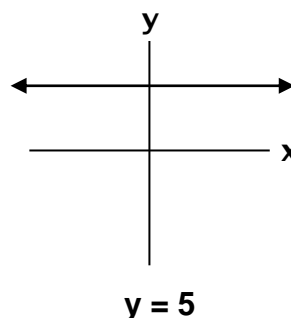
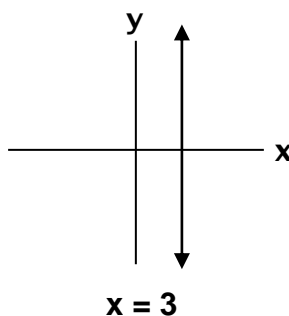
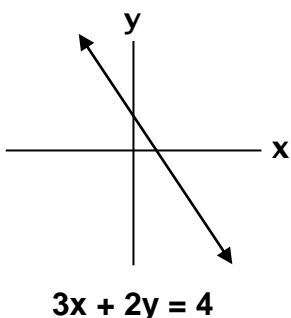


Graphing Linear Equations

A linear equation has variables x and y with exponents of 1. The standard form of a linear equation is $Ax + By = C$, where A and B cannot both be zero. (Example: $2x + y = 5$.) Linear equations are among the easiest equations to graph with a pencil and paper.

Examples of linear equations and their graphs:



There are several ways to graph the solutions of a linear equation. One of the most common methods involves using a t-chart, which lists pairs of x and y values that satisfy (solve) the equation. We start by choosing a number for x , substituting it into the equation and then solving for y . We'll use our example, $2x + y = 5$.

Choose 1 for x and solve for y .

$$\begin{aligned} 2x + y &= 5 \\ 2(1) + y &= 5 \\ 2 + y &= 5 \\ y &= 5 - 2 \\ y &= 3 \end{aligned}$$

So, when $x = 1$, $y = 3$.

Choose 0 for x and solve for y .

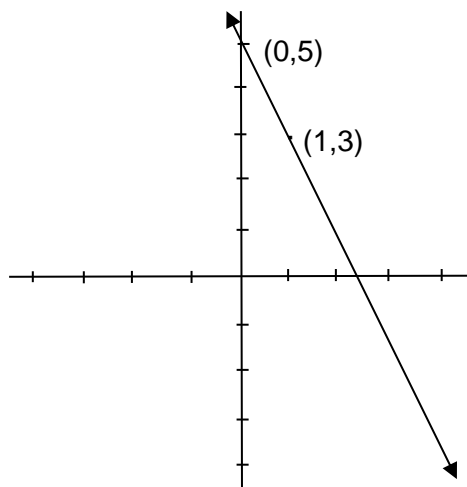
$$\begin{aligned} 2x + y &= 5 \\ 2(0) + y &= 5 \\ 0 + y &= 5 \\ y &= 5 - 0 \\ y &= 5 \end{aligned}$$

So, when $x = 0$, $y = 5$.

Put the values in the t-chart. Find and list more values, if needed, for the graph.

X	Y
1	3
0	5
4	-3

Plot the points from the t-chart as ordered pairs $(1, 3)$ and $(0, 5)$ on the graph. After that, draw a line through the points. The arrow heads on the line show that solutions to the equation extend past the ends of the line graphed.



Graphing Linear Equations

Another way to graph a linear equation involves changing the form of the equation to the slope-intercept form of the equation. This form ($y = mx + b$) allows us to easily identify the slope (m) and the y-intercept (b). Let's use an example that is different from the earlier one.

$$x - 3y = 3$$

If we take the original equation $x - 3y = 3$ and solve for y , it should look like $y = mx + b$

Start with the original equation.

$$x - 3y = 3$$

Add $-x$ to both sides.

$$-3y = -x + 3$$

Divide both sides by -3 .

$$\frac{-3y}{-3} = \frac{-x}{-3} + \frac{3}{-3}$$

Simplify to put in slope-intercept form.

$$y = \frac{1}{3}x - 1$$

So, the slope (m) is $\frac{1}{3}$ and the y-intercept (b) is -1 .

Graphing the line $y = \frac{1}{3}x - 1$

First, we plot the y-intercept $(0, -1)$. Then we use the slope to determine the location of the next point to plot. The slope of a line is a ratio of the change in the y values to the change in the x values of two points (also called rise over run). A slope of $\frac{1}{3}$ tells us that the change in y (or rise) is 1 and the change in x (or run) is 3. This means that from $(0, -1)$ we would go up 1 and to the right 3 to find our next point $(0 + 3, -1 + 1)$, which will be $(3, 0)$. Connect the two points to graph the line.

