Writing Equations of Lines Given a Graph

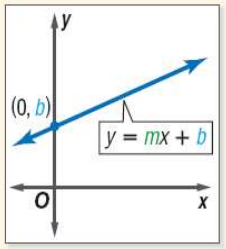
Slope-Intercept Form:

KEY CONCEPT — **Slope-Intercept Form**

Words The linear equation $y = mx + b$ is written in slope-intercept form, where m is the slope and b is the y-intercept.

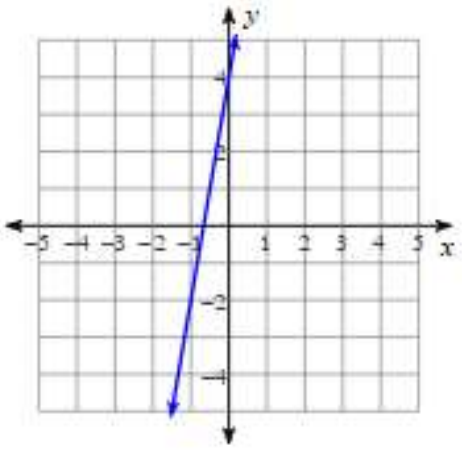
Symbols $y = mx + b$ (slope: m; y-intercept: b)

Graph

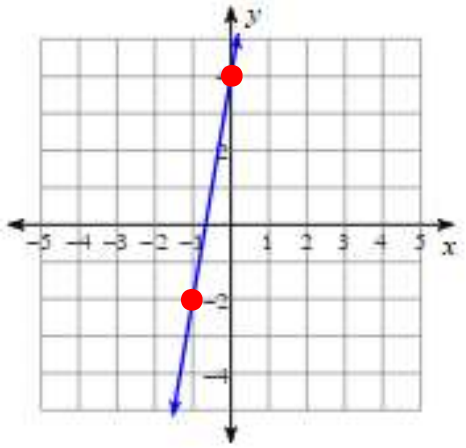


Example 1:

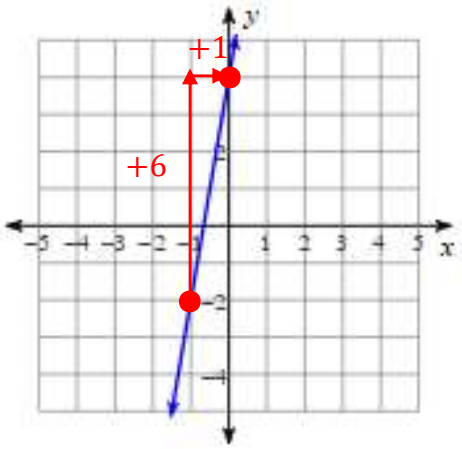
Write the slope-intercept form of the equation of each line.



We need to start by finding the slope of the line. This one doesn't have points placed on the line, so I just need to find two places where the line crosses the gridlines.



From here, we should calculate vertical and horizontal changes.



The slope is $\frac{\Delta y}{\Delta x} = \frac{6}{1} = 6$.

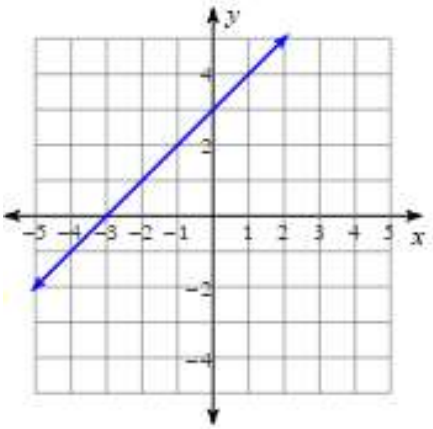
The y-intercept is the point where the line crosses the y-axis. If we look at our graph, we can see that the line crosses the y-axis at 4.

$y = mx + b$

$\boldsymbol{y = 6x + 4}$

Example 2:

Write the slope-intercept form of the equation of each line.



