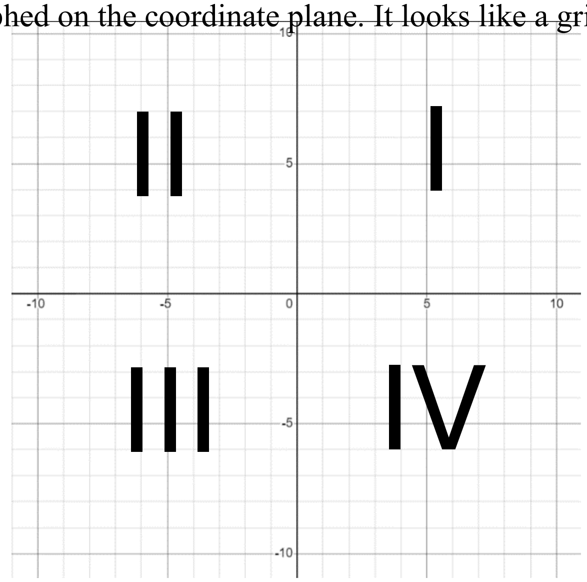
TSC | WILLIAM D. LAW, JR. LEARNING COMMONS

Coordinate Plan and Graphing Linear Equations

A linear equation has infinitely many ordered pair solutions. The graph of an equation in two variables are a drawing of the ordered pair solutions of the equation. It is not possible to name all the solutions. We generally find three ordered pair solutions and graph them. The complete solution set can be shown by drawing a straight line through the graphs of the ordered pairs. An arrow on each end of the line shows that the solution set continues in both directions.

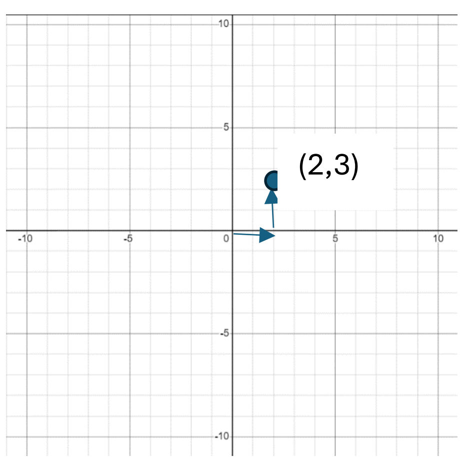
Linear equations are graphed on the coordinate plane. It looks like a grid, with bold lines marking the axes.



You'll also notice that they're marked into quarters. Those are called the Quadrants of the graph. All points in the first quadrant are of the form (x, y). All points in the second quadrant are of the form $(-x, y)$. All points in the third quadrant are of the form $(-x, -y)$. And all points in the fourth and final quadrant are of the form $(x, -y)$.

There are also two axes that divide the graph, one horizontal and one vertical. The horizontal line is the x-axis, which corresponds to the x coordinate. The vertical line is the y-axis, corresponding to the y coordinate. To graph, you must go x units along the x-axis and y units along the y axis, given that points are given in the form (x, y).

Take the point $(2,3)$. This point instructs us to go 2 units along the x axis and 3 units along the y axis. The result is the following:



Graphing Linear Equations

There are two main approaches to graphing linear equations. The first works regardless of the kind of equation you are given.

First approach: Creating a T-table.

Given a linear equation of any form, you can simply plug in a value for x and get a y value, or the other way around.

EXAMPLE:

$$y = 3x + 2$$

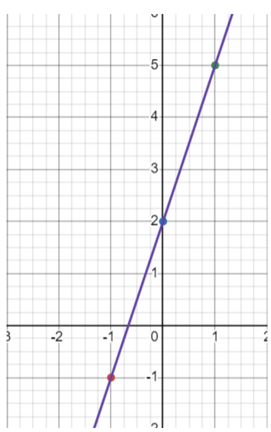
This is an equation given in slope-intercept form. We will be plugging -1,0, and 2, but any three numbers work for this method.

$x = -1$
$y = 3(-1) + 2$
$y = -3 + 2$
$y = -1$
First ordered pair: $(-1, -1)$

$x = 0$
$y = 3(0) + 2$
$y = 2$
Second ordered pair: $(0,2)$

$x = 1$
$y = 3(1) + 2$
$y = 3 + 2$
$y = 5$
Last ordered pair: $(1,5)$

From this we get the following graph:



We can also use the idea of a line being in the form: y = mx + b. If we use the b as our anchoring point for our graph, we can use the slope to "walk" to another point, and then connect the dots.

Thus, our original point would be at (0,2) for the y-intercept. The slope is also represented by

$m = \frac{rise}{run} = \frac{\text{Change in y}}{\text{Change in x}} = \frac{3}{1}.$