Chapter 4

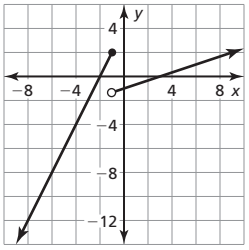
Chapter 4 Test (p. 229)

1.

x	$2x + 4$	y
-3	$2(-3) + 4$	-2
-2	$2(-2) + 4$	0
-1	$2(-1) + 4$	2

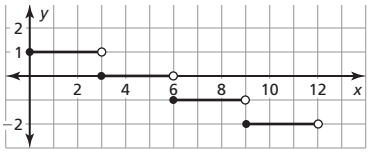
open dot:

x	$\frac{1}{3}x - 1$	y
-1	$\frac{1}{3}(-1) - 1$	$-1\frac{1}{3}$
0	$\frac{1}{3}(0) - 1$	-1
3	$\frac{1}{3}(3) - 1$	0



The domain is all real numbers. The range is all real numbers.

2.



The domain is $0 \le x \le 12$ and the range is $-2, -1, 0, 1$.

3. $y = mx + b$

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

The equation is $y = \frac{2}{5}x - 7$.

4. $m = \frac{-3 - 6}{3 - 0} = \frac{-9}{3}$, *or* -3

$y - y_1 = m(x - x_1)$

$y - 6 = -3(x - 0)$

$y - 6 = -3(x)$

$y - 6 = -3x$

$+ 6 \quad + 6$

$y = -3x + 6$

The equation is $y = -3x + 6$.

5. $y - y_1 = m(x - x_1)$

$y - (-8) = 3(x - (-2))$

$y + 8 = 3(x + 2)$

$y + 8 = 3(x) + 3(2)$

$y + 8 = 3x + 6$

$- 8 \quad - 8$

$y = 3x - 2$

The equation of the parallel line is $y = 3x - 2$.

6. $y = mx + b$

$1 = -4(1) + b$

$1 = -4 + b$

$+ 4 \quad + 4$

$5 = b$

Using $m = -4$ and $b = 5$, the equation of the perpendicular line is $y = -4x + 5$.

7. $y - y_1 = m(x - x_1)$

$y - 2 = 10(x - 6)$

The equation is $y - 2 = 10(x - 6)$.

8. $m = \frac{-1 - 2}{6 - (-3)} = \frac{-1 - 2}{6 + 3} = \frac{-3}{9}$, *or* $-\frac{1}{3}$

$y - y_1 = m(x - x_1)$ *or* $y - y_1 = m(x - x_1)$

$y - 2 = -\frac{1}{3}(x - (-3))$ $\quad$ $y - (-1) = -\frac{1}{3}(x - 6)$

$y - 2 = -\frac{1}{3}(x + 3)$ $\quad$ $y + 1 = -\frac{1}{3}(x - 6)$

The equation is $y - 2 = -\frac{1}{3}(x + 3)$ *or* $y + 1 = -\frac{1}{3}(x - 6)$.

9. $a_1 = 42$ and $d = 3$

$a_n = a_1 + (n - 1)d$

$a_n = 42 + (n - 1)(3)$

$a_n = 42 + n(3) - 1(3)$

$a_n = 42 + 3n - 3$

$a_n = 3n + 39$

a. $a_n = 3n + 39$

$a_{25} = 3(25) + 39$

$a_{25} = 114$

So, row 25 has 114 seats.

b. $a_n = 3n + 39$

$90 = 3n + 39$

$- 39 \quad - 39$

$51 = 3n$

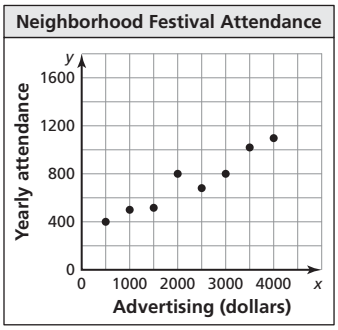
$\frac{51}{3} = \frac{3n}{3}$

$17 = n$

So, row 17 has 90 seats.

Chapter 4

10. a.



The scatter plot shows a positive correlation.

b. *Sample answer:* A line through (1000, 500) and (2000, 700) models the data.

The slope of the line is $m = \frac{700 - 500}{2000 - 1000} = \frac{200}{1000} = \frac{1}{5}$.

$y - y_1 = m(x - x_1)$

$y - 500 = \frac{1}{5}(x - 1000)$

$y - 500 = \frac{1}{5}(x) - \frac{1}{5}(1000)$

$y - 500 = \frac{1}{5}x - 200$

$+ 500 \qquad + 500$

$y = \frac{1}{5}x + 300$

An equation of the line of fit is $y = \frac{1}{5}x + 300$.

c. *Sample answer:* The slope of the line is $\frac{1}{5}$. This means that the yearly attendance at the festival increases by about 1 person for every \$5 spent on advertising. The y-intercept is 300, meaning that if no money is spent on advertising, about 300 people would attend the festival.

11. a. After entering the data from the table into two lists using a graphing calculator, the *linear regression* feature yields the equation $y = 0.19x + 309$.

b. The correlation coefficient is about 0.943. This means that there is a strong positive correlation between the amount spent on advertising and the yearly attendance of the festival. So, the equation $y = 0.19x + 309$ closely models the data.

c. *Sample answer:* Because the data show a strong positive correlation and the line of best fit closely models the data, you would expect the scatter plot of the residuals to show a relatively even distribution of residuals on both sides of the x-axis.

d. There may be a casual relationship in the data but the correlation may be caused by other factors, such as the quality of the attractions each year.

e. $y = 0.19x + 309$

$2000 = 0.19x + 309$

$- 309 \qquad - 309$

$1691 = 0.19x$

$8900 = x$

In order to get 2000 people to attend the festival, \$8900 should be spent on advertising.

12. Line 1: $y - c = ax$

$y - c + c = ax + c$

$y = ax + c$

Line 2: $ay = -x - b$

$\frac{ay}{a} = \frac{-x - b}{a}$

$y = \frac{-1}{a}x - \frac{b}{a}$

Line 3: $ax + y = d$

$ax - ax + y = d - ax$

$y = d - ax, \quad or \quad y = -ax + d$

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.

13. *Sample answer:*

$$f(x) = \begin{cases} -1, & \text{if } x \leq -3 \\ x, & \text{if } -3 < x \leq 1 \\ a, & \text{if } x > 1 \end{cases}$$

Chapter 4 Standards Assessment (pp. 230–231)

1. C; $d = 21 - 24 = -3$

$a_n = a_1 + (n - 1)d$

$a_n = 24 + (n - 1)(-3)$

$a_n = 24 + n(-3) - 1(-3)$

$a_n = 24 - 3n + 3$

$a_n = 27 - 3n$