 8 \)
   b: \( y = x^2 - 6x + 9 \)
   c: \( y = x^2 - 7x \)
   d: \( -x^2 - 4x + 5 \)

8-93. \( m = \frac{1}{2}, (0, 4) \)

8-94. a: \( = -1.4 \) and \( = 0.3 \)
   b: The quadratic is not factorable.

8-95. a: \( x = 4 \) or \( -10 \)
   b: \( x = -8 \) or \( 1.5 \)

8-96. a: 4
   b: -10
   c: -8
   d: 1.5

8-97. a: (1, -1)
   b: \( (-2, \frac{1}{2}) \)

Lesson 8.2.5

8-106. a: \( y = (x + 3)^2 + 6, (-3, 6) \)
   b: \( y = (x - 2)^2 + 5, (2, 5) \)
   c: \( y = (x + 4)^2 - 16, (-4, -16) \)
   d: \( y = (x + 2.5)^2 - 8.25, (-2.5, -8.25) \)

8-107. a: \( (4, -\frac{1}{2}) \)
   b: \( (-2, -3) \)
   c: \( (0, \frac{5}{2}) \)
   d: \( (0, -4) \)

8-108. \( = 1.088; 8.8\% \) monthly increase

8-109. x-intercepts: \((-1, 0)\) and \((-2, 0)\),
   y-intercept: \((0, 4)\), solution graph shown at right.

8-110. a: \( m = \frac{3}{4}, b = \frac{29}{4} \)
   b: Yes, it makes the equation a true statement.

8-111. a: \( p = 3.97v + 109.61 \), where \( p \) is power (watts) and \( v \) is VO2max (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 VO2max, with no
      apparent outliers. An increase of one ml/kg/min in VO2max 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 VO2max.
Lesson 9.1.1

9-6.  a: \((w + 14)^2 = 144\); \(w = -2\) or \(-26\)  
      b: \((x + 2.5)^2 = 2.25\); \(x = -1\) or \(-4\)  
      c: \((k - 8)^2 = 81\); \(k = -1\) or \(17\)  
      d: \((z - 500)^2 = 189225\); \(z = 65\) or \(935\)  

9-7.  line: (a) and (c); parabola: (b) and (d)  

9-8.  A and D  

9-9.  a: \(10^{1/3}\)  
      b: \(15^{1/2}\)  
      c: \(18^{3/4}\)  
      d: \(5^{-1/2}\)  

9-10.  (2, 5)  

9-11.  \(a_n = \frac{1}{9} \cdot 3^{n-1}\) or \(a_n = \frac{4}{27} \cdot 3^n\)  

Lesson 9.1.2

9-17.  a: \(x = 6\) or \(x = 7\)  
       b: \(x = \frac{2}{3}\) or \(x = -4\)  
       c: \(x = 0\) or \(x = 5\)  
       d: \(x = 3\) or \(x = -5\)  

9-18.  \(x = 6\) or \(7\); yes  

9-19.  No  
       a: The parabola should be tangent to the x-axis.  
       b: Answers vary, but the parabola should not cross the x-axis.  

9-20.  \(y = \frac{1}{2}x + 9\)  

9-21.  a: \((x + 2)^2 + 1\), \((-2, 1)\)  
       b: \((x - 3)^2 - 9\), \((3, -9)\)  
       c: minimum  

9-22.  $4.00  

9-23.  a: false  
       b: true  
       c: true  
       d: true  
       e: true  
       f: false  
       g: true  
       h: false
Lesson 9.1.3

9-27. \(a: x = 5 \quad b: x = -6 \text{ or } \frac{1}{3} \quad c: x = -1 \text{ or } \frac{5}{3} \quad d: x = \pm \frac{3}{4}\)

9-28. \(x = \frac{1}{3} \text{ or } x = -6; \text{ yes}\)

9-29. \(a: y = (x+3)(x-1) = x^2 + 2x - 3 \quad b: y = (x-2)(x+2) = x^2 - 4\)

9-30. If \(x\) is the width, then \(x(2x+5) = 403\); the width is 13 cm.

9-31. Both (b) and (c) are solutions.

9-32. \(a: 3 \text{ feet per second}\)
\(b: \text{ He travels a net distance of 18 feet in the direction that the conveyor belt is moving.}\)

9-33. \(a: 3x^2(x-1) \quad b: 2(x-2)(x-3)\)
\(c: 8(x-2)(x+2) \quad d: 2x(2x-3)(x+4)\)

Lesson 9.1.4

9-38. If \(n = \#\) nickels and \(q = \#\) of quarters, then \(0.05n + 0.25q = 1.90, n = 2q + 3,\) and \(n = 13,\) so Daria has 13 nickels.

9-39. \(a: x = \pm 0.08 \quad b: x = \frac{2}{9} \text{ or } -4\)
\(c: \text{ no solution} \quad d: x \approx 1.4 \text{ or } x \approx -17.4\)

9-40. While the expressions may vary, each should be equivalent to \(y = x^2 + 4x + 3.\)

9-41. \(a: x = 2 \quad b: x = 15 \quad c: x = -2 \quad d: \text{ all real numbers}\)

9-42. Line \(L\) has slope 4, while line \(M\) has slope 3. Therefore, line \(L\) is steeper.

