

LESSON  
3.5**Study Guide**

For use with pages 180–187

**GOAL** Find equations of lines.**Vocabulary**

The general form of a linear equation in **slope-intercept form** is  $y = mx + b$ , where  $m$  is the slope and  $b$  is the  $y$ -intercept.

A linear equation written as  $Ax + By = C$ , where  $A$  and  $B$  are not both zero, is written in **standard form**.

**EXAMPLE 1** Write an equation of a parallel line

**Write an equation of the line passing through the point (3, 4) that is parallel to the line with the equation  $y = -4x + 5$ .**

**STEP 1** Find the slope  $m$ . The slope of a line parallel to  $y = -4x + 5$  is the same as the given line, so the slope is  $-4$ .

**STEP 2** Find the  $y$ -intercept  $b$  by using  $m = -4$  and  $(x, y) = (3, 4)$ .

$$y = mx + b \quad \text{Use slope-intercept form.}$$

$$4 = -4(3) + b \quad \text{Substitute for } x, y, \text{ and } m.$$

$$16 = b \quad \text{Solve for } b.$$

Because  $m = -4$  and  $b = 16$ , an equation of the line is  $y = -4x + 16$ .

**EXAMPLE 2** Write an equation of a perpendicular line

**Write an equation of the line  $p$  passing through the point (6, -3) that is perpendicular to the line  $q$  with the equation  $y = 4x - 7$ .**

**STEP 1** Find the slope  $m$  of line  $p$ . Line  $q$  has a slope of 4.

$$4 \cdot m = -1 \quad \text{The product of the slopes of } \perp \text{ lines is } -1.$$

$$m = -\frac{1}{4} \quad \text{Divide each side by } -2.$$

**STEP 2** Find the  $y$ -intercept  $b$  by using  $m = -\frac{1}{4}$  and  $(x, y) = (6, -3)$ .

$$y = mx + b \quad \text{Use slope-intercept form.}$$

$$-3 = -\frac{1}{4}(6) + b \quad \text{Substitute for } x, y, \text{ and } m.$$

$$-1 = b \quad \text{Solve for } b.$$

Because  $m = -\frac{1}{4}$  and  $b = -1$ , an equation of line  $p$  is  $y = -\frac{1}{4}x - 1$ .

**LESSON**  
**3.5****Study Guide** *continued*  
*For use with pages 180–187***Exercises for Examples 1 and 2**

Write an equation of the line that passes through point  $P$  and is parallel to the line with the given equation.

1.  $P(10, 3), y = x - 12$     2.  $P(-5, 2), y = -x - 9$     3.  $P(-1, 2), y = \frac{2}{3}x - 2$

Write an equation of the line that passes through point  $P$  and is perpendicular to the line with the given equation.

4.  $P(8, 7), y = -x + 3$     5.  $P(-4, 5), y = 2x - 6$     6.  $P(2, -3), y = \frac{4}{7}x + 2$

**EXAMPLE 3****Graph a line with equation in standard form**

**Graph  $2x + 3y = 18$ .**

**Solution**

**STEP 1** Find the intercepts.

To find the  $x$ -intercept, let  $y = 0$ .

$$2x + 3y = 18$$

$$2x + 3(0) = 18$$

$$x = 9$$

To find the  $y$ -intercept, let  $x = 0$ .

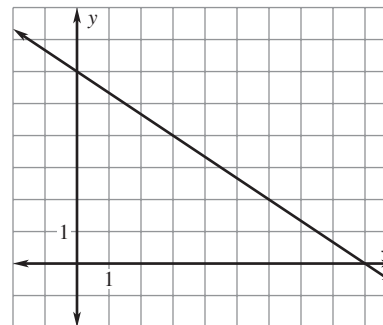
$$2x + 3y = 18$$

$$2(0) + 3y = 18$$

$$y = 6$$

**STEP 2** Graph the line.

The line intercepts the axes at  $(9, 0)$  and  $(0, 6)$ . Graph these points, then draw a line through the points.

**Exercises for Example 3**

**Graph the equation.**

7.  $5x + 2y = 20$

8.  $x - 6y = 12$

9.  $7x + 5y = -14$