Pre-Algebra Chapter 8—Linear Functions and Graphing

SOME NUMBERED QUESTIONS HAVE BEEN DELETED OR REMOVED. YOU WILL NOT BE USING A CALCULATOR FOR PART I MULTIPLE-CHOICE QUESTIONS, AND THEREFORE YOU SHOULD NOT USE ONE FOR THE REVIEW PACKETS.

MULTIPLE CHOICE

Plotting the points from each of the given tables as shown below, identify its correct graph.

1. | x  | y  |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-4</td>
</tr>
<tr>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>-5</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

A. ![Graph A](image)

B. ![Graph B](image)

C. ![Graph C](image)

D. ![Graph D](image)

ANS:
2. 

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>y</td>
</tr>
<tr>
<td>-1</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>-1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

4. Find the solution of \( y = 6x + 1 \) for \( x = 5 \).

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>(5, ( \frac{2}{3} ))</td>
<td>B.</td>
<td>(−29, 5)</td>
</tr>
<tr>
<td>C.</td>
<td>(5, 36)</td>
<td>D.</td>
<td>(5, 31)</td>
</tr>
</tbody>
</table>

ANS:

5. The equation \( m = 0.3048f \) gives the relationship between \( m \) meters and \( f \) feet. Express 9 feet in meters. Round your answer to the nearest thousandth.
6. Which ordered pair is a solution of the equation $5x + y = -23$?

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

ANS:

7. Dennis takes care of private swimming pools. He charges $50 to travel to a home and then $30 per hour. The equation $t = 50 + 30h$ models the total charge $t$ for $h$ hours of service. Which ordered pair $(h, t)$ is NOT a solution for the equation?

A. $(8, 290)$  B. $(10, 350)$  C. $(2, 110)$  D. $(3, 180)$

ANS:

8. The equation $a = 640s$ gives the relationship between $s$ square miles and $a$ acres. Pam owns 7.5 square miles of farmland. How many acres does she own?

A. 480 acres  B. 11.72 acres  C. 4,800 acres  D. 1.17 acres

ANS:

Identify the graph for the linear equation shown.

9. $y = -2x - 4$

ANS:
ANS:

10. \( y = 4x - 5 \)

ANS:

11. \( y = -3 \)
12. \( x = 2 \)

ANS:
Solve the equation for \( y \) in standard form and then identify the graph of the equation.

13. \( 2x + y = 3 \)

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

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

A

14. \( 5x - 4y = 12 \)

A. \( y = -\frac{5}{4}x - 3 \)

C. \( y = \frac{5}{4}x - 3 \)
ANS:

Find the slope of the given line.

15.

![Graph showing a line with points (-2,2) and (5,3).]

| A. $\frac{1}{7}$ | B. $-\frac{1}{7}$ | C. -7 | D. 7 |

ANS:

16.

![Graph showing a line with points (1,-1) and (4,-1).]
17. Find the slope of the line through the pair of points.

18. \( L(-9, 6), M(-1, -9) \)

A. \( \frac{3}{10} \)  
B. \( \frac{-15}{8} \)  
C. \( \frac{8}{15} \)  
D. \( \frac{15}{8} \)

ANS:

19. \( C(-6, -7), K(-1, -7) \)

A. 0  
B. \( \frac{5}{14} \)  
C. \( \frac{-14}{5} \)  
D. undefined

ANS:

20. \( A(2, -3), P(2, 9) \)

A. 0  
B. \( \frac{2}{3} \)  
C. \( \frac{-1}{3} \)  
D. undefined

ANS:
21. The temperature on a particular day started at $-13^\circ F$. It rose steadily by $3^\circ$ each hour. The function $y = -13 + 3x$ models the temperature, where $x$ is the number of hours and $y$ is the temperature. Find the graph of the equation.

**ANS:**

Identify the slope and $y$-intercept of the graph of the equation and find the graph of the equation.