9-43. \(a: 1.025 \quad b: \$579.85\)
Lesson 9.2.1

9-50. Let \( n = \) number of countries in North America. Then \( n + (2n) + (2n + 7) = 122 \) and \( n = 23 \). There are 23 countries in North America (Antigua and Barbuda, Bahamas, Barbados, Belize, Canada, Costa Rica, Cuba, Dominica, Dominican Republic, El Salvador, Grenada, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, St. Kitts & Nevis, St. Lucia, St. Vincent & the Grenadines, Trinidad & Tobago, and the United States), 46 countries in Europe, and 53 countries in Africa.

9-51. \[ \begin{align*}
\text{a:} & \quad p > -1, & \text{b:} & \quad k < 2, \\
\text{c:} & \quad 1 \leq k \quad \text{or} \quad k \leq 1.
\end{align*} \]

9-52. \[ \begin{align*}
\text{a:} & \quad k = 15 \quad \text{or} \quad -2 & \text{b:} & \quad m = 3 \quad \text{or} \quad -3 \\
\text{c:} & \quad w = 2 \quad \text{or} \quad -6 & \text{d:} & \quad n = \frac{4 \pm \sqrt{76}}{6} \approx 2.12 \quad \text{or} \quad -0.79
\end{align*} \]

9-53. \[ \begin{align*}
\text{a:} & \quad \text{always true} & \text{b:} & \quad \text{sometimes true} & \text{c:} & \quad \text{never true} \\
\text{d:} & \quad \text{sometimes true} & \text{e:} & \quad \text{always true} & \text{f:} & \quad \text{never true}
\end{align*} \]

9-54. \[ \begin{align*}
\text{a:} & \quad (5, 0) \quad \text{and} \quad (8, 0); \quad \text{Robbie must have backed up 5m from the launch pad and the rocket must have landed 8m away from him.} \\
\text{b:} & \quad 3 \text{ meters}
\end{align*} \]

9-55. \[ \begin{align*}
\text{a:} & \quad x = \frac{5 \pm \sqrt{13}}{2} \approx 0.7 \quad \text{or} \quad 4.3 & \text{b:} & \quad x = -1 \pm \sqrt{7} \approx -3.6 \quad \text{or} \quad 1.6
\end{align*} \]
Lesson 9.2.2

9-59. a: $k < 2$

b: $p \leq 15$

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

d: $t > 0$

9-60. 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: The “largest” residual value is about 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: A different model would be better. 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.

9-61. The graph should be a line with $x$-intercept $(1.5, 0)$ and $y$-intercept $(0, 3)$.

9-62. $y = - \frac{3}{5} \cdot \frac{x - \frac{8}{5}}{3}$

9-63. $x = \frac{2}{3}$ or $x = -\frac{5}{2}$

9-64. a: $(2x - 5)^2$ 
   b: not factorable
   c: $3x(x - 4)$ 
   d: $5(x - 4)(2x + 1)$
Lesson 9.3.1

9-70.  a: $x < 4$

9-71.  $1200 + 300x \leq 2700$, so $x \leq 5$. Algeria can order an advertisement up to 5 inches high.

9-72.  $y = 3(2)^x$

9-73.  a: $y = -\frac{2}{3}x - 2$

b: Yes; students can verify by substituting the coordinates into the equation and testing.

9-74.  B

9-75.  D

9-76.  a: $f(x) = (x + 3)^2 + 2$

b: $(-3, 2)$; See graph at right.

c: The parabola has no $x$-intercepts.
Lesson 9.3.2

9-83. A

9-84. a:  

b:  

9-85. \(1.25 + 0.75g \leq 20\), \(g \leq 25\), so \(\leq 25\) games

9-86. a: \(x = \frac{1}{3}\)  
b: \(x = 16\)  
c: \(x = \pm 5\)  
d: \(x > 5\)

9-87. 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.

9-88. There are two \(x\)-intercepts: (0.6, 0) and (−2, 0).

Lesson 9.4.1

9-94. a: 3  
b: 1  
c: 4  
d: 2

9-95. a: \(x < 1\)  
b: \(x \geq 6\)  
c: \(m \leq 2\)  
d: no solution

9-96. 1.08, 8% increase

9-97. a: \(x(5x - 2)(x + 3)\)  
b: \(2(3t - 1)(t - 4)\)  
c: \(6(x - 2)(x + 2)\)

9-98. \(2a + 3c = 27.75\), \(3a + 2c = 32.25\), \(a = 8.25\), \(c = 3.75\)

9-99. \(x = 3 \pm \sqrt{6}\)

9-100. B
Lesson 9.4.2

9-105.

9-106.

9-107. a: \( x \leq 6 \)  
    b: \( x > 1 \)  
    c: \( 2 \leq x < 7 \)  
    d: \( -3 \leq x \leq -1 \)

9-108. a: false  
    b: false  
    c: true  
    d: false

9-109. 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 to run 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 don’t 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.

9-110. a: \( r + 2.50c \geq 15 \)

    b: \( r + c \leq 25 \)

    c: 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.
Lesson 9.4.3

9-114. a: Yes, they are equivalent. One way to determine this is to change both to $y = mx + b$ form and compare slope and y-intercept.
   
   b: Students can multiply or divide both sides of either equation to find an equivalent equation. For example, $2x + y = 3$ and $8x + 4y = 12$ are both equivalent equations.

