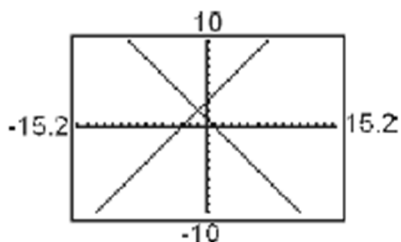


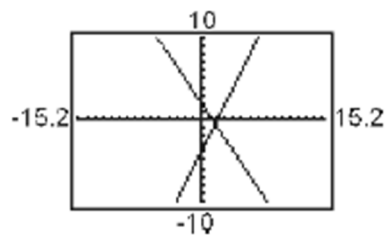
Section 4.3 Slope-Intercept Form of a Linear Equations

Section 4.3 Calculator Exercises

1. Perpendicular



3. Neither



5. The lines may appear to coincide on a graph; however, they are not the same line because they-intercepts are different.

Section 4.3 Practice Exercises

1. (a) $y = mx + b$

(b) standard

3. x-intercept: $y = 0$ y-intercept: $x = 0$

$$x - 5(0) = 10 \quad 0 - 5y = 10$$

$$x = 10 \quad y = -2$$

$$(10, 0) \quad (0, -2)$$

5. x -intercept: $y = 0$ y -intercept: $x = 0$
 none $3y = -9$

$y = -3$

$(0, -3)$

7. x -intercept: $y = 0$ y -intercept: $x = 0$

$-4x = 6(0)$ $-4(0) = 6y$

$x = 0$ $y = 0$

$(0, 0)$ $(0, 0)$

9. x -intercept: $y = 0$ y -intercept: $x = 0$

$5x = 20$ none

$x = 4$

$(4, 0)$

11. $y = -2x + 3$

$m = -2$; y -intercept = $(0, 3)$

13. $y = x - 2$

$m = 1$; y -intercept = $(0, -2)$

15. $y = -x$

$m = -1$; y -intercept = $(0, 0)$

17. $y = \frac{3}{4}x - 1$

$m = \frac{3}{4}$; y -intercept = $(0, -1)$

19. $2x - 5y = 4$

$-5y = -2x + 4$

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

$y = \frac{2}{5}x - \frac{4}{5}$

$m = \frac{2}{5}$; y -intercept = $(0, -\frac{4}{5})$

21. $3x - y = 5$

$y = 3x - 5$

$m = 3$; y -intercept = $(0, -5)$

23. $x + y = 6$

$y = -x + 6$

$m = -1$; y -intercept = $(0, 6)$

25. $x + 6 = 8$

$x = 2$

It is a vertical line at $x = 2$; slope is undefined and no y -intercept.

27. $-8y = 2$

$y = -\frac{1}{4}$

It is a horizontal line; $m = 0$, y -intercept

= $(0, -\frac{1}{4})$

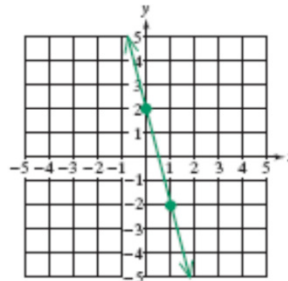
29. $3y - 2x = 0$

$3y = 2x$

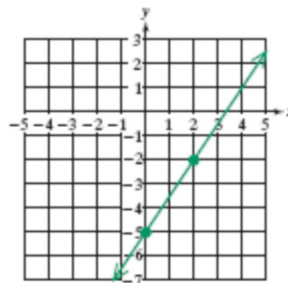
$y = \frac{2}{3}x$

$m = \frac{2}{3}$; y -intercept = $(0, 0)$

31.



33.



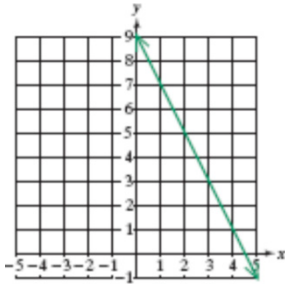
35. The slope is positive and the y -intercept is positive, so the equation matches graph b.