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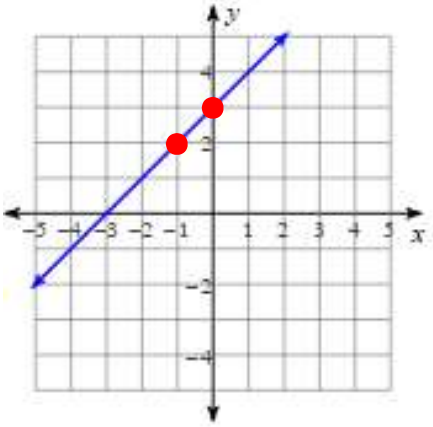

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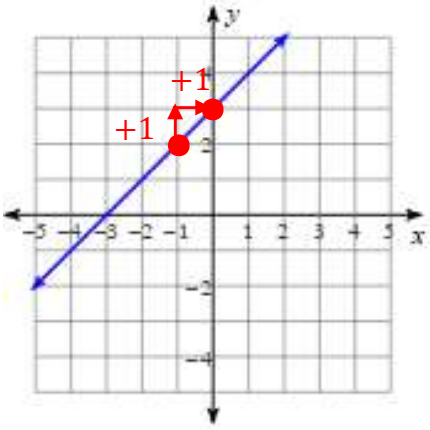


The slope is $\frac{\Delta y}{\Delta x} = \frac{1}{1} = 1$.

The y-intercept is the point where the line crosses the y-axis. If we look at our graph, we can see that the line crosses the y-axis at 3.

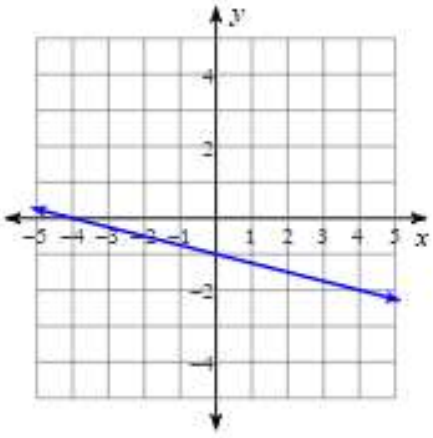
$y = mx + b$

$y = 1x + 3$ **Remember that you don't need to write the 1 in front of the x.

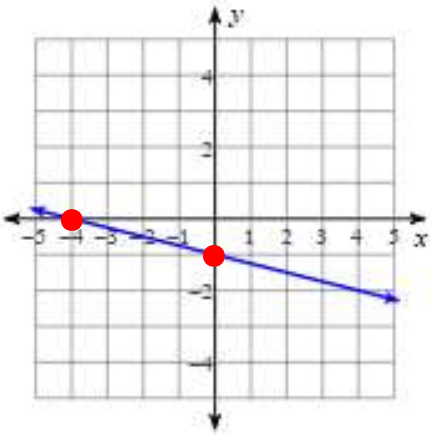
$\boldsymbol{y = x + 3}$

Example 3:

Write the slope-intercept form of the equation of each line.



We need to start by finding the slope of the line. This one doesn't have points placed on the line, so I just need to find two places where the line crosses the gridlines.



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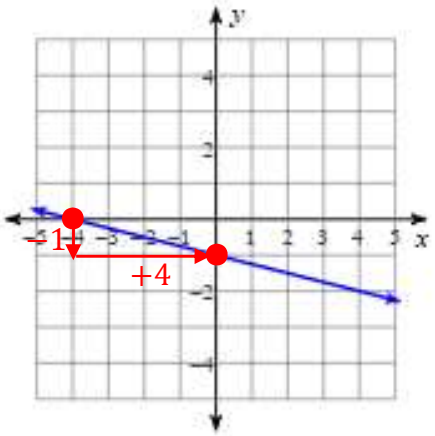


The slope is $\frac{\Delta y}{\Delta x} = \frac{-1}{4} = -\frac{1}{4}$.