9-115. $3280x + 1500 < 50,000$, less than 14.8 pounds

9-116. a: $m > 5$  
   
   b: $x \leq -6$
   
   c: $x > 7$
   
   d: no solution

9-117. Perfect square form: $(x - 5)^2 = 0$; $x = 5$; Answers vary.

9-118. D

9-119. a: $y = 2.75(1.05)^x$; $4.48$
   
   b: $y = 42,000(0.75)^x$; $9967$
   
   c: $y = 25(1.09)^x$; 9% increase
Lesson 10.1.1

10-10. Yes, he can.  
\( a: \ x = 2 \quad b: \text{Divide both sides by 100.} \)

10-11.  
\( a: \left( \frac{1}{3}, -2 \right) \quad b: (4, -9) \)

10-12.  
\( a: \text{Subscribe to Sunday paper and subscribe to local paper. See table at right.} \)
\[ b: 77\% \]
\[ c: 84.4\% \]

10-13.  
\( a: \text{See solution graph at right.} \)
\[ b: \text{No, it is not; it lies on both boundaries, but the boundary to } y < x \text{ is not part of the solution.} \]

10-14.  
\( a: \ x = \frac{11}{2}, -3 \quad b: \frac{4 \pm \sqrt{28}}{6} \approx 1.55, -0.22 \)

10-15.  
\( y = \frac{3}{4}x - 3 \)

10-16.  
\( a: \text{See table at right.} \quad \frac{44 + 44 + 20}{177} \approx 61\% \)
\[ b: \frac{44}{88} = 50\% \]

10-17.  
\( a: \ x - 2 = 4 \)
\[ b: \text{For each, } x = 6. \]
\[ c: x + 3 = 8, \ x = 5 \]

10-18.  
\( a: 3 \quad b: 1 \quad c: 4 \quad d: 2 \)

10-19.  
\( a: $4.10 \quad b: $1.90 \)

10-20.  
\( a: x \geq 2 \quad b: x > -1 \quad c: x \leq 9 \quad d: x > 10 \)

10-21.  
\( a: (8x + y)(8x - y) \quad b: (4x - 3y)(3x + 2y) \)
\[ c: (2x + 3)^2 \quad d: \text{not factorable} \]

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Lesson 10.2.1

10-27. Answers vary.

10-28. They all are equivalent to $12x^6$.

10-29. a: See table at right.
   b: $P(\text{Senior|OceanView}) = \frac{0.06}{0.24} = 25\%$

<table>
<thead>
<tr>
<th>Senior</th>
<th>Ocean View</th>
<th>Not Ocean View</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0.60)(0.10) = 0.06</td>
<td>0.04</td>
<td>0.10</td>
</tr>
<tr>
<td>(0.20)(0.90) = 0.18</td>
<td>0.72</td>
<td>0.90</td>
</tr>
</tbody>
</table>

10-30. $y = -\frac{1}{3}x + 2$

10-31. $y < -\frac{2}{3}x + 2$

10-32. a: $2d - 3$   b: $2d - 3 = 19$, $d = 11$ candies

10-33. $y = 6(0.8)^x$

Lesson 10.2.2

10-39. a: $x = 4$   b: $x = -5$ or 2   c: $x = \frac{16}{3}$   d: $x = \frac{1}{2}$

10-40. a: $(0, 3)$   b: $(\frac{1}{2}, 0)$ and $(3, 0)$

10-41. a: $t = 5$ seconds   b: 100 feet

10-42. If $x$ and $y$ represent the number of minutes he spends delivering the Times and Star, respectively, then $x + y = 60$ and $2x + y = 91$; $x = 31$ and $y = 29$; So he delivers 62 Times and 29 Star papers.

10-43. See solution graph at right.

10-44. $y = 27\left(\frac{1}{2}\right)^x$

10-45. C

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Lesson 10.2.3

10-53. a: \( x = 2 \) \hspace{1cm} b: \( x = 1.5 \) \hspace{1cm} c: \( x = -1 \)

10-54. a: \( 3 + 4x = 14 \) \hspace{0.5cm} x = \frac{11}{4} \hspace{1cm} b: \) Rewriting

10-55. Let \( x \) represent the amount of money the youngest child receives. Then \( x + 2x + x + 35 = 775 \); \$185, \$370, and \$220.

10-56. 31 terms

10-57. Let \( x \) = time of Marisol; Marisol: \( y = 2x \); Mimi: \( y = 3(x - 1) \); solution: \( x = 3 \) hrs, so 6 miles

10-58. a: \( \approx 0.463 \), 53.7% decrease \hspace{1cm} b: \( y = 20(0.463)^x \)

10-59. a: \( \frac{3 + 6 + 14 + 16}{100} = 39\% \) \hspace{1cm} b: \( \frac{18}{32} = 56\% \) \hspace{1cm} c: \( \frac{14 + 16}{3 + 6 + 14 + 16} = 77\% \)

\( d: \) See the relative frequency table below. Yes, the juniors and seniors are much less likely to be carrying a backpack.