37. The slope is negative and the y -intercept is positive, so the equation matches graph e.

39. The slope is positive and the y-intercept is (0, 0), so the equation matches graph c.

41. $2x + y = 9$

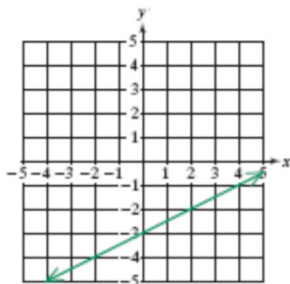
$$y = -2x + 9$$



43. $x - 2y = 6$

$$-2y = -x + 6$$

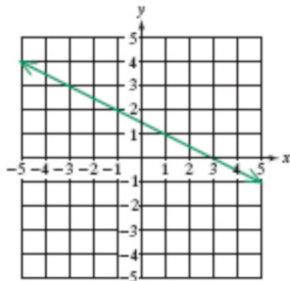
$$y = \frac{1}{2}x - 3$$



45. $2x = -4y + 6$

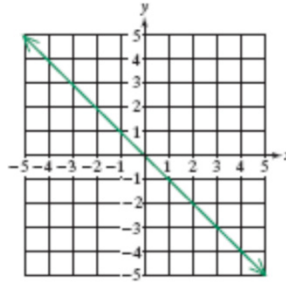
$$-4y = 2x - 6$$

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

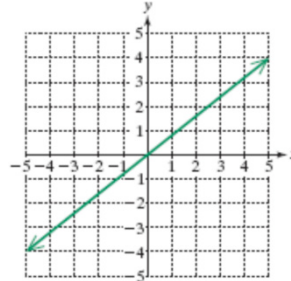


47. $x + y = 0$

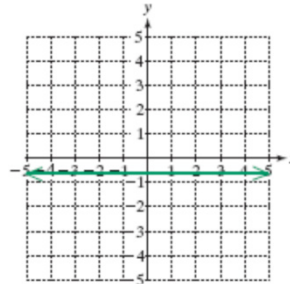
$$y = -x$$



49. $5y = 4x \Rightarrow y = \frac{4}{5}x$



51. $3y + 2 = 0 \Rightarrow y = -\frac{2}{3}$



53. $l_1: m_1 = -2$

$$l_2: m_2 = \frac{1}{2}$$

$$m_1 m_2 = -2 \left(\frac{1}{2} \right) = -1$$

The lines are perpendicular.

55. $l_1: m_1 = \frac{4}{5}$

$$l_2: m_2 = \frac{5}{4}$$

$$m_1 m_2 = \frac{4}{5} \left(\frac{5}{4} \right) = 1 \neq -1$$

$$m_1 \neq m_2$$

The lines are neither parallel nor perpendicular.

57. $l_1: m = -9$

$l_2: m = -9$

parallel

59. Vertical and horizontal lines; they are perpendicular.

61. Both are vertical lines and are parallel.

63. $l_1: 2x + 3y = 6$

$3y = -2x + 6$

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

$m_1 = -\frac{2}{3}$

$l_2: 3x - 2y = 12$

$-2y = -3x + 12$

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

$m_2 = \frac{3}{2}$

$m_1 m_2 = -\frac{2}{3} \left(\frac{3}{2} \right) = -1$

The lines are perpendicular.

65. $l_1: 4x + 2y = 6$

$2y = -4x + 6$

$y = -2x + 3$

$m_1 = -2$

$l_2: 4x + 8y = 16$

$8y = -4x + 16$

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

$m_2 = -\frac{1}{2}$

$m_1 m_2 = -2 \left(-\frac{1}{2} \right) = 1 \neq -1$

$m_1 \neq m_2$

The lines are neither parallel nor perpendicular.

67. $l_1: m = \frac{1}{5}$

$l_2: 2x - 10y = 20$

$-10y = -2x + 20$

$y = \frac{1}{5}x - 2$

$m_2 = \frac{1}{5}$

$m_1 = m_2$

The lines are parallel.

