

11.  $3x - 4y = 80$

12.  $2x + 3y = 90$

13.  $y - \frac{1}{2} = \frac{2}{3}\left(x - \frac{1}{4}\right)$

14.  $y + \frac{2}{3} = -\frac{1}{2}\left(x - \frac{2}{5}\right)$

Find the equation of the line that goes through the given point and has the given slope. Write the answer in slope-intercept form. See Example 1.

15.  $(1, 2), 3$

16.  $(2, 5), 4$



17.  $(2, 4), \frac{1}{2}$

18.  $(4, 6), \frac{1}{2}$

19.  $(2, 3), \frac{1}{3}$

20.  $(1, 4), \frac{1}{4}$

21.  $(-2, 5), -\frac{1}{2}$

22.  $(-3, 1), -\frac{1}{3}$

23.  $(-1, -7), -6$

24.  $(-1, -5), -8$

Write each equation in standard form using only integers. See Example 2.

25.  $y - 3 = 2(x - 5)$

26.  $y + 2 = -3(x - 1)$

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

28.  $y = \frac{1}{3}x + 5$

29.  $y - 2 = \frac{2}{3}(x - 4)$

30.  $y + 1 = \frac{3}{2}(x + 4)$

Find the equation of the line through each given pair of points. Write the answer in standard form using only integers. See Example 2.

31.  $(1, 3), (2, 5)$

32.  $(2, 5), (3, 9)$

33.  $(1, 1), (2, 2)$

34.  $(-1, 1), (1, -1)$

35.  $(1, 2), (5, 8)$



36.  $(3, 5), (8, 15)$

37.  $(-2, -1), (3, -4)$

38.  $(-1, -3), (2, -1)$

39.  $(-2, 0), (0, 2)$

40.  $(0, 3), (5, 0)$

41.  $(2, 4), (2, 6)$

42.  $(-3, 5), (-3, -1)$

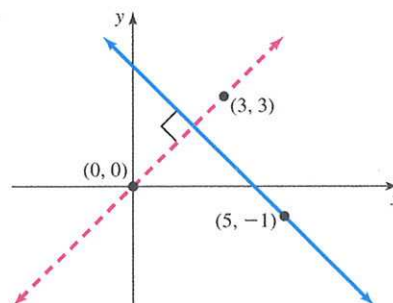
43.  $(-3, 9), (3, 9)$

44.  $(2, 5), (4, 5)$

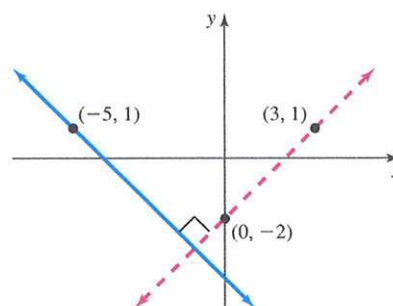
### 2-3 Parallel and Perpendicular Lines

The lines in each figure are perpendicular. Find the equation (in slope-intercept form) for the solid line.

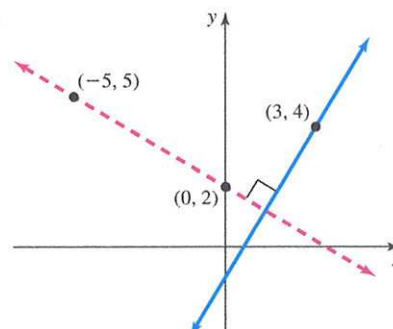
45.



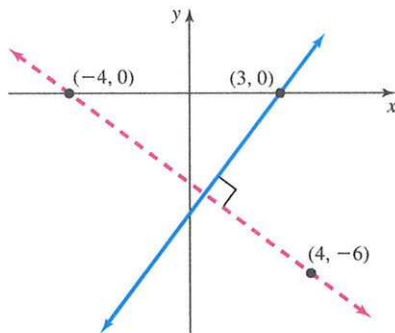
46.



47.



48.



Find the equation of each line. Write each answer in slope-intercept form. See Examples 3 and 4.