<table>
<thead>
<tr>
<th>Backpack</th>
<th>Freshmen</th>
<th>Sophomore</th>
<th>Junior</th>
<th>Senior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backpack</td>
<td>73%</td>
<td>73%</td>
<td>56%</td>
<td>54%</td>
</tr>
<tr>
<td>No Backpack</td>
<td>27%</td>
<td>27%</td>
<td>44%</td>
<td>46%</td>
</tr>
</tbody>
</table>
Lesson 10.2.4

10-67. a: \( x = 3 \) or \(-11\)  
   b: \( x = 14 \)  
   c: \( x = 2 \)  
   d: \( x = 2 \)

10-68. No, because \(-1\) is not greater than \(-1\).

10-69. a: \( 4x(x-3) \)  
   b: \( 3(y+1)^2 \)  
   c: \( m(2m+1)(m+3) \)  
   d: \( (3x-2)(x+2) \)

10-70. \( t = \) number of toppings, \( 1.19(3) + 0.49t = 4.55 \), and \( t = 2 \)

10-71. a: \( y = (x+1)^2 - 2 = x^2 + 2x - 1 \)
   b: Method 1: \( 5^2 + 2(5) - 1 = 34 \) tiles; Method 2: The next term in the pattern is 34 because the terms of the sequence \( (2, 7, 14, 23) \) increase by consecutive odd numbers.

10-72. \( x = 9 \) or \( x = 0.5 \)

10-73. If \( a = \) # of adult tickets and \( s = \) # of student tickets, then \( 7a + 5s \geq 5000 \).

Lesson 10.2.5

10-81. a: \( x = \pm 9 \)  
   b: \( x = \pm \sqrt{37} \)  
   c: \( x = \pm \sqrt{-49} \)  
   d: \( x = \pm \sqrt{-5} \)

10-82. a: \( R \)  
   b: 1  
   c: 1  
   d: \( R \)

10-83. a: \( x = \frac{1}{3} \)  
   b: \( x = \frac{35}{8} \)  
   c: \( x = 7 \) or \(-3 \)  
   d: \( x = -1 \)

10-84. See graph at right.
   a: \( (3, -4) \)
   b: D: all real numbers, \( R: y \geq -4 \)
   c: The parabola open upward, so it is a minimum.

10-85. If \( h = \) number of hats and \( t = \) number of t-shirts then \( 5h + 8t \leq 475 \).

10-86. \( y = -x(x-20) = -x^2 + 20x \); Its maximum height is 100 feet when \( x = 10 \).

10-87. 

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Lesson 10.2.6

10-90. See solution at right.

10-91. a: The quadratic equation \((x - 11)^2 = -4\) has no real solutions because when a real number is squared, it must be positive or 0.
   b: \(x = 11 \pm \sqrt{-4}\)

10-92. a: \(x = 1\) or 7        b: \(x = 4\) or 8        c: \(x = 3\)        d: no solution

10-93. a: \(x < 2\)
   b: \(x \geq 6\)
   c: \(x > 4\)
   d: \(x \geq 18\)

10-94. a: \(f(x) = 8(\frac{1}{2})^x\)        b: See graph at right.

10-95. a: \((2x + 3)(3x - 2)\)        b: \(2(2x - 5)(2x + 5)\)
   c: \(2x(x + 8)(x - 7)\)        d: \((3x - 4)^2\)

10-96. a: \(x = \frac{4 \pm \sqrt{76}}{6}\); irrational        b: \(x = \frac{5}{6}, \frac{1}{2}\); rational
Lesson 10.3.1

10-107. No; \(3(7 - 2) = 15\) and \(15 > 4\)

10-108. Yes, they will intersect; top line: \(y = -\frac{1}{4}x + 10\), bottom line: \(y = \frac{1}{3}x + 3\); they will cross at \((12, 7)\).

10-109. top line: \(x\)-intercept \((40, 0)\) and \(y\)-intercept \((0, 10)\); bottom line: \(x\)-intercept \((-9, 0)\) and \(y\)-intercept \((0, 3)\)

10-110. 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 \(\frac{3}{2}\)).

10-111. \(y = -\frac{20}{7}x + \frac{24}{7}\)

10-112. a: See graph at right.

   b: The vertex is at \((-2, 3)\).

   c: \(y = 3\)

10-113. A relative frequency table is shown at right. 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.

<table>
<thead>
<tr>
<th>NUMBER OF TACOS</th>
<th>Taco Shack</th>
<th>competitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15 grams cheese</td>
<td>11%</td>
<td>10%</td>
</tr>
<tr>
<td>15 - 25 g cheese</td>
<td>60%</td>
<td>61%</td>
</tr>
<tr>
<td>&gt;25 grams cheese</td>
<td>29%</td>
<td>29%</td>
</tr>
</tbody>
</table>

10-114. a: See graph at right. b: \((-2.3, 0.8)\)

   c: \(x = -2.3\)

10-115. a: I  b: R  c: I  d: I

10-116. If \(c = \) number of cars and \(t = \) number of trucks, \(2c + 3t \geq 500\)

10-117. A

10-118. a: \(3x + 1\)  b: \(9x - 2\)  c: \(9x - 6\)  d: \(3x + 7\)

10-119. a: See graph at right. b: \(f(x) = 10(2.3)^x\)

   c: Anything with an initial amount of 75 and losing 15% over each time period.
Lesson 10.3.2

10-124. a: \( x = \frac{1}{3} \) or \(-3\)  
   b: \( x = \frac{1}{2} \) or \(-3\)  
   c: no real solution, or, \( x = \frac{-2 \pm \sqrt{-16}}{2} \)  
   d: \( x = -7 \) or \(2\)

10-125. a: \(-y = x^2 - 4x + 1\)  
   b: \(-y = (x - 2)^2 - 3\)  
   c: \(y = -(x - 2)^2 + 3\)  
   d: \((2, 3); 3\)

10-126. He sold 9 watermelons.

