

Lesson 2-3

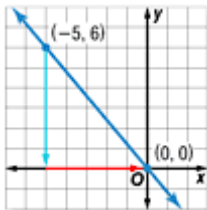
Example 1 Find Slope

Find the slope of the line that passes through $(0, 0)$ and $(-5, 6)$. Then graph the line.

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} && \text{Slope formula} \\ &= \frac{6 - 0}{-5 - 0} && (x_1, y_1) = (0, 0), (x_2, y_2) = (-5, 6) \\ &= \frac{6}{-5} \text{ or } -\frac{6}{5} && \text{Simplify.} \end{aligned}$$

The slope of the line is $-\frac{6}{5}$.

Graph the two ordered pairs and draw the line. Use the slope to check your graph by selecting any point on the line. Then go down 6 units and right 5 units or go up 6 units and left 5 units. This point should also be on the line.

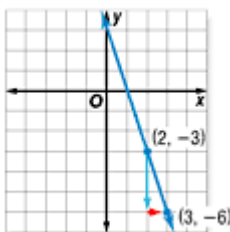


Example 2 Use Slope to Graph a Line

Graph the line passing through $(2, -3)$ with a slope of -3 .

Graph the ordered pair $(2, -3)$. Then according to the slope, go down 3 units and right 1 unit. Plot the new point $(3, -6)$. *You can also go up 3 units and then left 1 unit to plot the new point.*

Connect the points to draw the line.



Example 3 Rate of Change

ECONOMICS The table shows the number of national banks that were operating in the United States in various years. Find the rate of change from 1993 to 1999.

Year	Number of National Banks
1993	3304
1995	2858
1997	2597
1999	2363

Source: The World Almanac

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{Slope formula}$$

$$= \frac{2363 - 3304}{1999 - 1993} \quad \text{Substitute.}$$

$$\approx -157 \quad \text{Simplify.}$$

Between 1993 and 1999, the number of national banks decreased at an average rate of about 157 banks per year.

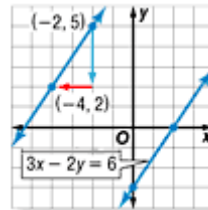
Example 4 Parallel Lines

Graph the line through $(-2, 5)$ that is parallel to the line with equation $3x - 2y = 6$.

The x -intercept is 2, and the y -intercept is -3 . Use the intercepts to graph $3x - 2y = 6$.

The line falls 3 units for every 2 units it moves to the left, so the slope is $\frac{3}{2}$.

Now use the slope and the point $(-2, 5)$ to graph the line parallel to the graph of $3x - 2y = 6$.

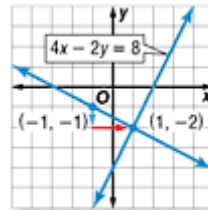


Example 5 Perpendicular Line

Graph the line through $(-1, -1)$ that is perpendicular to the line with equation $4x - 2y = 8$.

The x -intercept is 2, and the y -intercept is -4 . Use the intercepts to graph $4x - 2y = 8$.

The line rises 2 units for every 1 unit it moves to the right, so the slope is 2. The slope of the perpendicular line is the opposite reciprocal of 2, or $-\frac{1}{2}$.



Start at $(-1, -1)$ and go down 1 unit and right 2 units. Use this point and $(-1, -1)$ to graph the line perpendicular to the graph of $4x - 2y = 8$.