69. $y = mx + b$

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

71. $y = mx + b$

$y = 10x - 19$

73. $y = 6x - 8$

75. $y = \frac{1}{2}x - 3$ or $x - 2y = 6$

77. $y = -11$

79. $y = 5x$

81. Step 1: $m = \frac{3 - (-1)}{0 - 2} = -2$

Step 2: Using slope-intercept form

$y = mx + b$

with $m = -2$ and point $(0, 3)$,

$y = mx + b$

$y = -2x + b$

$3 = -2(0) + b$

$3 = b$

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

83. Step 1: $m = \frac{3 - 1}{-3 - 3} = -\frac{1}{3}$

Step 2: Using slope-intercept form

$y = mx + b$

with $m = -\frac{1}{3}$ and point $(-3, 3)$,

$y = mx + b$

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

$$3 = -\frac{1}{3}(-3) + b$$

$$3 = 1 + b \Rightarrow 2 = b$$

The equation of the line is $y = -\frac{1}{3}x + 2$.

85. Step 1: $m = \frac{-9-3}{-2-1} = 4$

Step 2: Using slope-intercept form

$$y = mx + b$$

with $m = 4$ and point $(1,3)$,

$$y = mx + b$$

$$y = 4x + b$$

$$3 = 4(1) + b \Rightarrow -1 = b$$

The equation of the line is

$$y = 4x - 1.$$

87. (a) $y = 1203x + 10,006$

$m = 1203$; The slope represents the rate of increase in the number of cases of Lyme disease per year.

(b) $y = 1203x + 10,006$

$$b = 10,006$$

$(0, 10006)$; In the year 1993 ($x = 0$) there were 10,006 cases of Lyme disease reported.

(c) In 2010, $x = 2010 - 1993 = 17$

$$y = 1203(17) + 10,006$$

$$= 20,451 + 10,006 = 30,457$$

According to the equation, there were 30,457 cases of Lyme disease reported in 2010.

(d) $1203x + 10,006 = 42,487$

$$1203x = 42,487 - 10,006$$

$$= 32,481$$

$$x = \frac{32,481}{1203} = 27$$

$x = 27$ corresponds to the year

$$1993 + 27 = 2020$$

89. $Ax + By = C$

$$By = -Ax + C$$

$$y = \frac{-A}{B}x + \frac{C}{B}$$

$$m = \frac{-A}{B}$$

91. $A = 6, B = 7$

$$m = -\frac{A}{B} = -\frac{6}{7}$$

93. $A = 11, B = -8$

$$m = -\frac{A}{B} = -\frac{11}{-8} = \frac{11}{8}$$

Problem Recognition Exercises

a. $y = 5x$: $m = 5$, passes through the origin

b. $2x + 3y = 12$:

$$m = -\frac{2}{3}; y\text{-intercept} = (0, 4);$$

$$x\text{-intercept} = (6, 0)$$

c. $y = \frac{1}{2}x - 5$: $m = \frac{1}{2}$; y -intercept = $(0, -5)$;

$$x\text{-intercept} = (10, 0)$$

d. $3x - 6y = 10$: $m = \frac{1}{2}$;

$$y\text{-intercept} = \left(0, -\frac{5}{3}\right); x\text{-intercept} = \left(\frac{10}{3}, 0\right);$$

e. $2y = -8$: $m = 0$; y -intercept = $(0, -4)$;

no x -intercept

f. $y = -2x + 4$: $m = -2$; y -intercept = $(0, 4)$;

x -intercept = (2, 0)

g. $3x = 1$; slope is undefined; no y -intercept;

x -intercept = $\left(\frac{1}{3}, 0\right)$

h. $x + 2y = 6$: $m = -\frac{1}{2}$; y -intercept = (0, 3);

x -intercept = (6, 0)

- 1.** Line whose slope is positive: a, c, d
- 3.** Line that passes through the origin: a
- 5.** Line whose y -intercept is (0, 4): b, f

7. Line whose slope is $\frac{1}{2}$: c, d

9. Line whose slope is 0: e

11. Line that is parallel to the line with the equation $y = -\frac{2}{3}x + 4$: b

13. Line that is vertical: g

15. Line whose x -intercept is (10, 0): c

17. Line that is parallel to the x -axis: e

19. Line with a negative slope and positive y -intercept: b, f, h