10-127. \((6; 20)\) and \((-1, 6)\)

10-128. A

10-129. See solution graph at right.

10-130. \(x \approx 3.2\)

---

Lesson 10.3.3

10-137. a: Two: \( x = 1 \) and \( x = -3 \)  
   b: Three: \( x < -3 \), \(-3 < x < 1 \), and \( x > 1 \)  
   c: \(-3 < x < 1\)

10-138. a: \((x + 1)^2\)  
   b: \((3x + 1)^2 - 3\)  
   c: \(3(x + 1)^2 - 9\)  
   d: \((x + 4)^2 - 3\)

10-139. a: two  
   b: one  
   c: none  
   d: one

10-140. See graph at right. \(x \approx 1.75\)

10-141. a: \( x = 13\)  
   b: \( x = 3\)  
   c: \(-5 \leq x \leq 5\)  
   d: \(x < -\frac{2}{3} \) or \( x > 2\)

10-142. a: \((x - 7)(x - 1)\)  
   b: \((y - 5)(y + 3)\)  
   c: \(7(x + 3)(x - 3)\)  
   d: \((3x + 4)(x + 2)\)
Lesson 11.1.1

11-4.  a: $2x - 1$, shift up 2 units  
b: $4x - 3$, twice as steep  
c: $2x + 1$, shift left 2 units  
d: $4x - 6$, twice as steep,  
y-intercept shifts down 3 units,  
x-intercept does not change

11-5.  a: $x = 2$  
b: $k \approx 3.76$ or 1.24  
c: $-2 < x < 10$  
d: $x = 5$

11-6.  $1,400,000 - 50x > 1,200,000$, less than 4000 square miles per year

11-7.  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 $(0, -1)$

11-8.  $(3, 3)$ and $(-2, -7)$

11-9.  $s = a + 150, 3s + 5a = 4730$; 685 students

11-10.  a: $f(x) + 2 = x^2 - 1$; Shifted up 2 units.  
b: $2f(x) = 2x^2 - 6$; Twice as steep and the vertex shifts down 3 units.  
c: $f(x + 2) = (x + 2)^2 - 3$; Shifted left 2 units.  
d: $f(2x) = 4x^2 - 3$; Four times as steep.

11-11.  a: $\frac{1}{3}$  
b: $\frac{-1 \pm \sqrt{-3}}{2}$ is not a real number because the square root of a negative number is an imaginary number.

11-12.  a: 3  
b: 2  
c: does not exist  
d: 0  
e: 1  
f: 1

11-13.  a: $y = x^2 + 3x - 28$  
b: $y = x^2 + 10x + 24$  
c: $y = x^2 + 6x + 9$

11-14.  A

11-15.  $|S - $24,000$| \leq $1575; $22,425 \leq S \leq $25,575
Lesson 11.1.2

11-20. a: \( f^{-1}(x) = \frac{x^3}{2} \)  
   b: \( g^{-1}(x) = 4x + 5 \)

11-21. a: \(-1 \leq x \leq 3\)  
   c: all real numbers  
   b: \( x = -2 \pm \sqrt{7} \approx 0.65 \) or \(-4.65\)  
   d: \( x = -2.5 \) or \(5.5\)

11-22. a: \((x-3)^2 - 1\), shift down 1 unit  
   c: \((x-4)^2\), shift right 1 unit  
   b: \(-(x-3)^2\), reflected over the \(x\)-axis  
   d: \(-(x-3)^2\), reflected over the \(y\)-axis

11-23. a: one  
   b: none  
   c: two  
   d: one

11-24. \( |m-3| \leq 5; \ 26 \leq m \leq 36 \)

11-25. The team president is using the mean, and the fans are using the median. A few large “outliers,” such as super star players, have very high salaries.

Lesson 11.2.1 (Day 1)

11-28. \((46.4, 48.5, 50.4, 52.5, 55.9)\)

11-29. a: \( f^{-1}(x) = 3(x + 2) \)
   b: \( g^{-1}(x) = \frac{(x-5)}{2} = 2(x-5) \)

11-30. a: \( x = 1 \)  
   b: \( x > 3 \) or \( x < -3 \)  
   c: \( 0 \leq x \leq \frac{4}{3} \)  
   d: \( x = \frac{1}{4} \)  
   e: \( -2 \leq x \leq 3 \)  
   f: \( x = 3 \)

11-31. 45 miles

11-32. \( y > 2x - 1 \)

11-33. a: \( x = \frac{1}{2} \) or \(-2\)  
   b: no real solution
Lesson 11.2.1 (Day 2)

11-34. \(a: (1.58, 2.50, 2.91, 3.49, 4.29)\)

\(b: \) See solution graph at right.

\(c: \) The median (center) is at 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.

