

Section 4 – 4: Graphing a Line Given its Equation

There are three different kinds of line graphs possible and each of the three different type of graphs corresponds to one of three different types of line equations.

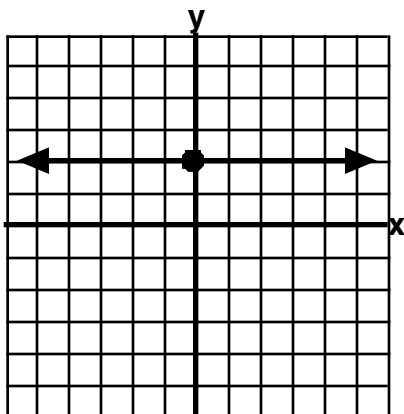
Case 1

Equations of the form
 $y = a \text{ constant}$

like $y = 2$

**have
a zero slope**

and are graphed as a
horizontal line
through the y axis at 2



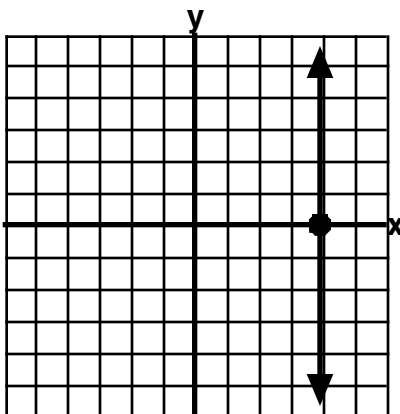
Case 2

Equations of the form
 $x = a \text{ constant}$

like $x = 4$

**have
an undefined slope**

and are graphed as a
vertical line
through the x axis at 4



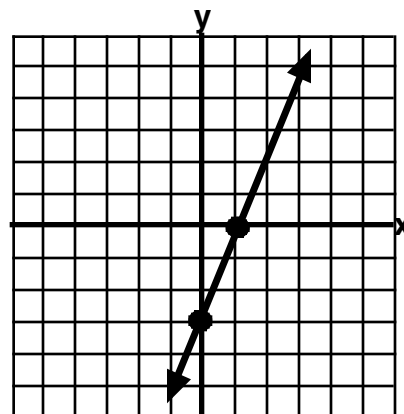
Case 3

Equations of the form
 $y = mx - b$

like
 $y = 3x - 5$ or
 $y = -2x + 4$

**have
a slope m that is a
non zero number**

and are graphed as a
sloped line
through the x and y axis



To Graph a Line given it's Equation

$$y = \text{constant}$$

Case 1: If the equation is of the form $y = y_1$ (where y_1 is the constant)

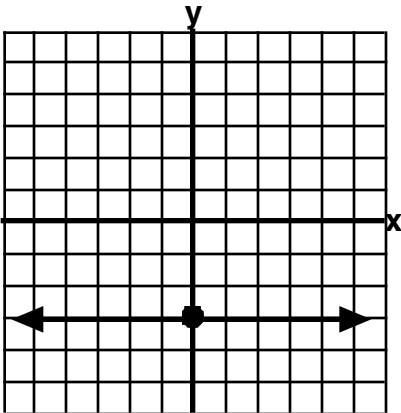
Graph a **horizontal line** crossing the y axis at y_1 (the constant)

Example 1

Graph $y = -3$

$$y = -3$$

is graphed as a
horizontal line
through the y axis at **-3**

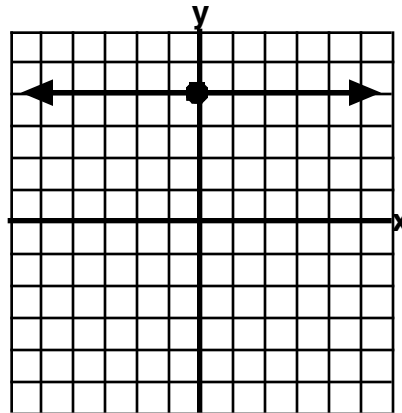


Example 2

Graph $y = 4$

$$y = 4$$

is graphed as a
horizontal line
through the y axis at **4**



To Graph a Line given it's Equation

x = constant

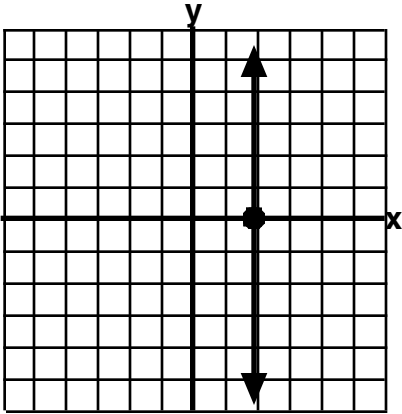
Case 2: If the equation is of the form $x = x_1$ (where x_1 is the constant)

