In exercises 1-2, write the equation of the line in slope-intercept form.

1. Write an equation in slope-intercept form of the line with the given characteristics.
   3. slope = \( \frac{2}{3} \), y-intercept = -7
   4. passes through (0, 6) and (3, -3)
   5. parallel to the line \( y = 3x - 1 \); passes through (-2, -8)
   6. perpendicular to the line \( y = \frac{1}{4}x - 9 \); passes through (1, 1)

Write an equation in point-slope form of the line with the given characteristics.

7. slope = 10; passes through (6, 2)
8. passes through (-3, 2) and (6, -1)
9. The first row of an auditorium has 42 seats. Each row after the first has three more seats than the row before it.
   a. Find the number of seats in Row 25.
   b. Which row has 90 seats?

The table shows the average number of minutes \( y \) per kilometer for runners and the total distance of a running race, \( x \) (in kilometers).

<table>
<thead>
<tr>
<th>( x )</th>
<th>3.1</th>
<th>6.2</th>
<th>9.3</th>
<th>12.4</th>
<th>15.5</th>
<th>18.6</th>
<th>21.7</th>
<th>24.8</th>
<th>27.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>5.4</td>
<td>5.6</td>
<td>5.7</td>
<td>5.9</td>
<td>6.0</td>
<td>6.1</td>
<td>6.3</td>
<td>6.5</td>
<td>6.9</td>
</tr>
</tbody>
</table>

- Use a graphing calculator to find an equation of the line of best fit.
- Identify and interpret the correlation coefficient.
- Interpret the slope and y-intercept of the line of best fit.
- Approximate the average number of minutes per kilometer when the distance of a race is 31 kilometers.

Let \( a, b, c, \) and \( d \) be constants. Determine which of the lines, if any, are parallel or perpendicular. Explain.

Line 1: \( y - c = ax \)  
Line 2: \( ay = -x - b \)  
Line 3: \( ax + y = d \)
8.34. Do the freshmen really have the largest backpacks, or is that just high school legend stuff? Delenn was able to weigh a random sample of student backpacks throughout the school year. She also recorded the number of quarters of high school completed by the student who owns the bag. Using spreadsheet software, Delenn found the following:

a. Interpret the slope of the least squares regression line in the context of this study.
b. Interpret the y-intercept of the least squares regression line in the context of this study.
c. Interpret the correlation coefficient.

13. Aaron performed an experiment in class. He kept track of his distance as he walked from the marked starting place, and graphed his results. The results are shown.

a. What is Aaron’s rate of change for the first 3 seconds?
b. What does the horizontal section of the graph indicate?
c. What is Aaron’s rate of change between 7 and 10 seconds?
d. How far is he from the starting point at 7 seconds? At 10 seconds?

14. Write an equation for the nth term of the arithmetic sequence. Then find $a_{10}$.

a. $-9, -1, 7, 15, ...$

b. $\frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3}, ...$

c. $-4, 3, 10, 17, 24, ...$

d. $43, 39, 35, 31, 27, ...$

15. In 15 and 16, use the information in the tables below, find residuals and create a residual plot. Then determine whether the model is a good fit for the data in the table. Explain.

a. $y = \frac{7}{2}x - 8$

<table>
<thead>
<tr>
<th>$x$</th>
<th>-4</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>
</tr>
</thead>
<tbody>
<tr>
<td>$y$</td>
<td>-21</td>
<td>-19</td>
<td>-15</td>
<td>-12</td>
<td>-8</td>
<td>-4</td>
<td>-1</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
b. \( y = -4x + 27 \)

\[
\begin{array}{c|cccccccc}
 x & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\
 \hline
 y & 24 & 22 & 19 & 18 & 15 & 11 & 9 & 6 & 5 \\
\end{array}
\]

16. The table shows the time \( x \) (in hours) students spent studying for a science exam and the grade they received.

<table>
<thead>
<tr>
<th>Time (hours), ( x )</th>
<th>3</th>
<th>2</th>
<th>5</th>
<th>1</th>
<th>0</th>
<th>4</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade, ( y )</td>
<td>84</td>
<td>77</td>
<td>92</td>
<td>70</td>
<td>60</td>
<td>90</td>
<td>75</td>
</tr>
</tbody>
</table>

The slope of the line of best fit is 6.31. Interpret the slope in the context of this situation.

