MTH1W Grade 9 Mathematics

4.3 The $y = mx + b$ Form for the Equation of a Line

Goal(s) *- To sketch the graph of a line given its slope and y-intercept*

- To write the equation of a line in the form $y = mx + b$ given the slope and y-intercept

- To state the slope and y-intercept of a line when given the equation of a line in $y = mx + b$ form

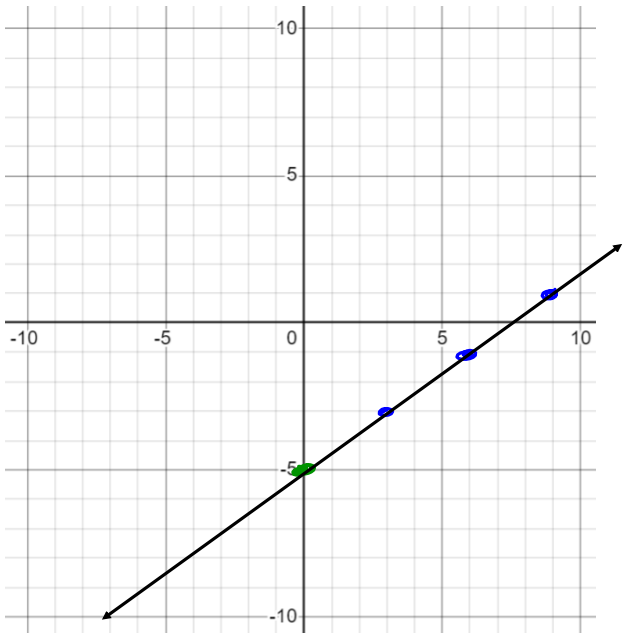
To sketch a graph given its slope and y-intercept:

- plot the y-intercept on the graph

- from this point count the rise and then the run to get to the next point; repeat to plot more points

slope: $\frac{2}{3}$ rise / run

y-intercept: *-5*



The equation of a line can be written in **slope / y-intercept** form:

$$y = mx + b$$

m represents the slope of the line. It is the coefficient of the independent variable.

b represents the y-intercept of the line, where the line crosses the vertical axis.

Begin with b, move with m

For each equation identify the *slope* and the *y-intercept*.

$y = -3x + 9$

slope = -3

y-intercept is (0,9)

$y = 4x - 21$

slope = 4

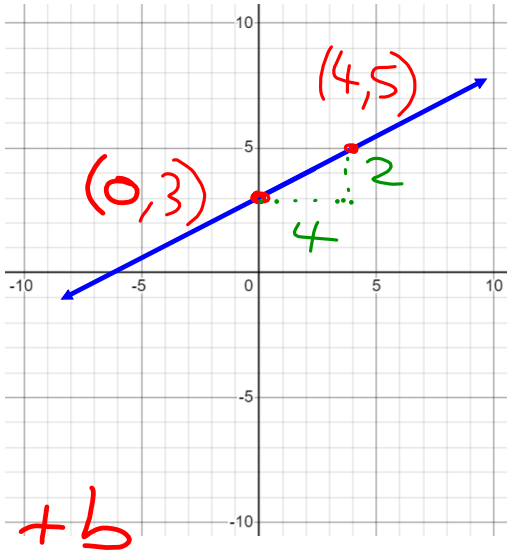
y-intercept is (0,-21)

$y = -\frac{8}{5}x + 11$

slope = $\frac{-8}{5}$

y-intercept is (0,11)

For the graph given:



a) Determine the slope of the line.

$\text{slope} = \frac{2}{4} = \frac{1}{2}$

b) Identify the y-intercept.

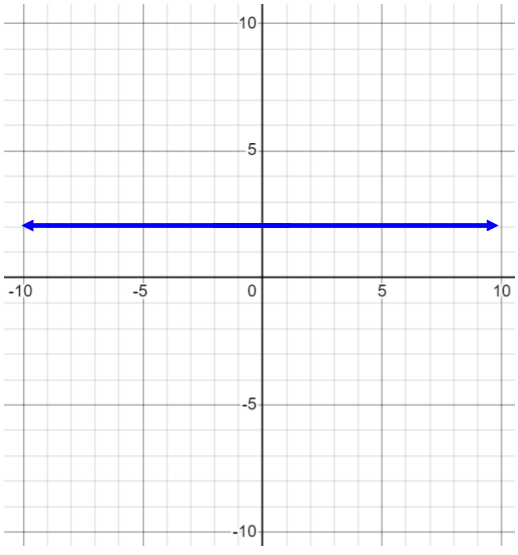
$(0,3)$

c) Write the equation of the line.

Equation $y = mx + b$

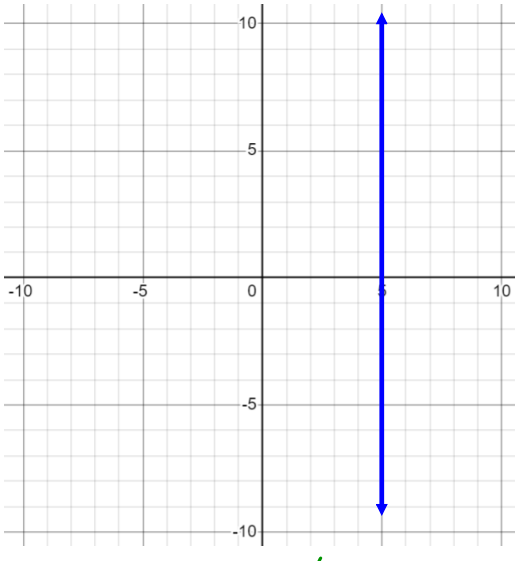
$y = \frac{1}{2}x + 3$

Determine the slope of each line.



