

Graphs of the Linear Equation

The graph of an equation of two variables is the set of all points that are solutions to the equation. (Obviously, it is impossible to plot all the points that are solutions to equation. We determine the type of graph that is associated with the specific type of equation and plot enough points to position the graph).

The Linear Equation

An equation of the form $Ax + By + C = 0$ is called a linear (first degree) equation.

The graph of a linear equation is a straight line.

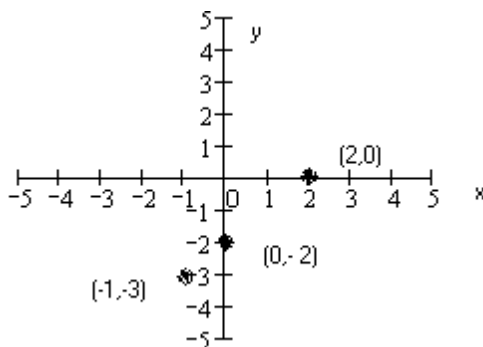
To graph a linear equation

1. Find three points that solve the equation (pick 3 values for x and evaluate the corresponding values for y). (Note: Technically you can draw a line using only two points, but we use three for accuracy in our rough sketches)
2. Plot the 3 points on a Cartesian Plane.
3. Draw a straight line through the 3 points. (If you cannot draw a straight line between the three points, you probably made a mistake in step 1)

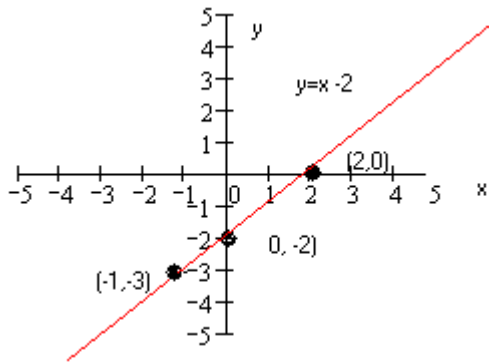
Examples:

Graph $y = x - 2$

x	$y = x - 2$	Point
-1	$y = 1 - 2 = -3$	(-1, -3)
0	$y = 0 - 2 = -2$	(0, -2)
2	$y = 2 - 2 = 0$	(2, 0)



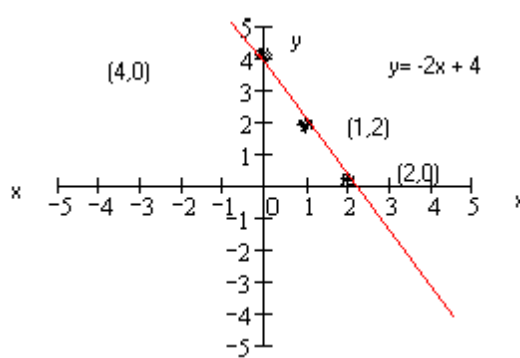
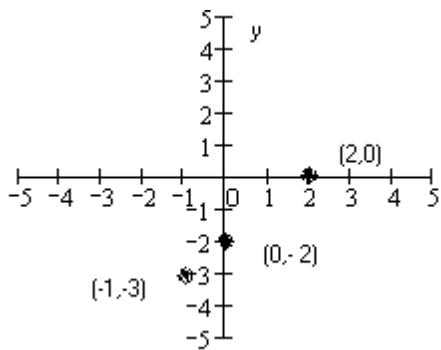
Plot the points



Draw line through the points

Graph $y = -2x + 4$

x	$y = -2x + 4$	Point
0	$y = -2(0) + 4 = 4$	$(0, 4)$
1	$y = -2(1) + 4 = 2$	$(1, 2)$
2	$y = -2(2) + 4 = 0$	$(2, 0)$

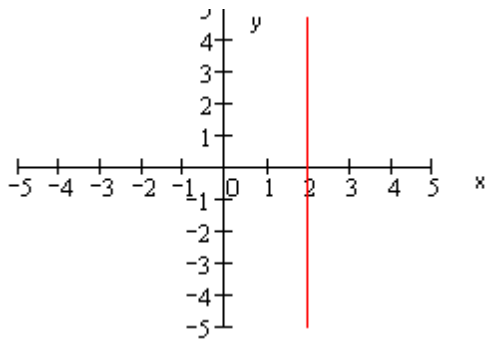


Special Lines

A linear equation with $B = 0$, $Ax + C = 0$ is represented by a vertical line through the point

Example:

$$\begin{aligned}\text{Graph } 2x + 4 &= 0 \\ 2x + 4 &= 0 \\ 2x &= -4 \\ x &= -2\end{aligned}$$



A linear equation with $A = 0$, $By + C = 0$ represents a horizontal line through the point

Example:

$$\begin{aligned}\text{Graph } 3y - 12 &= 0 \\ 3y &= 12 \\ y &= 4\end{aligned}$$

