

Obtaining the Equation of a Line: Slope and y-Intercept (review)

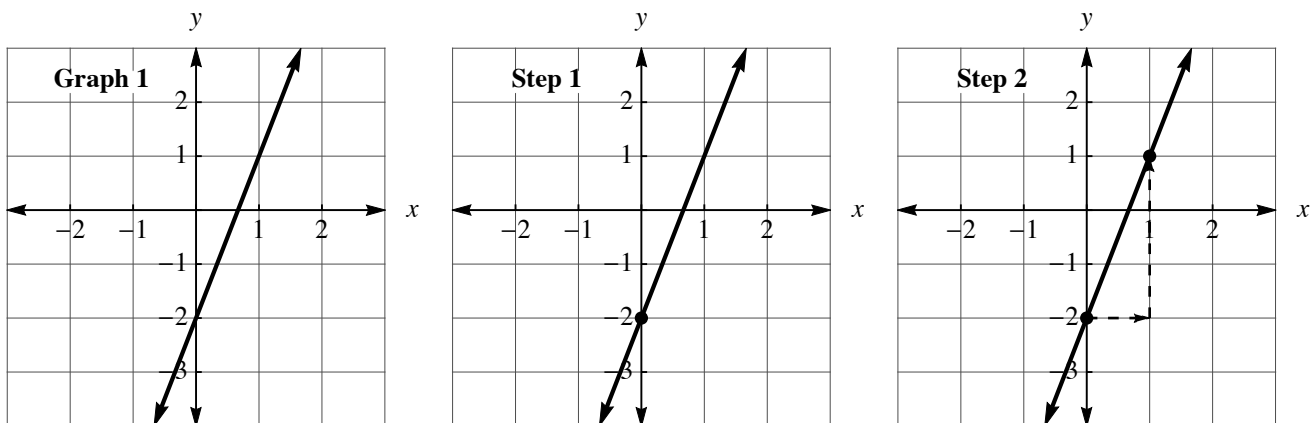
If you are given a graph with a line (or line segment) drawn and you are asked to find the equation of the line, the task can be broken down into three basic steps:

1. Find the y -intercept of the line (which has the variable name b).
2. Find the slope of the line (which has the variable name m).
3. Use the *slope-intercept* form of the equation of the line, $y = mx + b$, to obtain the equation.

The examples below illustrate.

Example 1

Find the equation of the line shown in Graph 1 below.



Step 1

Find the y -intercept, which is where the line crosses the y -axis. By looking at the graph, we can see the y -intercept is -2 , so $b = -2$. This always means the point $(0, -2)$ is on the line.

Step 2

Find the slope. To get the slope, we look for another point on the graph that has easy coordinates to identify. In this example, the point $(1, 1)$ is an obvious choice. Now that we have two points on the line, $(0, -2)$ and $(1, 1)$, we can find the slope using:

$$m = \text{slope} = \frac{\text{rise}}{\text{run}} = \frac{3}{1} = 3$$

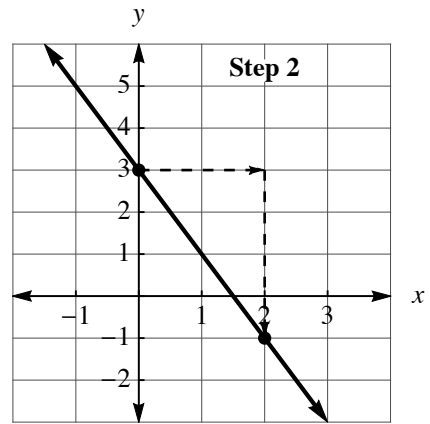
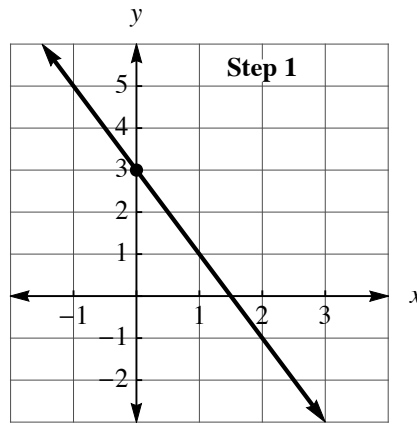
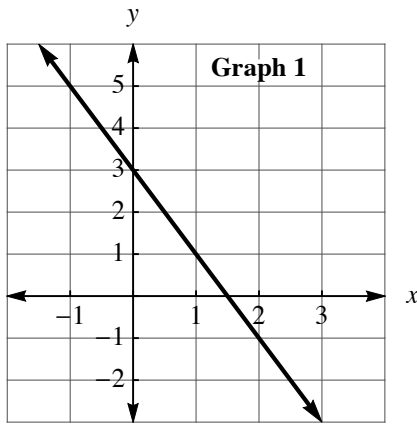
Step 3

Now that we have m and b , we can build the equation by substituting our values for m and b :

$$\begin{aligned} y &= mx + b \\ y &= (3)x + (-2) \\ y &= 3x - 2 \end{aligned}$$

Example 2

Find the equation of the line shown in Graph 2 below.



Step 1

Find the y -intercept, which is where the line crosses the y -axis. By looking at the graph, we can see the y -intercept is 3, so $b = 3$. This always means the point $(0, 3)$ is on the line.

Step 2

Find the slope. To get the slope, we look for another point on the graph that has easy coordinates to identify. In this example, the point $(2, -1)$ is one obvious choice. Now that we have two points on the line, $(0, 3)$ and $(2, -1)$, we can find the slope using:

$$m = \text{slope} = \frac{\text{rise}}{\text{run}} = \frac{-4}{2} = -2$$

Step 3

Now that we have m and b , we can build the equation by substituting our values for m and b :

$$y = mx + b$$

$$y = (-2)x + (3)$$

$$y = -2x + 3$$