11-35. The graph starts at \((3, 1)\); D: \(x \geq 3\), R: \(y \geq 1\).

11-36. While there are multiple ways to write the equation, one possible way is \(y = (x + 2)(x + 3) + 1\). However, all equations should be equivalent to \(y = x^2 + 5x + 7\).

11-37. \(1980 + 30m + 2590 + 20m = 5000\), \(m = 8.6\);
It will be full after 8 months; there will not be enough room for songs in the 9th month.

11-38. \(a: -2 < x < 2\) \quad \(b: x \geq 2.5\) \quad \(c: x = \frac{1}{4}\)

\(d: \) no solution \quad \(e: x = -12\) \quad \(f: -5 \leq x \leq 3\)

11-39. \(a: \) The vertex is at \((2, 6)\). The coefficient of \(-2\) means the graph is pointing downward, so the vertex is a maximum.

\(b: \) The y-intercept is at \(-2(-2)^2 + 6 = -2\). Along with the vertex, and knowing the parabola is pointing downward, there is enough information to make a sketch of the graph.
Lesson 11.2.2 (Day 1)

11-46. **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 symmetrical and has an outlier, the mean is not an appropriate measure of center.

11-47. **a:** $t(n) = -3n + 10$ or $t(n) = 7 - 3(n - 1)$

**b:** $t(n) = \frac{2000}{3} \cdot 3^{n-1}$ or $a_n = \frac{2000}{9} \cdot (3)^n$

11-48. **a:** $x^2 - 5$, shift down 2 units

**b:** $-2x^2 + 6$, reflected over x-axis, stretched

**c:** $(x - 2)^2 - 3$, shift right 2 units

**d:** $(-2x)^2 - 3$ or $4x^2 - 3$, stretched, and reflected over y-axis onto itself

11-49. **a:** The vertex is $(-1, -5)$ and the point is a minimum.

**b:** $-5$

11-50. They will be the same after 20 years, when both are $\$1800$.

11-51. **a:** $25a^{-22}b^{36}$

**b:** $5 \cdot 3^{-1}x^{-9}y^5$

11-52. 72 represents room temperature and a horizontal asymptote of the graph. 0.7 represents a temperature loss of 30% per unit of time.
Lesson 11.2.2 (Day 2)

11-53. a: See graphs at right. The median 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 $77 - 39.5 = 38$ 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.

11-54. a: $f^{-1}(x) = \frac{(x+2)}{7}$

b: Yes

11-55. a: $x \leq 12$

b: $-10 < x < 10$

c: $x < 0$

d: $x < -5, x > 1$

11-56. $y = 2(x+1)^2 + 4$

11-57. a: $x = \pm 4$

b: $(-5, -17)$

c: $x = 4$ or $-2$

d: $x = \frac{-1 \pm \sqrt{77}}{4} \approx 1.64$ or $-2.14$

11-58. See graph at right.

11-59. Based on direction and vertex of the parabola compared with the slope and y-intercept of the line, there are two points of intersection.
Lesson 11.2.3

11-67. 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.

11-68. a: See boxplots at right below. 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 type of tree—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 are symmetrical; the distributions are skewed. The maximum on the shady plot may be an outlier.

11-69. a: \( y = x^2 + 4x \)  
b: \( y = x^2 - 4 \)  
c: \( y = 4x^2 - 4x + 3 \)

11-70. \((-2, -10)\)

11-71. a: all real numbers  
b: \(-5 < x < 4\)  
c: no solution  
d: \( x = \frac{1}{3} \)

11-72. 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.

11-73.
Lesson 11.3.1

11-75. Edison is correct because \(3(2) + 2(-3) = 2\) and \(5(2) - 12 = -2\).

11-76. 16

11-77. See solution graph at right. D: \(x \leq 3\), R: \(y \leq 0\)

11-78. \(\begin{align*}
a: & \text{ not possible } \\
b: & -27 \\
c: & 8 \\
d: & 0 \\
e: & -1
\end{align*}\)

11-79. 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.

11-80. \((1, 12)\) and \((-5, 42)\)

11-81. If \(d =\) number of dimes and \(q =\) number of quarters, then \(q = 2d - 6\) and \(d + q = 147\). Then \(d = 51\) and \(q = 96\), so Jessica has \(51(0.10) + 96(0.25) = 29.10\).

11-82. \(f(x) = -(x - 3)(x + 1) = -(x - 1)^2 + 4 = -x^2 + 2x + 3\)

11-83. \(\begin{align*}
a: & x = 1 \\
b: & x < -1 \text{ or } x > 7 \\
c: & x = 7
\end{align*}\)

11-84. See graph at right. The vertex is at \((3, -1)\); \(x\)-intercepts \((4, 0)\) and \((2, 0)\); \(y\)-intercept \((0, 2)\)

11-85. \(\begin{align*}
a: & \text{ Team 2 works, on average, a little faster—the median number of widgets per team member is slightly higher. The distributions for both teams are similarly symmetric. However, the members of Team 1 are much more consistent than Team 2. The variability (IQR) of Team 1 is almost half that of Team 2, and Team 1’s range is less too. Neither team had outliers.}
\end{align*}\)

\(\begin{align*}
b: & \text{ Since both distributions are nearly symmetric with no outliers, it is appropriate to compare standard deviations. Since Team 1 had both IQR and range smaller than Team 2, we would expect that Team 1 has a smaller standard deviation.}
\end{align*}\)
Lesson 11.3.2

11-88. 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. 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.

