CHAPTER 6 Analyse Linear Relations
6.5 Find an Equation for a Line Given the Slope and a Point
Finding an Equation for a Line Given the Slope and a Point

Example:

a) Find the equation of a line with a slope of $\dfrac{3}{4}$ that passes through the point (4, 4).

b) A line has a slope of $-\dfrac{2}{5}$ and passes through the point (–8, 7). Use this information to graph the line without finding the equation of the line.

c) Find the equation of a line that is parallel to the line $y = 2x - 3$ that passes through the point (3, 7).

d) Find the equation of a line that is perpendicular to the line $y = \dfrac{3}{2}x - 5$, and passes through the point (3, 0).

Solution:

a) Substitute the given information into the equation of a line, and solve for the *y*-intercept.

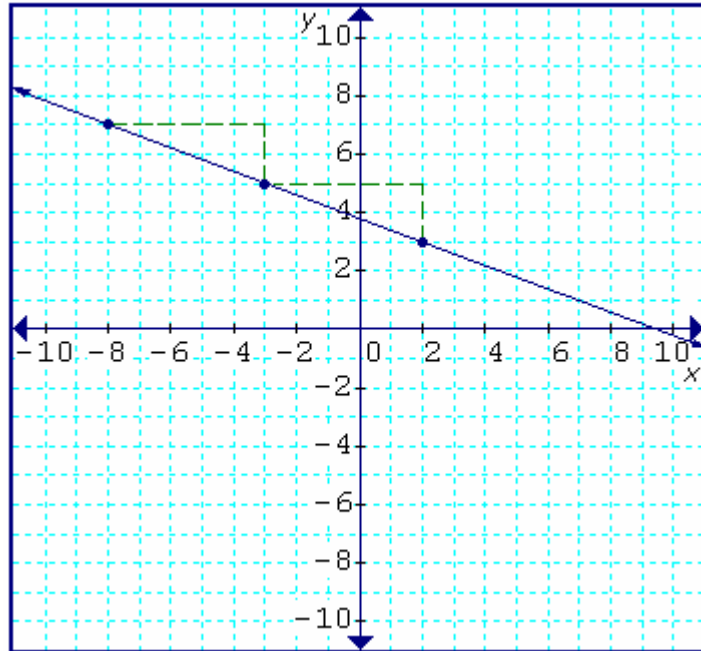$$y = mx + b$$
$$4 = \frac{3}{4}(4) + b$$
$$4 = 3 + b$$
$$4 - 3 = 3 + b - 3$$
$$1 = b$$

The equation of the line is $y = \dfrac{3}{4}x + 1$.

b) Start at the given point (–8, 7). Move 5 units right, and then 2 units down, as indicated by a slope of $-\dfrac{2}{5}$.

Repeat one more time to check. Then, draw the line.

c) The slope of the given line is 2. The desired line is parallel to the given line and must also have a slope of 2. Substitute the given information into the equation of a line, and solve for the *y*-intercept.

$$y = mx + b$$
$$7 = 2(3) + b$$
$$7 = 6 + b$$
$$7 - 6 = 6 + b - 6$$
$$1 = b$$

The equation of the line is $y = 2x + 1$.

d) The slope of the given line is $\dfrac{3}{2}$. Since the desired line is perpendicular to the given line, its slope must be the negative reciprocal, or $-\dfrac{2}{3}$. Substitute the given information into the equation of a line and solve for the *y*-intercept.

$$y = mx + b$$
$$0 = -\frac{2}{3}(3) + b$$
$$0 = -2 + b$$
$$0 + 2 = -2 + b + 2$$
$$2 = b$$

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

Practice:

1. a) Find the equation of a line with a slope of $\frac{5}{2}$ that passes through the point (6, 8).

b) A line has a slope of $\frac{4}{3}$ and passes through the point (–6, –9). Use this information to graph the line without finding the equation of the line.

c) Find the equation of a line that is parallel to the line $y = \frac{1}{2}x + 3$ that passes through the point (4, –3).

d) Find the equation of a line that is perpendicular to the line $y = \frac{1}{3}x + 4$ and passes through the point (1, -1).

Answers:

1. a) $y = \frac{5}{2}x - 7$.

b) The graph is shown.

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

d) $y = -3x + 2$