Horizontal line

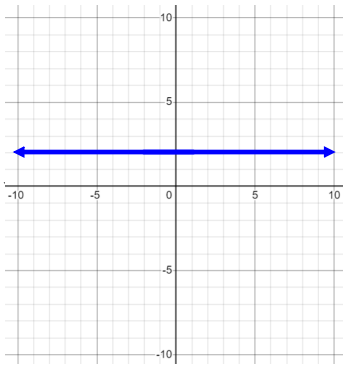
$\Rightarrow$ slope $= 0$



Vertical line

$\Rightarrow$ Slope = undefined

What is the equation of each line?



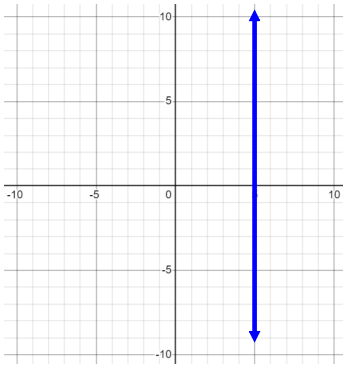
$m = 0$

$b =$ 2

$\Rightarrow y = mx + b$

$y = 0x + 2$

$y = 2$



$m =$ **undefined**

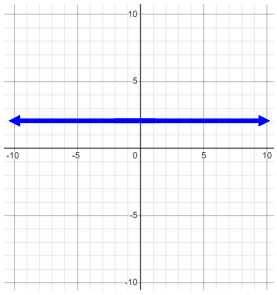
$b =$ isn't one!

Every point on the line is (5, ?)

$\Rightarrow$ Equation is $x = 5$

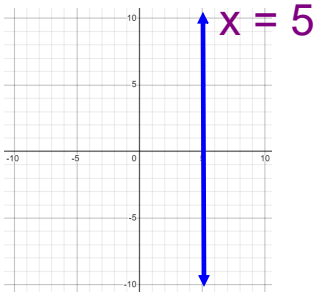
Horizontal lines have a slope of **zero**.

The equation of the line is written in the form: $y = b$, where b is the y-intercept.



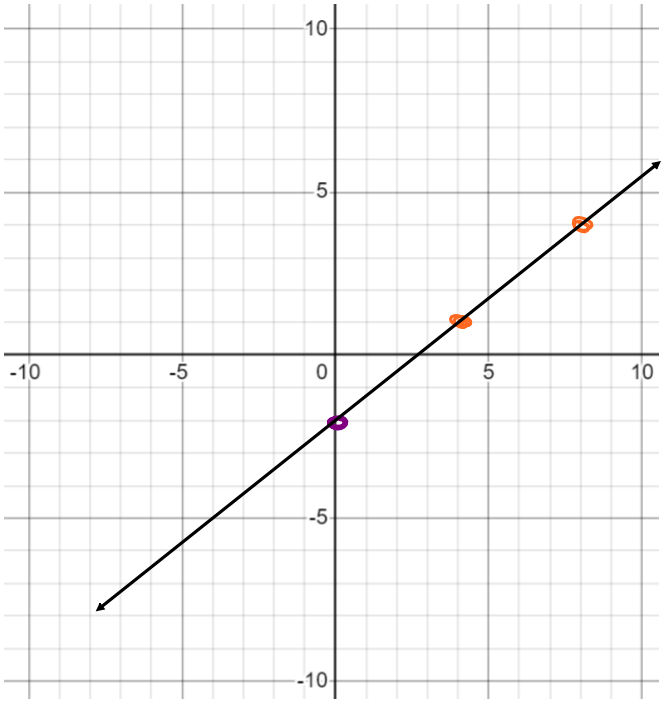
Vertical lines have a slope that is **undefined**.

The equation of the line is written in the form: $x = a$, where a is the x-intercept.



The **slope** of a line is $\frac{3}{4}$, and the ***y*-intercept** is *-2*.

Write the equation of the line and sketch the graph.

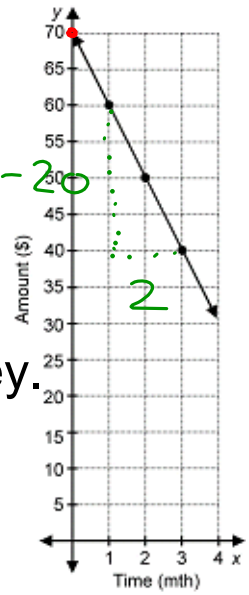


Equation is

$y = mx + b$

$y = \frac{3}{4}x - 2$

Identify the slope and the vertical intercept of the linear relation and explain what they mean.



$slope = \frac{-20}{2} = -10$

y-intercept = $70

y-intercept is the starting amount of money. Slope is the rate of change in the amount of money. In this case -$10/month.

Write an equation to describe the relationship.

Equation $y = mx + b$

is $y = -10x + 70$