11-89. $y = \frac{1}{2} (x - 2)^2 + 3$

11-90. a: 3  b: 1  c: 2

11-91. $0.50c + 0.75b \geq 100, c \geq 0, b \geq 0$

11-92. The parabola has vertex $(1, -3)$ and points down. The line has y-intercept at $(0, -5)$ and decreases. There are two points of intersection.

11-93. $|w - 10| > 0.13$;  $w < 9.87$ or $w > 10.13$
Lesson 11.3.3

11-98. No

11-99. a: yes
b: no; most inputs have two outputs
c: no; \(x = -1\) has two outputs

11-100. a: \(x = 3 \pm \sqrt{21}\)  b: \(x = 2 \pm \sqrt{7}\)

11-101. a: none  b: two  c: two  d: one

11-102. a: The slope of the line of best fit is \(-75.907\). Jeremiah has 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, \(y = 17\) years from now. In 2027 he will have only 3 coins left.

11-103. 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 \(Z\) which might indicate a reliability problem.
Lesson 11.3.4

11-110. \((-2.5, -36.75)\); Students can complete the square or they can use the fact that due to the parabola’s symmetry, the vertex must have an \(x\)-coordinate that is halfway between the \(x\)-intercepts.

11-111. a: \(y = 2\) or \(-2\)  \quad b: \(x = 8\) or \(-3\)

11-112. \((6, 8)\) and \((5, 3)\)

11-113. D: \(x < 2\) and \(x > 2\), R: \(y < 0\) and \(y > 0\)
Solution graph shown at right.

11-114. \(8x + 10(6) = 8.5(x + 6)\), 18 pounds

11-115. 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.

11-116. \((-2, 5)\) and \((6, 21)\)

11-117. See solution at right.

11-118. a: none  
    b: two  
    c: one  
    d: two

11-119. a: \(x = -12\)  \quad b: \(4 - \sqrt{12} < b < 4 + \sqrt{12}\)  
    c: \(-33 \leq x \leq 27\)  \quad d: \(n = \frac{1}{5}\) or \(2\)

11-120. \(x\)-intercepts: \((= 0.2, 0)\) and \((= 3.1, 0)\), vertex \((= 1.7, = -6.3)\); Solution graph is shown at right.

11-121. a: See table and graph at far right.  
    b: \(y = (x - 2)(x - 5) = x^2 - 7x + 10\)  
    c: See graph at right.  
    d: 4 seconds, 256 feet
Lesson 11.3.5

11-126. Based on direction and vertex of the parabola compared with the intercepts of the line, there are two points of intersection.

11-127. a: $x \geq 4$

b: $x > 20.5$

c: $-5 \leq x \leq 1$

d: $x > 19$ or $x < -12$

11-128. $x = -9$ or $-5$

11-129. See graph at right.

11-130. 25 homes

11-131. See graph at right.
   x-intercept: (-2, 0),
y-intercept: (0, -2);
   there is no value for $g(1)$, which creates a break in the graph.

11-132. B

11-133. $y = -\frac{3}{2}x - 1$

11-134. Answers vary, but likely answers are $6(m - 2)$, $2(3m - 6)$, $3(2m - 4)$, and $1(6m - 12)$.

11-135. a: -1  b: 2  c: -2  d: -1

11-136. a: $5m^2 + 9m - 2$
   b: $-x^2 + 4x + 12$
   c: $25x^2 - 10xy + y^2$
   d: $6x^2 - 15xy + 12x$

11-137. $x = -3$ or -11
Lesson A.1.1

A-6.  $4x + 7$

A-7.  $3x^2 + 8x + 9$

A-8.  a: perimeter = 120 units, area = 647 sq. units  
b: perimeter = 70 units, area = 192 sq. units

A-9.  a: 52 units  
b: 168 sq. units

A-10. a: 11  
b: 14  
c: −30  
d: 10

A-11. a: $\frac{1}{4}$  
b: $−\frac{1}{2}$  
c: −8  
d: 8

Lesson A.1.2

A-17. a: $y^2 + 6y + 5$  
b: not possible; no terms alike  
c: $3xy + 6x + 3y + 6$  
d: $4m^2 + 5m + 2mn$

A-18. a: 7  
b: 14  
c: −2  
d: 74

A-19. a: 10 ft by 15 ft  
b: bathroom = 63 sq. ft, kitchen = 105 sq. ft, living room = 150 sq. ft  
c: 318 sq. ft

A-20. a: $A(−4, 3), B(2, 1), C(−2, 0),$ and $D(−3, −3)$  
b: See graph at right

A-21. $6x^2 + 4x + 3xy + 6y + y^2$

A-22. a: −45  
b: 10  
c: 2  
d: −264  
e: $−\frac{1}{4}$  
f: −2
Lesson A.1.3

A-30.  a: $4x^2 + 6x + 13$  
        b: $5y^2 + 8x + 19$  
        c: $9x^2 + x + 44$  
        d: $5y^2 + 6xy + 30$

A-31.  See graph at right.  
        a: a square  
        b: 9 units  
        c: 81 square units  
        d: 36 units

A-32.  Let $b = \text{beige tiles}$, $435 = 107 + b + 3b$; she is buying 82 beige, 
        107 red, and 246 navy-blue tiles.