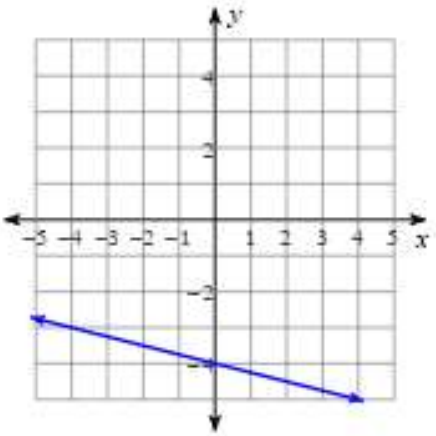
The y-intercept is the point where the line crosses the y-axis. If we look at our graph, we can see that the line crosses the y-axis at -1.

$y = mx + b$

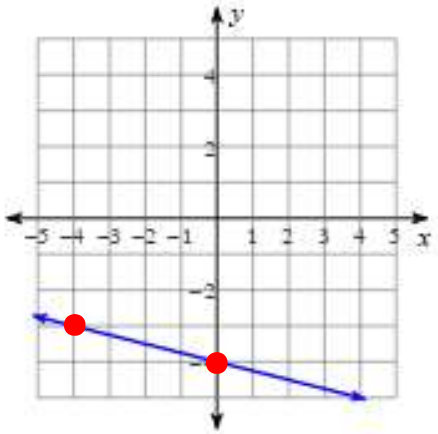
$\boldsymbol{y = -\frac{1}{4}x - 1}$

Example 4:

Write the slope-intercept form of the equation of each line.



We need to start by finding the slope of the line. This one doesn't have points placed on the line, so I just need to find two places where the line crosses the gridlines.



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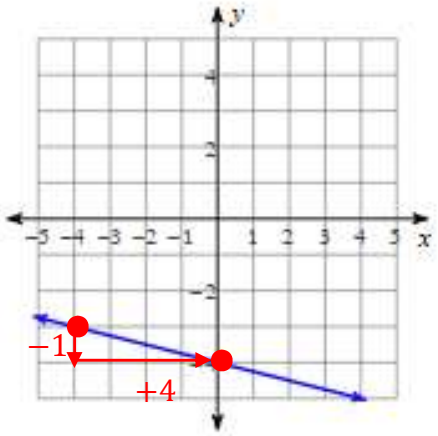


The slope is $\frac{\Delta y}{\Delta x} = \frac{-1}{4} = -\frac{1}{4}$.

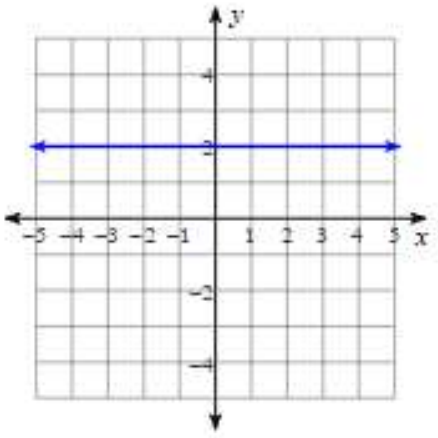
The y-intercept is the point where the line crosses the y-axis. If we look at our graph, we can see that the line crosses the y-axis at -4.

$y = mx + b$

$\boldsymbol{y = -\frac{1}{4}x - 4}$

Example 5:

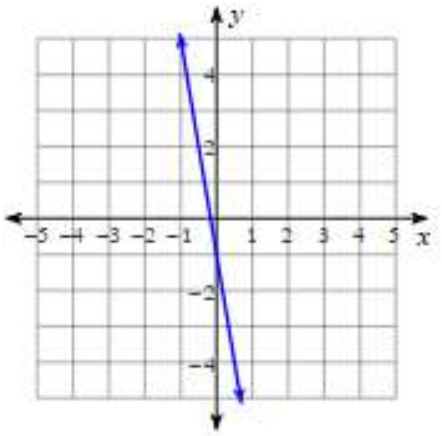
Write the slope-intercept form of the equation of each line.