22. $y = \frac{4}{5}x + 1$

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>slope: $\frac{5}{4}$; $y$-intercept: $-1$</td>
<td>C.</td>
</tr>
</tbody>
</table>
B. slope: $\frac{5}{4}$; y-intercept: 1

D. slope: $\frac{4}{5}$; y-intercept: 1

ANS:

$23. y = -\frac{5}{4}x + 1$

A. slope: $-\frac{5}{4}$; y-intercept: -1

C. slope: $-\frac{5}{4}$; y-intercept: 1
24. \( y = -x \)

ANS:

A. slope: \(-1\); y-intercept: 0

C. slope: 0; y-intercept: 0

B. slope: 1; y-intercept: 0

D. slope: \(-1\); y-intercept: 0

ANS:
25. \( y = 2 \)

A. slope: 0; y-intercept: 2

B. slope: undefined; y-intercept: none

C. slope: 1; y-intercept: 2

D. slope: undefined; y-intercept: none

ANS:

26. Alexandra has a home-based business putting on children’s parties. She charges $60 to design the party and then $4.00 per child. Write a function rule that relates the total cost of the party to the number of children \( n \).

A. \( f(n) = 4 - 55n \)  
B. \( f(n) = 4 + 60n \)  
C. \( f(n) = 4n - 55 \)  
D. \( f(n) = 60 + 4n \)

ANS:

27. The sales tax in one state is 7%. Write a function rule for finding the total cost of an item with selling price \( x \). Then find the total cost of a CD player with a selling price of $150.

A. \( f(x) = x - 7 \); $148.93  
B. \( 0.07x = 0.07 \times 150 \); $160.50  
C. \( f(x) = 7 + x \); $151.07  
D. \( 0.07x = 1.07 \times 150 \); $160.50
Identify the “rule” or equation for the linear function in the table that would yield the points given.

28.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>16</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>-16</td>
</tr>
<tr>
<td>8</td>
<td>-32</td>
</tr>
</tbody>
</table>

A. $f(x) = -4x$  B. $f(x) = x + 16$  C. $f(x) = 4x$  D. $f(x) = \frac{1}{4}x$

ANS:

29.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-1</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

A. $f(x) = x + 2$  B. $f(x) = 3x$  C. $f(x) = x - 2$  D. $f(x) = x - 1$

ANS:

30.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-7</td>
</tr>
<tr>
<td>2</td>
<td>-10</td>
</tr>
<tr>
<td>3</td>
<td>-13</td>
</tr>
<tr>
<td>4</td>
<td>-16</td>
</tr>
</tbody>
</table>

A. $f(x) = -\frac{1}{3}x - 4$  B. $f(x) = 3x + 4$  C. $f(x) = -3x - 4$  D. $f(x) = x - 7$

ANS:

31.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

A. $f(x) = -\frac{1}{3}$  B. $f(x) = 3$  C. $f(x) = 2$  D. $f(x) = 1$
32. 

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>$\frac{3}{2}$</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>$\frac{5}{2}$</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

A. $f(x) = \frac{1}{2}x + 1$  
B. $f(x) = \frac{1}{2}x - 1$  
C. $f(x) = x + \frac{1}{2}$  
D. $f(x) = \frac{1}{2}x$

ANS:

33. Select the correct “rule” or equation for the linear function shown in the graph.

A. $y = -4x + 13$  
B. $y = -4x - 13$  
C. $y = 4x - 13$  
D. $y = \frac{1}{4}x - 13$

ANS:

34. Which function “rule” or equation of the line describes the graph?
The scatter plot shows the study times and test scores for a number of students.

35. Describe the person represented by point A.

A. This person studied for 77 minutes and scored 45.
B. This person studied for 45 minutes and scored 77.
C. This person studied for 45 hours and scored 77.
D. This person studied for 77 hours and scored 45.

ANS:

36. How long did the person who scored 81 study?

A. 50 minutes B. 81 minutes C. 16 minutes D. 100 minutes

ANS:
ANS:

38. The scatter plot shows the number of students per class at Monida Middle School and the number of magazine subscriptions each class sold for a fund-raiser. About how many subscriptions did the class of 30 students sell?

