5-3 Slope-Intercept Form (Pages 272–277)

The coordinates at which a graph intersects the axes are known as the **x-intercept** and the **y-intercept**.

Finding Intercepts	To find the x-intercept, substitute 0 for y in the equation and solve for x. To find the y-intercept, substitute 0 for x in the equation and solve for y.
Slope-Intercept Form of a Linear Equation	If a line has a slope of m and a y-intercept of b, then the slope-intercept form of an equation of the line is $y = mx + b$.

Example

Find the x- and y-intercepts of the graph of $2x + 3y = 5$. Then, write the equation in slope-intercept form.

$2x + 3(0) = 5$ Let y = 0.
  $2x = 5$ Simplify.
  $x = \dfrac{5}{2}$ The x-intercept is $\dfrac{5}{2}$.

$2(0) + 3y = 5$ Let x = 0.
  $3y = 5$ Simplify.
  $y = \dfrac{5}{3}$ The y-intercept is $\dfrac{5}{3}$.

Slope-Intercept Form: $2x + 3y = 5$
  $3y = -2x + 5$ Subtract 2x from each side.
  $y = -\dfrac{2}{3}x + \dfrac{5}{3}$ Divide each side by 3.

Note that in this form we can see that the slope m of the line is $-\dfrac{2}{3}$, and the y-intercept b is $\dfrac{5}{3}$.

Practice

Find the x- and y-intercepts of the graph of each equation.

1. $6x + 2y = 10$ **2.** $6x - y = -7$ **3.** $8y - 5 = 3x$

Write an equation in slope-intercept form of a line with the given slope and y-intercept. Then write the equation in standard form.

4. $m = 5, b = 5$ **5.** $m = 2, b = -7$ **6.** $m = -3, b = 0$

Find the slope and y-intercept of the graph of each equation.

7. $7y = x - 10$ **8.** $8x - \dfrac{1}{2}y = -2$ **9.** $4(x - 5y) = 9(x + 1)$

10. Chemistry The graph of an equation to convert degrees Celsius, x, to degrees Fahrenheit, y, has a y-intercept of 32°. Given that water boils at 212°F and at 100°C, write the conversion equation.

11. Standardized Test Practice What is the slope-intercept form of an equation for the line that passes through $(0, 1)$ and $(3, 37)$?

A $y = 12x - 1$ **B** $y = 12x + 1$ **C** $y = -12x - 1$ **D** $y = -12x + 1$