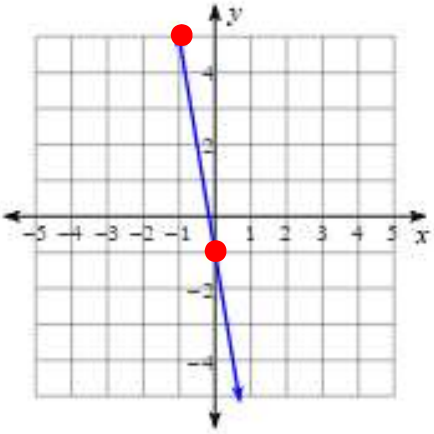
This is a horizontal line. All horizontal lines have equations $y = \#$. Since this line is at 2, the equation of our line is $\boldsymbol{y = 2}$.

Example 6:

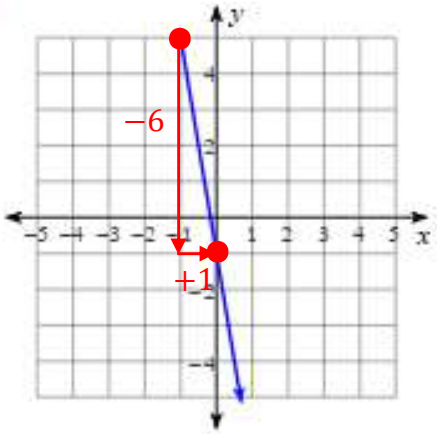
Write the slope-intercept form of the equation of each line.



We need to start by finding the slope of the line. This one doesn't have points placed on the line, so I just need to find two places where the line crosses the gridlines.



From here, we should calculate vertical and horizontal changes.



The slope is $\frac{\Delta y}{\Delta x} = \frac{-6}{1} = -6$.

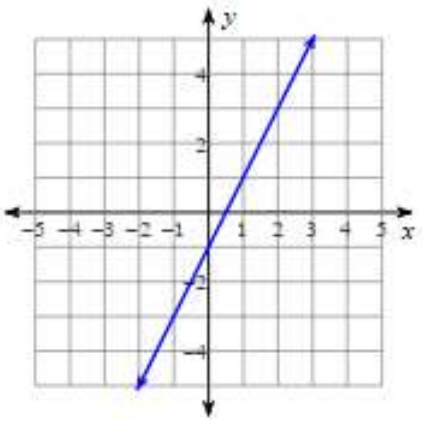
The y-intercept is the point where the line crosses the y-axis. If we look at our graph, we can see that the line crosses the y-axis at -1.

$y = mx + b$

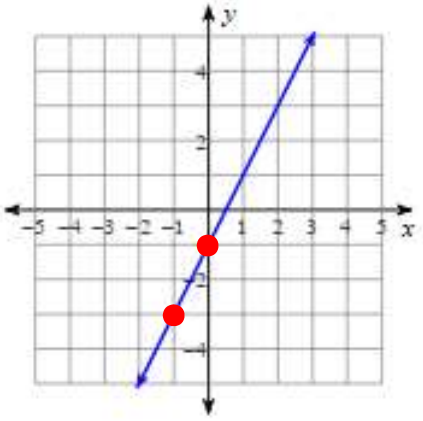
$\boldsymbol{y = -6x - 1}$

Example 7:

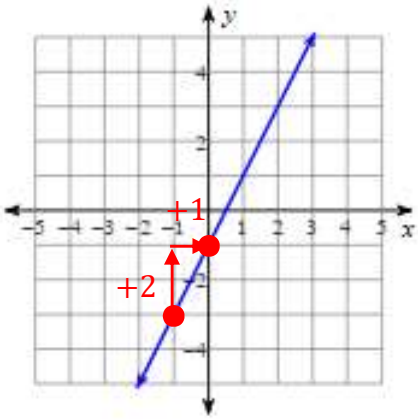
Write the slope-intercept form of the equation of each line.



