A Strategy for Graphing Linear Equations in Two Variables

While there are several techniques for graphing linear equations in two variables, the following strategy will work for every scenario seen in algebra (it may now be the quickest way, but it will always work).

First, determine the form of the equation. In other words, how is the equation written?

If the equation is written as $x = a$:

- Draw a point on the x-axis at $(a, 0)$.
  - This is the line's x-intercept.
- Sketch a vertical line that passes through $(a, 0)$.

If the equation is written as $y = b$:

- Draw a point on the y-axis at $(0, b)$.
  - This is the line's y-intercept.
- Sketch a horizontal line that passes through $(0, b)$.

If the equation is in standard form, $ax + by = c$:

- Find the x-intercept.
  - Let $y = 0$ and solve for x.
  - Draw a point on the x-axis at $(x, 0)$, where x is the value found in the last step.
- Find the y-intercept.
  - Let $x = 0$ and solve for y.
  - Draw a point on the y-axis at $(0, y)$, where y is the value found in the last step.
- Sketch the line that passes through the two intercepts.

NOTE: If the equation is in standard form and $c = 0$, both intercepts are at the origin so a line cannot be drawn this way. If this is the case, solve the equation for y and use the next technique.

If the equation is in slope-intercept form, $y = mx + b$:

- Find the y-intercept.
  - Draw a point on the y-axis at $(0, b)$.
- Find a second point using the slope, m.
  - If necessary, write m as a fraction. If m is negative, move the negative sign to the numerator.
  - From the y-intercept at $(0, b)$, move vertically the amount of the slope's numerator (up if it is positive, down if it is negative).
  - Move horizontally the amount of the slope's denominator (it should be positive, so move right).
  - Draw a point at this location.
- Sketch the line that passes through the two points.

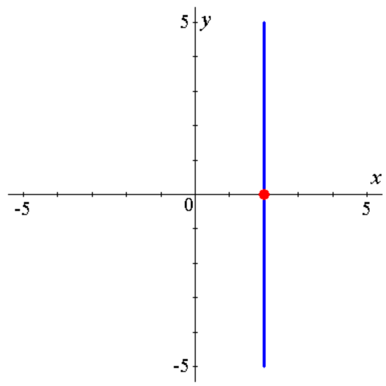
If the equation is written any other way, rewrite it to be in one of the forms above.

Some Examples

Example 1: Graph $x = 2$.

First, recognize this equation represents a vertical line since it is in the form $x = a$. It will have an x-intercept of (2, 0).

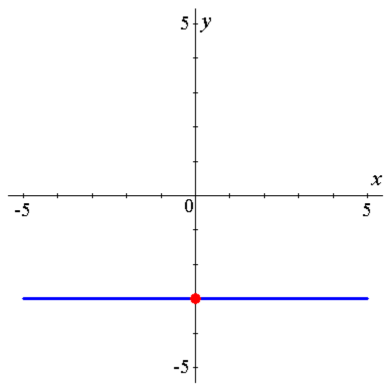
Draw a point at (2, 0) on the x-axis, then draw a vertical line that passes through that point.



Example 2: Graph $y = -3$.

First, recognize this equation represents a horizontal line since it is in the form $y = b$. It will have a y-intercept of (0, –3).

Draw a point at (0, –3) on the y-axis, then draw a horizontal line that passes through that point.



Example 3: Graph $3x - 4y = 6$.

First, recognize this equation is in standard form. Find the x- and y-intercepts, then draw the line that passes through those two points.

For the x-intercept, let $y = 0$ and solve for x:

$$3x - 4(0) = 6$$
$$3x = 6$$
$$x = 2$$

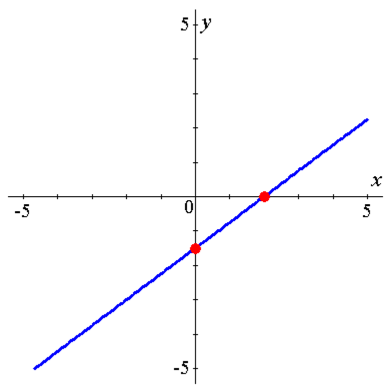
This means there is an x-intercept at (2, 0).

For the y-intercept, let $x = 0$ and solve for y:

$$3(0) - 4y = 6$$
$$-4y = 6$$
$$y = -3/2$$

This means there is a y-intercept at (0, –3/2).

Draw a point at (2, 0) on the x-axis and a point at (0, –3/2) on the y-axis, then draw the line that passes through the two points.



Example 4: Graph $y = 4x - 3$.

First, recognize this equation is in slope-intercept form. Find the y-intercept, use the slope to find a second point, and then draw the line that passes through those two points.

Since $b = -3$, the y-intercept is $(0, -3)$.

Since $m = 4$, the slope is 4/1.

Draw a point at $(0, -3)$ on the y-axis. From there, move up 4 units (since the slope's numerator is positive) and right 1 unit. Draw a second point at this location, which is at $(1, 1)$.

Now draw the line that passes through the two points.