A-33.  a: 3  
        b: 18  
        c: $-24$  
        d: $-30$  
        e: $-6$  
        f: 8  
        g: $-12$  
        h: $-1$

A-34.  a: $m = 40$  
        b: $x = 5.4$  
        c: $y = 6$  
        d: $m = 27$

Lesson A.1.4

A-42.  $3x^2 + 14x + 15$

A-43.  Parts (a) and (b) are possible, but part (c) is not.

A-44.  a: 14  
        b: 6.5  
        c: 74  
        d: 12  
        e: 11

A-45.  a: $2x - 3 - (x + 1) = x - 4$  
        b: $y + 3 - y - 1 = 2$  
        c: $-x - (x + 2) = -2x - 2$

A-46.  $4x + 8$

A-47.  a:  
        b:  
        c:  
        d:  

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Lesson A.1.5

A-53.  a: \(4x^2 + 3x - 3\)  
b: \(5x^2 - 23x\)  
c: \(4x + 3y\)  
d: \(2y^2 + 3xy + 27\)

A-54.  a: \[
\begin{array}{c|c|c}
64 & 8 & -8 \\
\hline
8 & 5 & 0
\end{array}
\]
  b: \[
\begin{array}{c|c|c}
-25 & -5 & 5 \\
\hline
1 & 4 & 1
\end{array}
\]
  c: \[
\begin{array}{c|c|c|c}
-12 & \frac{1}{2} & \frac{1}{6} \\
\hline
-3 & \frac{1}{6} & \frac{1}{6}
\end{array}
\]
  d: \[
\begin{array}{c|c|c|c}
-\frac{1}{2} & \frac{1}{6} & \frac{1}{6} \\
\hline
\frac{1}{2} & \frac{1}{6} & \frac{1}{6}
\end{array}
\]

A-55.  a: The steeper line is B.  
b: \(\approx 3\) years  
c: \(\approx 65,000\)  
d: Company B’s profits are, because its line is steeper.

A-56.  a: right  
b: right

A-57.  a: \(-23.8\)  
b: 36  
c: 1.5  
d: \(-14\)

A-58.  9 \(\frac{1}{3}\) hours

Lesson A.1.6

A-61.  a: \(2x - 1\)  
b: 4  
c: \(x^2 - y - 4\)

A-62.  a: \(A = 2, B = 4, C = 3, D = 1; 5\) is not matched.  
b: base = 6 un., height = 4 un., area = 24 sq. un.  
c: The area of the rectangle represented by the point (6, 4) is 24 sq. un., not 36 sq. un.  
d: 10-by-3.6, 15-by-2.4, 12-by-3, etc.  
e: A curve.

A-63.  a: 17  
b: 9  
c: 45  
d: 10  
e: \(-22\)  
f: 4

A-64.  a: \(39.48 \div 12 = 3.29\)  
b: \(3.29 \cdot 15\) gallons = \$49.35  
c: \(13.16 \div 3.29 = 4\) gallons

A-65.  a: Six parts are shaded.  
b: \(\frac{3}{4} \div \frac{1}{8} = \frac{3}{4} \cdot \frac{8}{1} = 6\)

A-66.  a: \(-7\)  
b: 2  
c: 11  
d: \(-1\)
Lesson A.1.7

A-71. Let \( x \) = the number of adults, \( 1220 = x + (150 + x) \); 685 students attended.

A-72. Not quite. She correctly removed \( 2x \) from both sides and also flipped a 1 from the “−” region to the “+” region and removed a zero. However, on the left side, the −1 and the 1 in the “−” region do not make zero, so this is not a “legal” move.

A-73. 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.

A-74. a: \( 4y + 2x + 2; 4(10) + 2(6) + 2 = 54 \) units
   b: \( y^2 + 2x + 1 = (10)^2 + 2(6) + 1 = 113 \) square units

A-75. a: 4  b: 1  c: 7  d: 2
    e: 5  f: 6  g: 3

A-76. 405 miles

Lesson A.1.8

A-82. Each problem can be simplified down to a different value
   a: The right side is greater.
   b: The left and right expressions are equal.

A-83. One possible equation is: \( x + (x − 14) = 40 \); Her numbers are 27 and 13.

A-84. a: \( 2y − 2x + 3 \)  b: \( 2x^2 + 3x + 6 \)  c: 0  d: \( x − y \)

A-85. \((-3, -2), (-6, -4), (9, 6), \) and various others

A-86. a: \( =17.67 \)  b: 18

A-87. a: \( \frac{2}{15} \)  b: \( 1 \frac{5}{8} \)  c: −6  d: \( −\frac{1}{3} \)
Lesson A.1.9

A-92. Possible equation: \(2 - 2x - (4 - x) = 2 - 3 - (x - 2)\)

A-93. 16 weeks

A-94. Sample solutions: \((-4, 2), (-6, 3), (4, -2)\)

A-95. a: \(x = -2\)  
b: \(x = -1\)

A-96. a: right  
b: equal

A-97. a: 60  
b: -32  
c: 3598  
d: -6