We need to start by finding the slope of the line. This one doesn't have points placed on the line, so I just need to find two places where the line crosses the gridlines.



From here, we should calculate vertical and horizontal changes.



The slope is $\frac{\Delta y}{\Delta x} = \frac{2}{1} = 2$.

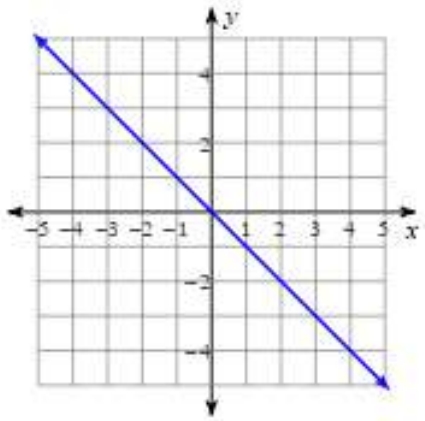
The y-intercept is the point where the line crosses the y-axis. If we look at our graph, we can see that the line crosses the y-axis at -1.

$y = mx + b$

$\boldsymbol{y = 2x - 1}$

Example 8:

Write the slope-intercept form of the equation of each line.



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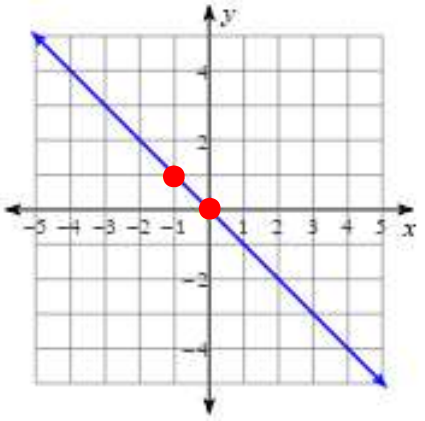
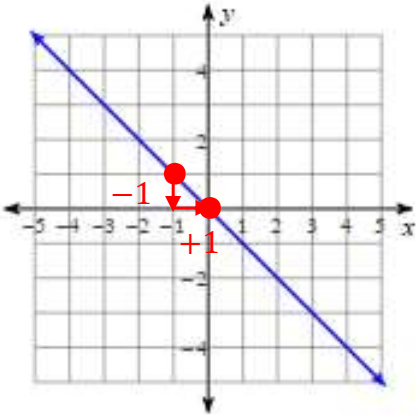


From here, we should calculate vertical and horizontal changes.



The slope is $\frac{\Delta y}{\Delta x} = \frac{-1}{1} = -1$.

The y-intercept is the point where the line crosses the y-axis. If we look at our graph, we can see that the line crosses the y-axis at 0.

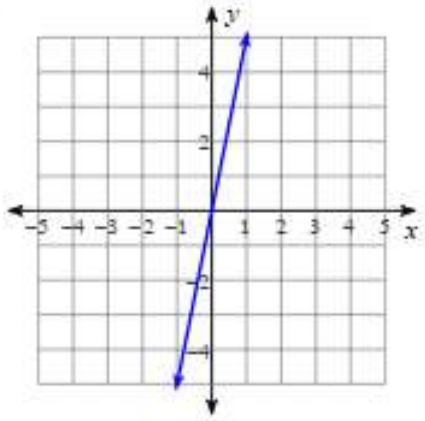
$y = mx + b$

$y = -1x + 0$ **Remember that you do not need to write the 1 in front of the x or the $+0$

$\boldsymbol{y = -x}$

Example 9:

Write the slope-intercept form of the equation of each line.



