Using a Table of Values to Graph Linear Equations

You can graph any equation using a table of values. A table of values is a graphic organizer or chart that helps you determine two or more points that can be used to create your graph.

x	$2x+1$	y	Order Pairs
-2	$2(-2)+1$	-3	$(-2,3)$
0	$2(0)+1$	1	$(0,1)$
2	$2(2)+1$	5	$(2,5)$

Why Use a Table of Values?

In order to graph a line, you must have two points. For any given linear equation, there are an infinite number of solutions or points on that line.

If you just find two of the solutions, then you can plot your two points and draw a line through. This will be the line that represents the equation. Every point on that line is a solution to the equation.

In the above table, there are four columns as described below:

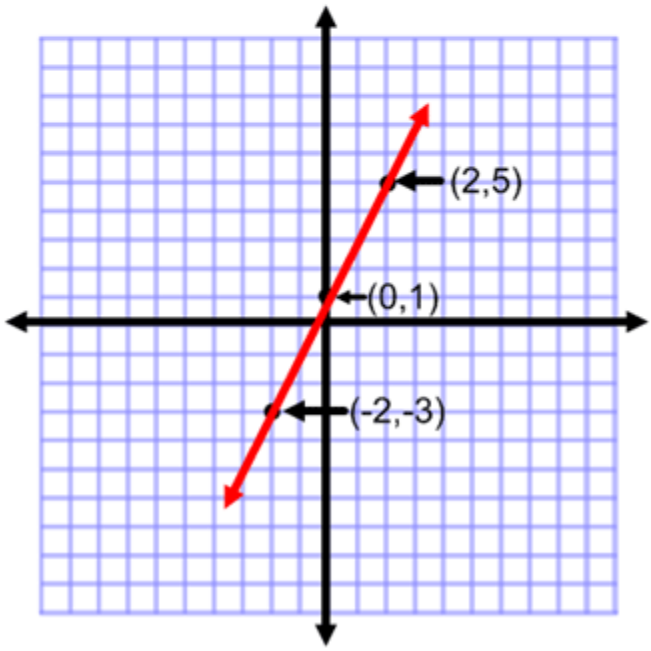
- The **first** column is for the **x coordinate**. For this column, I can choose any number I wish. Try to choose numbers that can be graphed on your graph. For example, if your x axis only extends to 10, don't choose 12 as an x coordinate.
- The **second** column is for **substituting** x into the equation in order to solve for y. So, whatever value I chose for x, I will substitute back into the equation and solve to find the y value.
- The **third** column is for the **y** value. After substituting your x value into the equation, your answer is the y coordinate.
- The **last** column is for your **ordered pair**. Your ordered pair is the x value and the y value. This is the point on your graph.

Here are a few examples.

Example 1:

Graph the line for: $y = 2x + 1$

x	2x +1	y	Ordered Pairs
-2	2(-2)+1	-3	(-2,-3)
0	2(0)+1	1	(0,1)
2	2(2)+1	5	(2,5)



In this first example, **-2, 0,** and **2** are the x coordinates.

After substituting those values into the equation: **y = 2x +1,** the values are **-3, 1**, and **5**.

Therefore, the ordered pairs on the graph were: **(-2,-3)**, (**0,1**), and (**2,5**). Those points are plotted on the graph.

Use a ruler to draw a straight line through those points. *This is the line for the equation* **y = 2x +1.**

If you had done this problem on your own, *you may have found three different points using the table of values*. ***That's ok, because even if your three points are different, your line will still look exactly the same***!

We can also find other solutions for the equation just by reading the graph. For example, (**3,7**) is a point on the graph. If you substitute **3** for **x** into the equation, you will get **7** as the **y** coordinate.