49. The line is parallel to  $y = x - 9$  and goes through the point  $(7, 10)$ .
50. The line is parallel to  $y = -x + 5$  and goes through the point  $(-3, 6)$ .
51. The line contains the point  $(3, 4)$  and is perpendicular to  $y = 3x - 1$ .
52. The line contains the point  $(-2, 3)$  and is perpendicular to  $y = 2x + 7$ .
53. The line is perpendicular to  $3x - 2y = 10$  and passes through the point  $(1, 1)$ .
54. The line is perpendicular to  $x - 5y = 4$  and passes through the point  $(-1, 1)$ .
55. The line is parallel to  $2x + y = 8$  and contains the point  $(-1, -3)$ .
56. The line is parallel to  $-3x + 2y = 9$  and contains the point  $(-2, 1)$ .
57. The line goes through  $(-1, 2)$  and is perpendicular to  $3x + y = 5$ .
58. The line goes through  $(1, 2)$  and is perpendicular to  $y = \frac{1}{2}x - 3$ .
59. The line goes through  $(2, 3)$  and is parallel to  $-2x + y = 6$ .
60. The line goes through  $(1, 4)$  and is parallel to  $x - 2y = 6$ .

### Miscellaneous

Find the equation of each line in the form  $y = mx + b$  if possible.



61. The line through  $(3, 2)$  with slope 0
62. The line through  $(3, 2)$  with undefined slope
63. The line through  $(3, 2)$  and the origin
64. The line through the origin that is perpendicular to  $y = \frac{2}{3}x$
65. The line through the origin that is parallel to the line through  $(5, 0)$  and  $(0, 5)$

66. The line through the origin that is perpendicular to the line through  $(-3, 0)$  and  $(0, -3)$
67. The line through  $(-30, 50)$  that is perpendicular to the line  $x = 400$
68. The line through  $(20, -40)$  that is parallel to the line  $y = 6000$
69. The line through  $(-5, -1)$  that is perpendicular to the line through  $(0, 0)$  and  $(3, 5)$
70. The line through  $(3, 1)$  that is parallel to the line through  $(-3, -2)$  and  $(0, 0)$

For each line described here choose the correct equation from (a) through (h).

71. The line through  $(1, 3)$  and  $(2, 5)$
72. The line through  $(1, 3)$  and  $(5, 2)$
73. The line through  $(1, 3)$  with no  $x$ -intercept
74. The line through  $(1, 3)$  with no  $y$ -intercept
75. The line through  $(1, 3)$  with  $x$ -intercept  $(5, 0)$
76. The line through  $(1, 3)$  with  $y$ -intercept  $(0, -5)$
77. The line through  $(1, 3)$  with slope  $-2$
78. The line through  $(1, 3)$  with slope  $\frac{1}{2}$ 
  - a)  $x + 4y = 13$
  - b)  $x = 1$
  - c)  $x - 2y = -5$
  - d)  $y = 8x - 5$
  - e)  $y = 2x + 1$
  - f)  $y = 3$
  - g)  $2x + y = 5$
  - h)  $3x + 4y = 15$

### <4> Applications

Solve each problem. See Example 5.

79. **Automated tellers.** ATM volume reached 10.6 billion transactions in 1996 and 14.2 billion transactions in 2000 as shown in the accompanying graph. If 1996 is year 0 and 2000 is year 4, then the line goes through the points  $(0, 10.6)$  and  $(4, 14.2)$ .
  - a) Find and interpret the slope of the line.
  - b) Write the equation of the line in slope-intercept form.
  - c) Use your equation from part (b) to predict the number of transactions at automated teller machines in 2010.

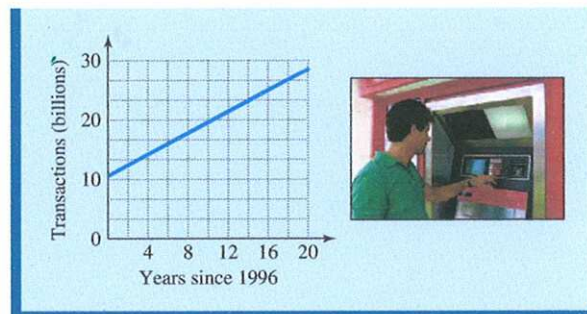


Figure for Exercise 79