![Scatter plot image]

<table>
<thead>
<tr>
<th>Study Time (min)</th>
<th>16</th>
<th>21</th>
<th>25</th>
<th>27</th>
<th>31</th>
<th>38</th>
<th>20</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Score</td>
<td>62</td>
<td>67</td>
<td>85</td>
<td>71</td>
<td>68</td>
<td>71</td>
<td>77</td>
<td>81</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study Time (min)</th>
<th>16</th>
<th>21</th>
<th>25</th>
<th>27</th>
<th>31</th>
<th>38</th>
<th>45</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Score</td>
<td>62</td>
<td>75</td>
<td>68</td>
<td>71</td>
<td>68</td>
<td>71</td>
<td>77</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study Time (min)</th>
<th>16</th>
<th>21</th>
<th>25</th>
<th>27</th>
<th>31</th>
<th>38</th>
<th>45</th>
<th>50</th>
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</thead>
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</tbody>
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<th>62</th>
<th>67</th>
<th>68</th>
<th>71</th>
<th>68</th>
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</thead>
<tbody>
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<td>Test Score</td>
<td>16</td>
<td>21</td>
<td>25</td>
<td>27</td>
<td>31</td>
<td>38</td>
<td>45</td>
<td>50</td>
</tr>
</tbody>
</table>
ANS:

39. Use the table to make a scatter plot of the temperature and the number of ice cream cones sold at the school cafeteria.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Number of Cones Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>59</td>
<td>58</td>
</tr>
<tr>
<td>76</td>
<td>83</td>
</tr>
<tr>
<td>94</td>
<td>102</td>
</tr>
<tr>
<td>67</td>
<td>73</td>
</tr>
<tr>
<td>85</td>
<td>99</td>
</tr>
<tr>
<td>74</td>
<td>78</td>
</tr>
<tr>
<td>97</td>
<td>107</td>
</tr>
</tbody>
</table>

ANS:

40. The scatter plot shows the number of CDs that Disc–O CD factory produced in different months. What is the best prediction for the month in which they will produce 5,500 CDs?
41. The scatter plot shows the average temperature each month in a particular city. What is a good prediction for the temperature in July if the temperature continues to increase until then?

ANS:

42. Solve the system of equations by graphing.

\[
\begin{align*}
    y &= \frac{1}{2}x + 3 \\
    y &= -2x - 7
\end{align*}
\]
ANS:

43. \[ x + y = 7 \]

\[ 4x - y = 3 \]
ANS:

44. $x + y = 3$

$y = 2r - 15$
46. \[ x + y = 5 \]
\[ 2y = 10 - 2r \]

ANS:
ANS:

47. At the Wild Thing Zoo, you can rent a motorized cart to tour the grounds for a $4 initial charge and $4 per hour. An equation that represents the total cost $y$ for $x$ hours is $y = 4 + 4x$. At Safari Zoo, you can rent the same cart for a $3 initial charge and $5 per hour. An equation that represents the total cost $y$ for $x$ hours is $y = 3 + 5x$. For how many hours is the total charge the same?

A. 2 hours  B. 3 hours  C. 1 hour  D. 4 hours

ANS:

48. Find two numbers with a sum of 20 and a difference of 14.

A. 4 and 18  B. –3 and –17  C. 2 and 16  D. 3 and 17

ANS:

49. A thirty-foot-long piece of fencing wire is cut into two pieces for placing around trees. One piece is five times as long as the other. Write a system of equations to find the length of each piece. Then find the lengths.

A. $x + y = 30, x = 5y; 5$ feet and $25$ feet
B. $x - y = 30, x = 5 + y; 12.5$ feet and $17.5$ feet
C. $x + y = 30, x = 5y; 5$ feet and $25$ feet
D. $y = 30 + x, y = 5x; 7.5$ feet and $22.5$ feet

ANS:

50. The perimeter of a rectangle is 150 meters. The length is four times the width. What is the area of the rectangle?
SHORT ANSWER

1. David does landscaping for private homes and businesses. He charges $40 to travel to the site and then $40 per hour for his services. The equation \( y = 40 + 40x \) models the charge for his services \( y \) for any number of hours \( x \).
   a. Graph the equation.
   b. What is the slope of the line? What does the slope represent?
   c. What is the y-intercept of the line? What does the y-intercept represent?
   d. Julia paid David $240 for his services. How many hours did David work?

   ANS:
   a. 
   b. 
   c. 
   d. 

2. If you know the number of yards for a measurement, you can change that measure to meters by multiplying the number of yards by 0.9144.
   a. Write a function rule that relates meters to yards.
   b. How many meters are equivalent to 7,200 yards? Round your answer to the nearest hundredth, if necessary.
   c. How many yards are equivalent to 2,500 meters? Round your answer to the nearest hundredth, if necessary.

   ANS:
   a. 
   b. 
   c. 