Graph a vertical line crossing the x axis at x_1 (the constant)

Example 1

Graph $x = 2$

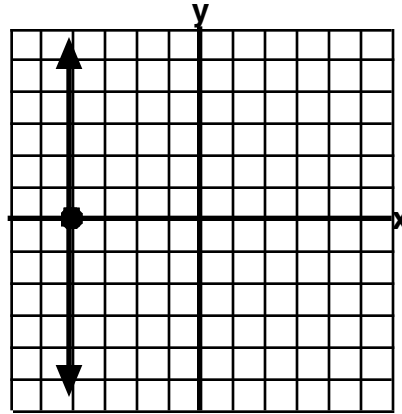
$x = 2$
is graphed as a
vertical line
through the x axis at 2



Example 2

Graph $x = -4$

$x = -4$
is graphed as a
vertical line
through the x axis at -4



To Graph a Line given it's Equation

$$y = mx + b$$

Case 3: If the equation has x and y variables and can be written in the form $y = mx + b$

Step 1. Put the equation into the form $y = mx + b$

Step 2. List the slope m and the y intercept b

Step 3. **Plot a point** on the graph on the y axis **at b**.

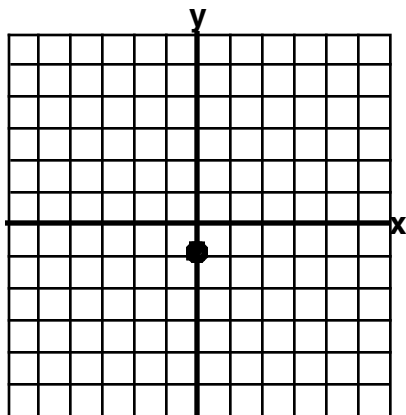
Step 4. To get a second point, **start at the y intercept** and move in the x and y directions based on the slope.

Step 5. Draw a line through the two points.

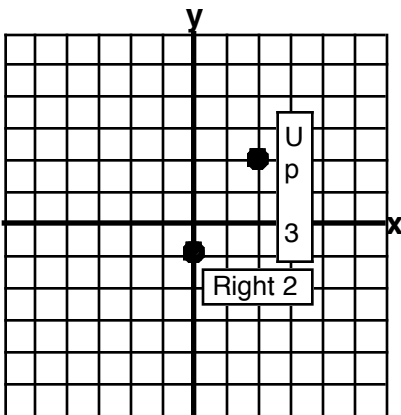
Example 1. Graph $y = \frac{3}{2}x - 1$

Step 2. The slope is $m = \frac{3}{2}$ up 3
right 2 and the y intercept b is -1

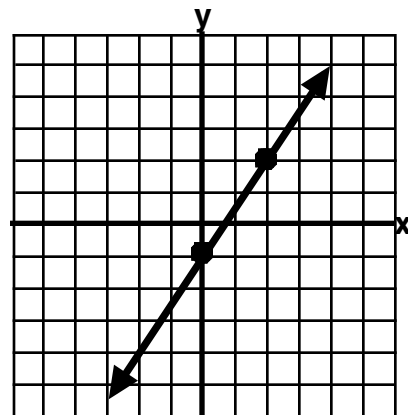
Step 3. Plot (0, -1)
points



Step 4. go right 2 up 3
and plot a point



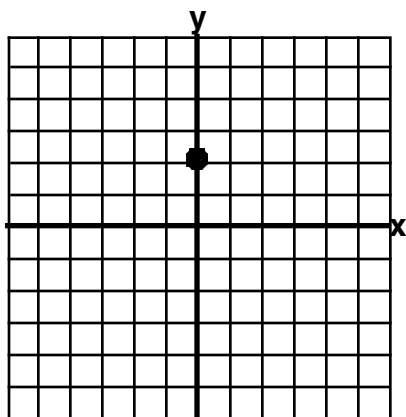
Step 5. Draw the line graph
through the 2



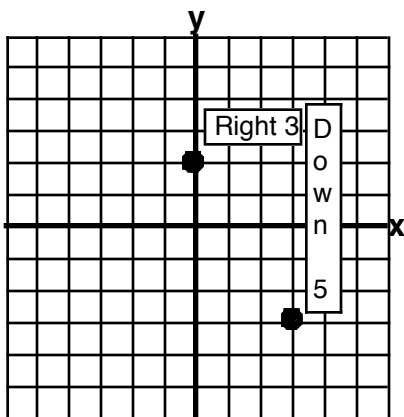
Example 2. Graph $y = \frac{-5}{3}x + 2$

Step 2. The slope is $m = \frac{-5}{3}$ down 5 right 3 and the y intercept b is 2

