



# Writing the Equation of the Line through a Given Point and Perpendicular to a Given Line

## • Example 1

Write the equation of the line perpendicular to the line given by  $3x - 4y = -10$  that passes through the point  $(-1, 4)$ .

We first find the slope of the given line by solving for  $y$ .

$$\begin{aligned} 3x - 4y &= -10 \\ -4y &= -3x - 10 \\ y &= \frac{3}{4}x + \frac{5}{2} \end{aligned}$$

So the slope of this line is  $\frac{3}{4}$ .

The slope of any line perpendicular to this line is the negative reciprocal of  $\frac{3}{4}$  which is  $-\frac{4}{3}$ .

Using this slope and the point  $(-1, 4)$ , we can find the equation of the line using the slope-intercept form of a line.

$$\begin{aligned} y &= mx + b \\ 4 &= \left(-\frac{4}{3}\right)(-1) + b \\ 4 - \frac{4}{3} &= b \\ \frac{8}{3} &= b \end{aligned}$$

The equation of the line in slope-intercept form is  $y = -\frac{4}{3}x + \frac{8}{3}$ .

### • • • CHECK YOURSELF 1

Write the equation of the line perpendicular to the line given by  $x - 2y = 4$  that passes through the point  $(1, 5)$ .

---

### • • • CHECK YOURSELF ANSWER

1.  $y = -2x + 7$  or  $2x + y = 7$ .

---

# 3.18 Exercises

Name \_\_\_\_\_

Section \_\_\_\_\_

Date \_\_\_\_\_

## A N S W E R S

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

Find the equation of the line perpendicular to the given line that passes through the given point.

1.  $y = -\frac{1}{2}x + \frac{5}{2}; (1, 1)$

2.  $y = 2x + 7; (3, 10)$

3.  $6x - 2y = -5; (5, 6)$

4.  $x + y = 7; (5, -4)$

5.  $2x - y = 4; (3, 5)$

6.  $-3x + 4y = 1; (1, -2)$

7.  $6x - 2y = -5; (0, 7)$

8.  $-8x - y = -7; (-4, -5)$