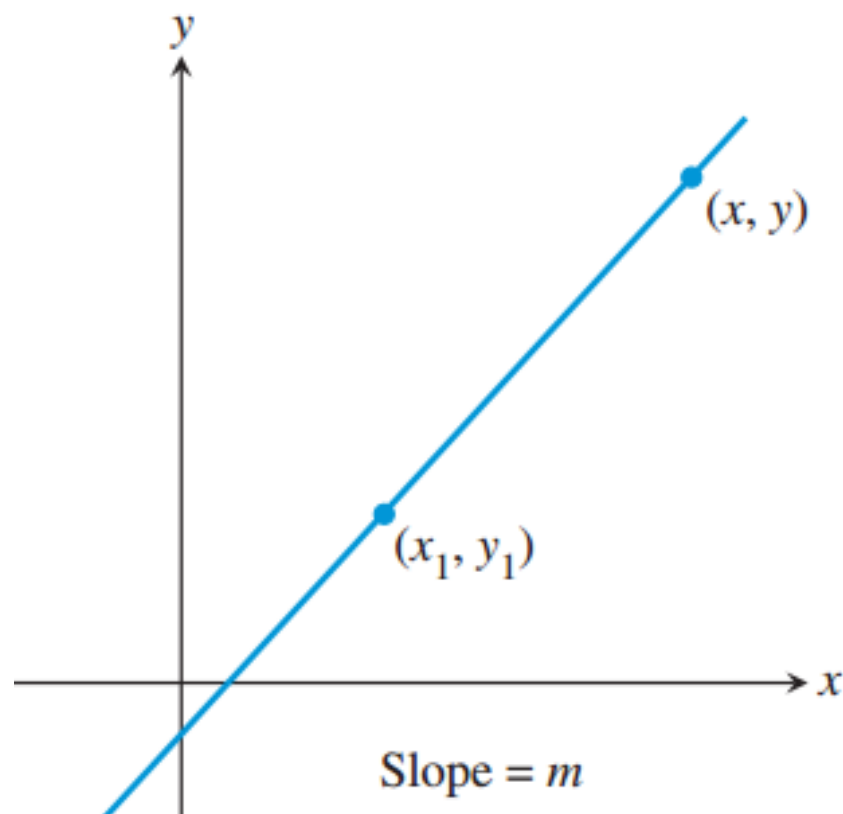## DEFINITION Slope of a Line

The **slope** of the nonvertical line through the points (x_1, y_1) and (x_2, y_2) is

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}.$$

If the line is vertical, then $x_1 = x_2$ and the slope is undefined.

Slope = m

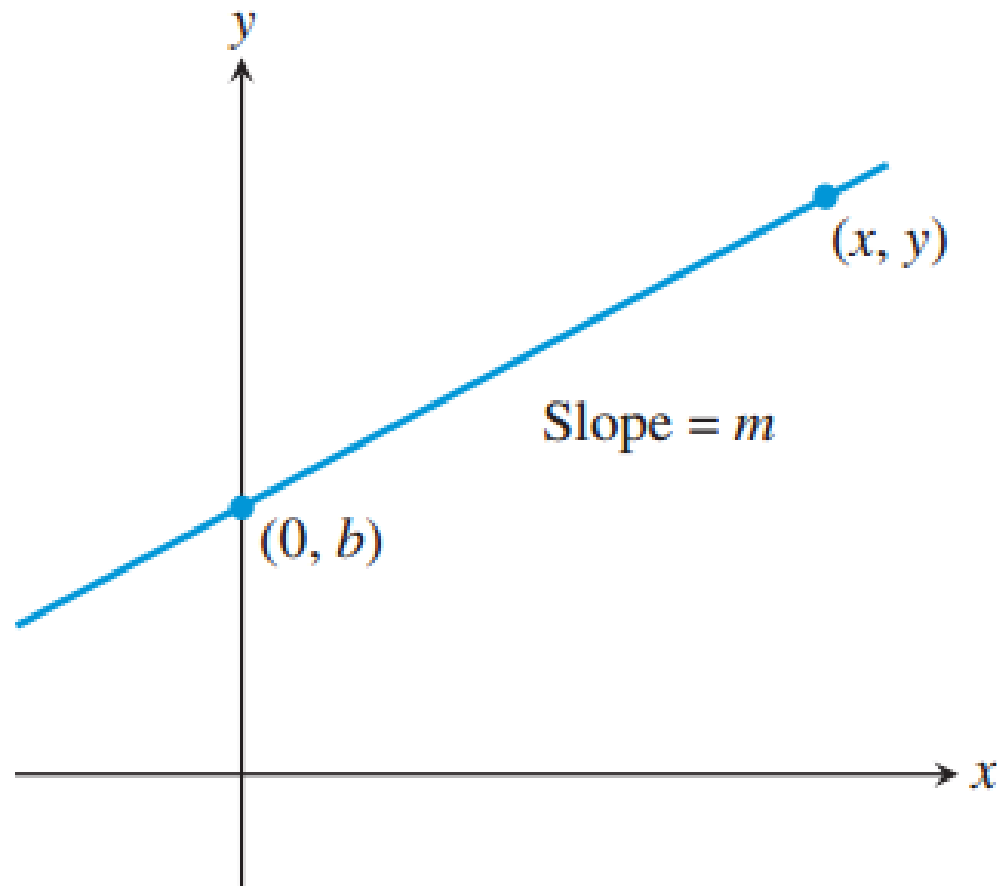## DEFINITION Point-Slope Form of an Equation of a Line