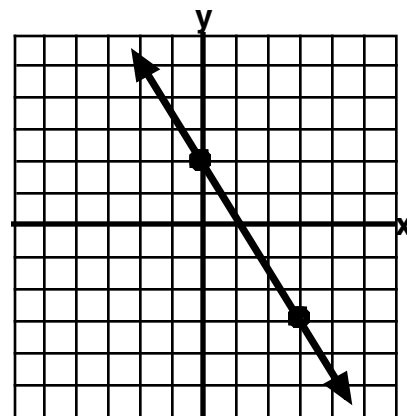
Step 3. Plot (0 , 2)
points



Step 4. go right 3 down 5
and plot a point



Step 5. Draw the line graph
through the 2



Example 3. Graph $5x - 2y = 0$

Step 1. Solve for y:

$$5x + 2y = 0$$

$$-5x \quad -5x$$

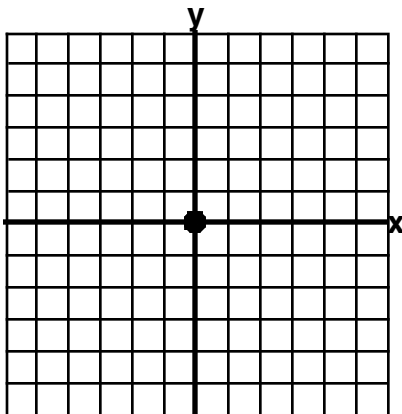
$$2y = -5x$$

$$\frac{2y}{2} = \frac{-5x}{2}$$

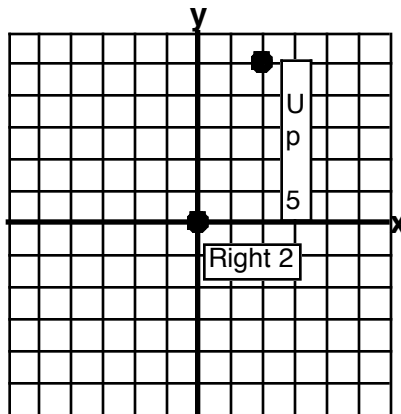
$$y = \frac{5}{2}x$$

Step 2. The slope is $m = \frac{5}{2}$ up 5 right 2 and the y intercept b is 0

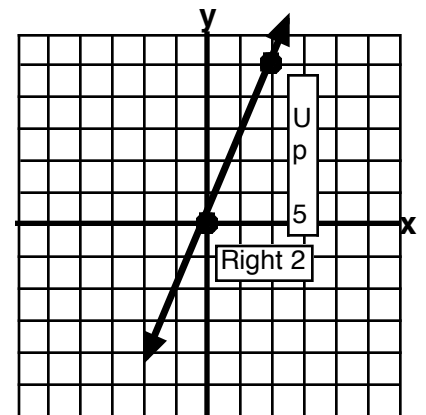
Step 3. Plot (0, 0) points



Step 4. go right 2 up 5 and plot a point



Step 5. Draw the line graph through the 2



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

Step 1. Solve for y:

$$4x - 3y = -6$$
$$-4x \quad -4x$$

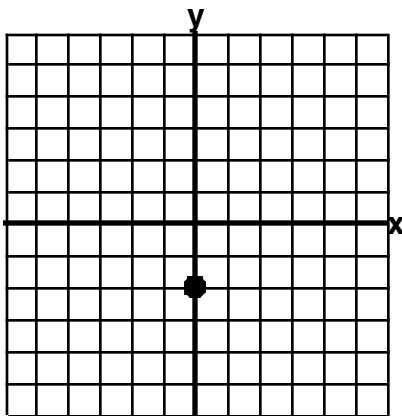
$$-3y = -4x + 6$$

$$\frac{-3y}{-3} = \frac{-4x}{-3} + \frac{6}{-3}$$

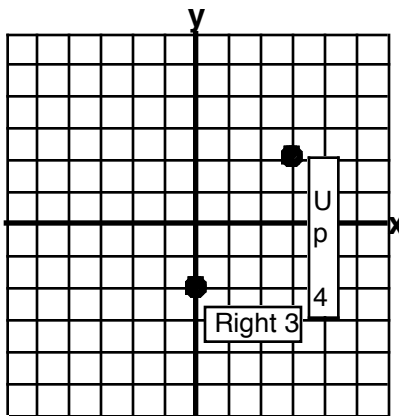
$$y = \frac{4}{3}x - 2$$

Step 2. The slope is $m = \frac{4}{3}$ up 4 right 3 and the y intercept b is -2

Step 3. Plot (0, -2)
points



Step 4. go right 3 up 4
and plot a point



Step 5. Draw the line graph
through the 2