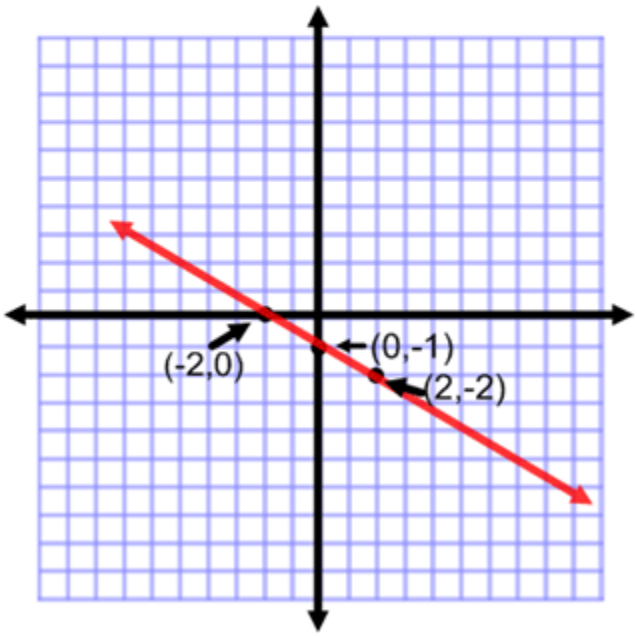
This line goes on forever, so there are infinite solutions to the equation.

Another example:

Example 2:

Graph the line for; $y = -\frac{1}{2}x - 1$

x	$-\frac{1}{2}x - 1$	y	Ordered Pairs
-2	$-\frac{1}{2}(-2) - 1$	0	(-2,0)
0	$-\frac{1}{2}(0) - 1$	-1	(0,-1)
2	$-\frac{1}{2}(2) - 1$	-2	(2,-2)



This equation, **y = -1/2 x - 1** has a fraction as the coefficient of **x.** This becomes a little trickier in choosing **x** coordinates because you could end up with a fraction for the **y** coordinate. This becomes a little more difficult to graph.

So, the trick is to look at the denominator of the coefficient. You want to choose **x** coordinates that are either multiples of the denominator or 0. 0 is the easiest choice. Then choose either the same value as the denominator or a multiple of the denominator.

Remember, you also have a choice of positive or negative numbers!

This will ensure that your y coordinate is an integer which is much easier to graph.

Tip

If the coefficient is a fraction, choose 0 or a multiple of the denominator as your x coordinates!

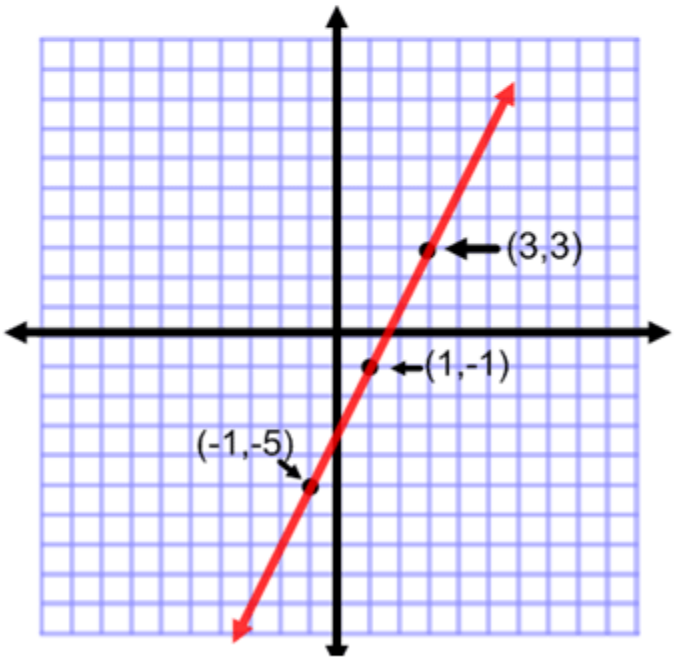
Final example:

Example 3:

Find 3 solutions for the equation: $y = 2x - 3$
Then graph the equation.

x	2x - 3	y	Ordered Pairs
-1	2(-1) - 3	-5	(-1,-5)
1	2(1) - 3	-1	(1,-1)
3	2(3) - 3	3	(3,3)

Three solutions to the equation $y = 2x - 3$ are:
(-1,-5)
(1,-1)
(3,3)



There are an infinite number of solutions, as the line for this graph goes on forever! Any point on this line is a solution to this equation.

This example has a slightly different direction, but involves the same process.

The problem asks for 3 solutions.

Remember, that when you find ordered pairs in your table of values, these are actually solutions to the equation.

There are other solutions, which are all of the other points on the line.

Any point on the line would be a correct answer to this problem.