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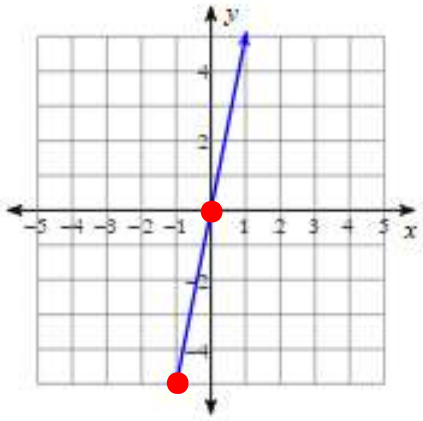
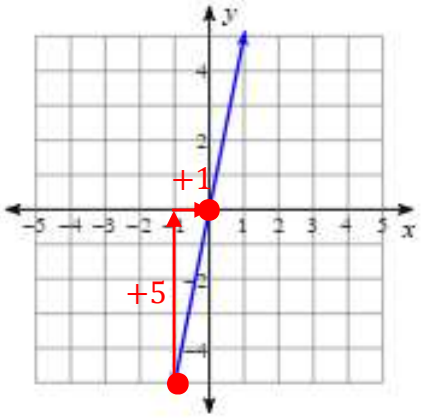


From here, we should calculate vertical and horizontal changes.



The slope is $\frac{\Delta y}{\Delta x} = \frac{5}{1} = 5$.

The y-intercept is the point where the line crosses the y-axis. If we look at our graph, we can see that the line crosses the y-axis at 0.

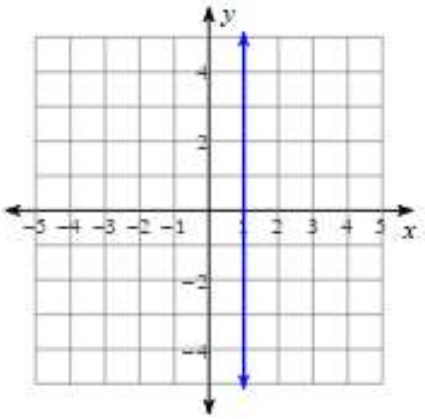
$y = mx + b$

$y = 5x + 0$ **Remember that you do not need to write the $+0$

$\boldsymbol{y = 5x}$

Example 10:

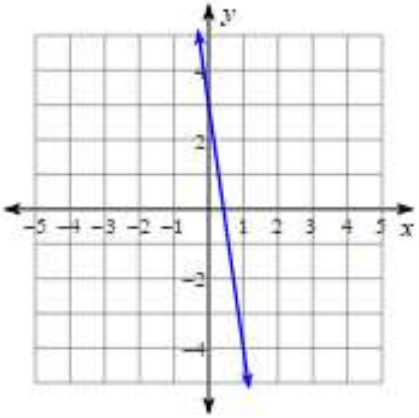
Write the slope-intercept form of the equation of each line.



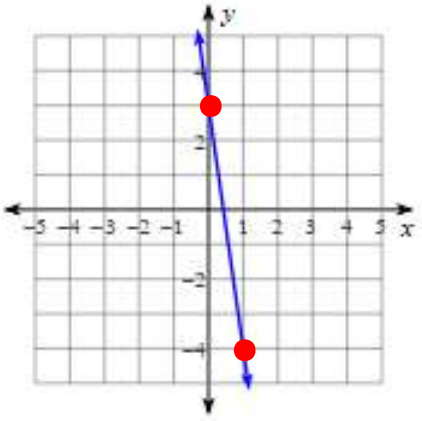
This is a vertical line. All horizontal lines have equations $x = \#$. Since this line is at 1, the equation of our line is $\boldsymbol{x = 1}$.

Example 11:

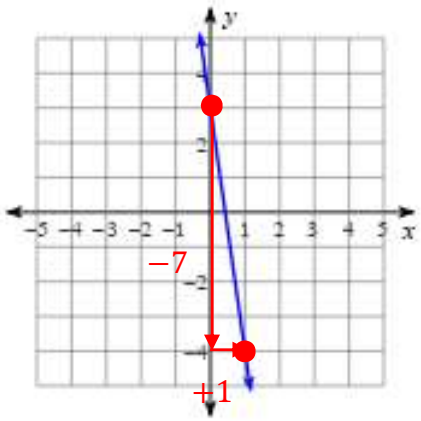
Write the slope-intercept form of the equation of each line.