The **point-slope form** of an equation of a line that passes through the point (x_1, y_1) and has slope m is

$$y - y_1 = m(x - x_1).$$

DEFINITION Slope-Intercept Form of an Equation of a Line

The **slope-intercept form** of an equation of a line with slope m and y-intercept $(0, b)$ is

$$y = mx + b.$$

Forms of Equations of Lines

General form: $\qquad\qquad Ax + By + C = 0$, A and B not both zero

Slope-intercept form: $\qquad\qquad\qquad y = mx + b$

Point-slope form: $\qquad\qquad\qquad y - y_1 = m(x - x_1)$

Vertical line: $\qquad\qquad\qquad\qquad x = a$

Horizontal line: $\qquad\qquad\qquad\qquad y = b$

Use a Graphing Utility

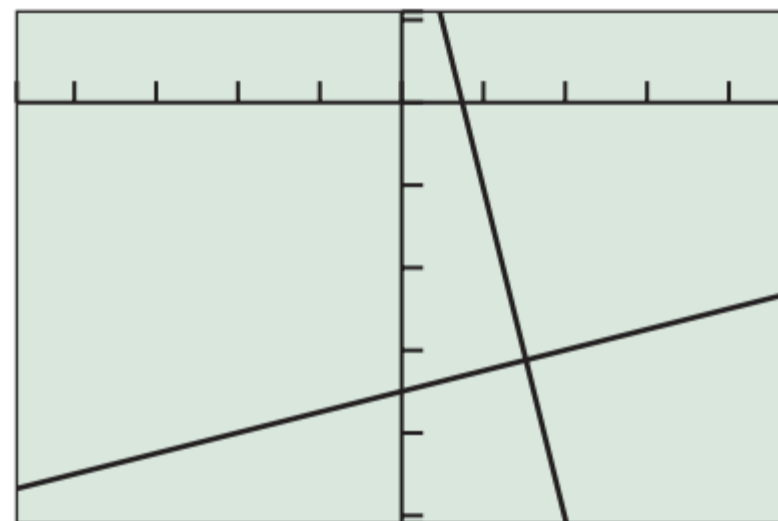Draw the graph of $2x + 3y = 6$.
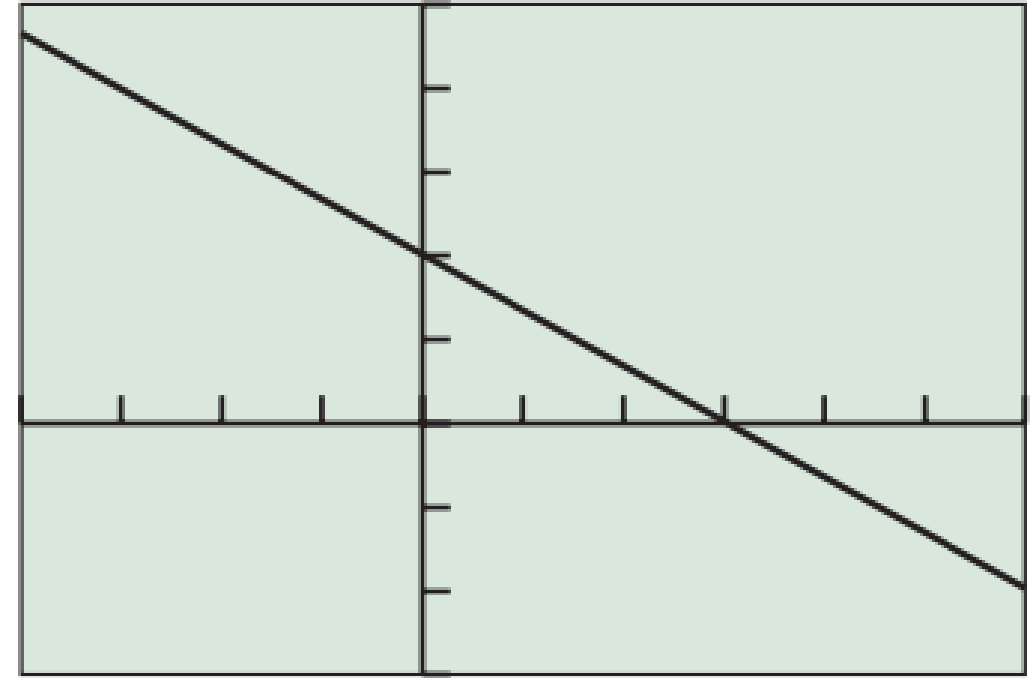
[−4, 6] by [−3, 5]

Parallel and Perpendicular Lines

1. Two nonvertical lines are parallel if and only if their slopes are equal.

2. Two nonvertical lines are perpendicular if and only if their slopes m_1 and m_2 are opposite reciprocals. That is, if and only if

$$m_1 = -\frac{1}{m_2}.$$

Finding an Equation of a
Perpendicular Line

Find an equation of the line through $P(2, -3)$ that is perpendicular to the line L with equation $4x + y = 3$. Support the result with a grapher.

[–4.7, 4.7] by [–5.1, 1.1]