3. Is there a positive correlation, a negative correlation, or no correlation in the scatter plot? Explain the relationship between the data on the horizontal axis and the data on the vertical axis.

   ![Scatter plot with data points]
ANS:

4. Ayesha is a gardener who makes square gardens in various sizes. The table shows the side lengths, in feet, and the areas of various gardens, in square feet.

<table>
<thead>
<tr>
<th>Side Length (feet)</th>
<th>Area (square feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>196</td>
</tr>
<tr>
<td>18</td>
<td>324</td>
</tr>
<tr>
<td>22</td>
<td>484</td>
</tr>
<tr>
<td>26</td>
<td>676</td>
</tr>
<tr>
<td>30</td>
<td>900</td>
</tr>
</tbody>
</table>

- a. Write the values from the table as a set of ordered pairs (side length, area).
- b. Graph the relation. Describe the graph and explain whether it is a function.
- c. Describe the relationship between the side length and the area of the gardens.
- d. Suppose the area of a garden is 3,600 square feet. Describe how to find the side length of the garden.

ANS:
- a.
- b.
- c.
- d.

5. A scientific experiment requires that the temperature be lowered at a steady and gradual rate. The beginning temperature is 27°C and the temperature is lowered 3 degrees per day. A linear equation for the situation is \( y = -3x + 27 \).

- a. Graph the equation. Explain your method.
- b. Find the solutions of the equation for \( x = 0 \) and \( y = 0 \). Explain what these points represent.

ANS:
- a.
- b.

6. On one evening at 6 P.M., the temperature was 24°F. As the night progressed, the temperature dropped at the steady rate of 4°F per hour.

- a. Make a table of values for the function for values of \( x \) from 0 through 8. Let 0 represent the time of 6 P.M.
- b. Write a function rule for the linear function. Explain your method for writing the rule.
- c. At what time will the temperature reach 0°F? Explain your method for finding the time.

ANS:
- a.
- b.
- c.

7. The Rose Park pool holds 75,000 gallons of water. At the end of the season, the pool has to be drained
<table>
<thead>
<tr>
<th>Hours Drained $x$</th>
<th>(gallons) $y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>75,000</td>
</tr>
<tr>
<td>1</td>
<td>72,500</td>
</tr>
<tr>
<td>2</td>
<td>70,000</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
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<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

b. Make a scatter plot of the data. Describe the graph and any correlation.
c. What is the $y$-intercept? What does it represent?
d. What is the slope? What does it represent?
e. In how many hours will the pool be empty? Explain how you found the answer.

ANS:
a.
b.
c.
d.
e,

8 Currently, Jodi has a collection of 44 CDs and Veronica has a collection of 22 CDs. Jodi is adding 2 CDs per month to her collection, while Veronica plans to add 4 CDs per month.

a. Write a system of equations for this situation. Explain your method.
b. Graph the system of equations.
c. In how many months will they have the same number of CDs? What will be the number of CDs? Explain how you found the answer.
d. At the end of 2 months, who will have more CDs? Explain how you found the answer.

ANS:
a.
b.
c.
d,
a. Explain what the ordered pair (4, 100) represents.
b. Is the set of ordered pairs a function? Explain.
c. What would the value of y be in the order pair (9, y)? Explain.

ANS:
a. 
b. 
c.

10. The graph shows the distance traveled by three cars at different speeds. The horizontal axis represents time in hours and the vertical axis represents distance traveled in miles.

![Graph showing the distance traveled by three cars at different speeds.]

a. Which car is going fastest? Explain.
b. What is the speed of each car? Explain.
c. What is the relationship between the speed of the car represented by the steepest line and the speed of the car represented by the least steep line?

ANS:
a. 
b. 
c.

11. The table shows the relationship between temperature and the number of cups of hot cocoa sold at the concession stand for the football game.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Number of Cups of Cocoa Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>240</td>
</tr>
<tr>
<td>20</td>
<td>215</td>
</tr>
</tbody>
</table>
a. Make a scatter plot of the data with temperature on the horizontal axis and number of cups of cocoa on the vertical axis. Describe how you make the scatter plot.
b. Describe the relationship between temperature and number of cups of cocoa sold. Include the type of correlation.
c. Suppose you made a scatter plot with number of cups of cocoa sold on the horizontal axis and temperature on the vertical axis. Describe the graph.

ANS:
a. 

b. 

c.