We need to start by finding the slope of the line. This one doesn't have points placed on the line, so I just need to find two places where the line crosses the gridlines.



From here, we should calculate vertical and horizontal changes.



The slope is $\frac{\Delta y}{\Delta x} = \frac{-7}{1} = -7$.

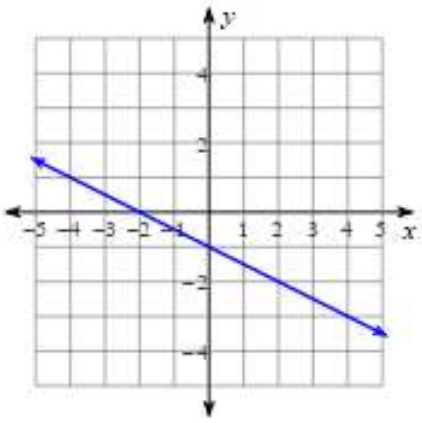
The y-intercept is the point where the line crosses the y-axis. If we look at our graph, we can see that the line crosses the y-axis at 3.

$y = mx + b$

$\boldsymbol{y = -7x + 3}$

Example 12:

Write the slope-intercept form of the equation of each line.



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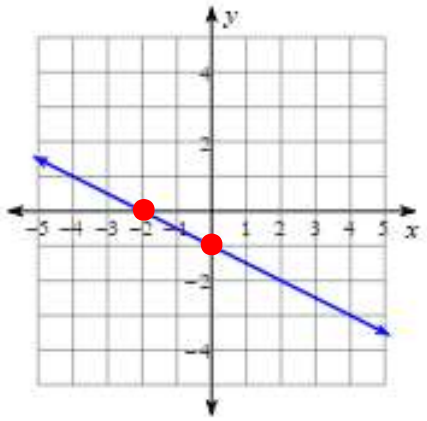

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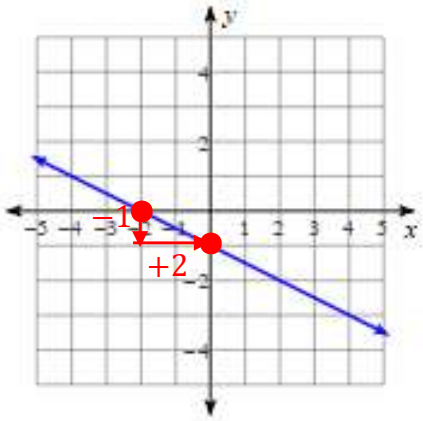

The slope is $\frac{\Delta y}{\Delta x} = \frac{-1}{2} = -\frac{1}{2}$.

The y-intercept is the point where the line crosses the y-axis. If we look at our graph, we can see that the line crosses the y-axis at -1.

$y = mx + b$

$\boldsymbol{y = -\frac{1}{2}x - 1}$

Example 13:

Write the slope-intercept form of each line given the slope and y-intercept.

Slope $= 2$, y-intercept $= 0$

$y = mx + b$

$y = 2x + 0$

$\boldsymbol{y = 2x}$

Example 14:

Write the slope-intercept form of each line given the slope and y-intercept.

Slope $= -1$, y-intercept $= 1$

$y = mx + b$

$y = -1x \mp 1$

$\boldsymbol{y = -x + 1}$

Example 15:

Write the slope-intercept form of each line given the slope and y-intercept.

Slope $= 0$, y-intercept $= 3$

$y = mx + b$

$y = 0x + 3$

$\boldsymbol{y = 3}$

Example 16:

Write the slope-intercept form of each line given the slope and y-intercept.

Slope = undefined, x-intercept $= -3$

Undefined slopes define vertical lines, so we know this equation does not follow $y = mx + b$. We know vertical lines are $x = \#$. Since they tell us that this line crosses the x-axis at -3, we know that the equation is:

$\boldsymbol{x = -3}$