17. Write a linear function \( f \) with the given values.

a. \( f(-2) = 1, \ f(12) = 7 \)

b. \( f(-8) = 12, \ f(-3) = -3 \)

18. Tell whether a correlation is likely in the situation. Explain your reasoning.

a. the height of a person and the length of their stride

b. the number of flat tires on your car and the number of pets you own

19. A climber is on a hike. After 2 hours he is at an altitude of 400 feet. After 6 hours, he is at an altitude of 700 feet. What is the average rate of change?

20. Michael’s savings account balance changed from $350 after 4 weeks, to $400 after 9 weeks. What is the rate of change of money in his savings account per week?

21. Write an equation, in slope-intercept form, for the line perpendicular to \( y = -\frac{1}{2}x + 6 \) containing the point (6, 3).

22. Write an equation, in slope-intercept form, for the line parallel to \( y = -\frac{1}{2}x + 6 \) containing the point (2, -3).
Algebra Ch 4 Review Answers

1. \( y = \frac{1}{4}x + 2 \) 
2. \( y = -6x + 3 \) 
3. \( y = \frac{2}{5}x - 7 \) 
4. \( y = -3x + 6 \) 
5. \( y = 3x - 2 \) 
6. \( y = -4x + 5 \) 
7. \( y - 2 = 10(x - 6) \) 
8. \( y - 2 = -\frac{1}{3}(x + 3) \) or \( y + 1 = -\frac{1}{3}(x - 6) \) 
9. a. Row 25 has 114 seats 
   b. Row 17 has 90 seats. 
10. a. \( f(x) = 0.054x + 5.2 \) 
    b. \( r = 0.98 \), strong positive correlation 
    c. slope = 0.054; Each 1-kilometer increase in distance adds 0.054 to the average time in minutes per kilometer for the run. 
    y-intercept = 5.2; Interpretation of the y-intercept is not applicable to the nature of the data, as a total running distance of 0 kilometers would not have an average number of minutes of 5.2 minutes per kilometer. 
    d. \( f(31) = 6.874 \text{ min/km} \) 
11. Line 1: \( y - c = ax \) 
    Line 2: \( ay = -x - b \) 
    Line 3: \( ax + y = d \) 
    The slope of line 1 is \( a \). The slope of line 2 is \( -\frac{1}{a} \), which is the negative reciprocal of \( a \). So, lines 1 and 2 are perpendicular. The slope of line 3 is \( -a \), which is the opposite of \( a \) and the reciprocal of \( -\frac{1}{a} \), but neither the same nor the negative reciprocal of either. So, line 3 is neither parallel nor perpendicular to the other two lines. 
    \[ ax - ax + y = d - ax \] 
    \[ y = d - ax, \text{ or } y = -ax + d \] 
12. a. The weight of a student’s backpack decreases by 0.55 lbs. for every quarter of high school that is completed. 
   b. A student who is starting high school has a backpack that weighs 13.84 lbs. This does make sense in this context. 
   c. The correlation coefficient is \(-0.66\) so there is a fairly weak negative correlation. 
13. a. 4 feet every 1 sec 
   b. Aaron is standing still 
   c. 2 feet every 1 sec 
   d. 12 ft; 18 ft. 
14. a. \( a_n = -9 + (n - 1)8 \) or \( a_n = 8n - 17 \); \( a_{10} = 63 \) 
   b. \( a_n = \frac{1}{3} + (n - 1) \left( \frac{1}{3} \right) \) or \( a_n = \frac{1}{3}n \); \( a_{10} = \frac{10}{3} \) 
   c. \( a_n = -4 + (n - 1)7 \) or \( a_n = 7n - 11 \); \( a_{10} = 59 \) 
   d. \( a_n = 43 + (n - 1)(-4) \) or \( a_n = -4n + 47 \); \( a_n = 7 \) 
15. a. yes; The residual points are evenly dispersed about the horizontal axis. 
   b. no; The residual points are not evenly dispersed about the horizontal axis. 
16. Students’ grade increased by about 6.31 percentage points for every 1 hour of studying. 
17. a. \( f(x) = \frac{3}{7}x + 1 \frac{6}{7} \) 
   b. \( f(x) = -3x - 12 \) 
18. a. There is a likely correlation. Typically, the taller the person, the longer their legs so their stride would be longer. 
   b. There is no correlation. There is no relationship between flat tires and the number of pets. 
19. 75 ft/hour 
20. $10/week 
21. \( y = 2x - 9 \) 
22. \( y = -\frac{1}{2}x - 2 \)