4.3 - Another Form of Linear Relations

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4.3: Another Form of the Equation for a Linear Relation

Consider the following scenario:

"Two integers add together to equal 3."

What possible values are there for the two integers? Let's call the first integer "x", and the second integer "y". Pick some values for x, and then calculate y:

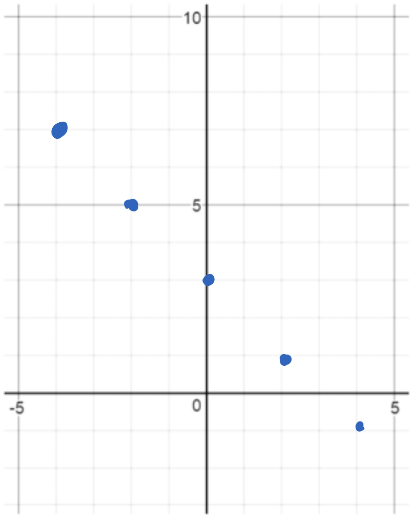
First Integer, x	Second Integer, y
-6	9
-4	7
-2	5
0	3
2	1
4	-1
6	-3

As an equation, this would be $x + y = 3$. Now we can graph this relation:

y= ____ .

Is this relation linear?

Yes!



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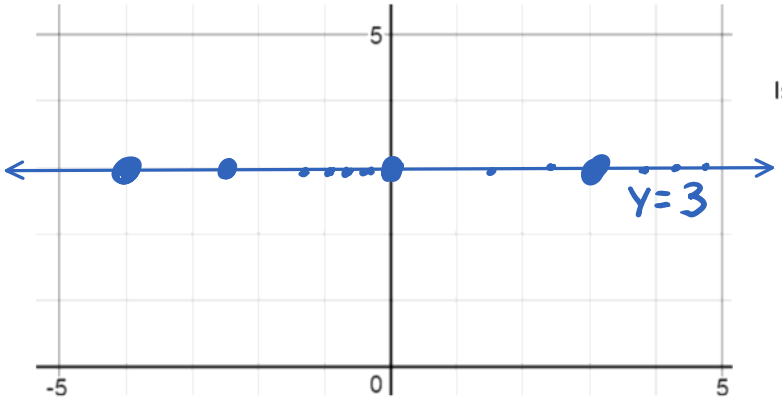
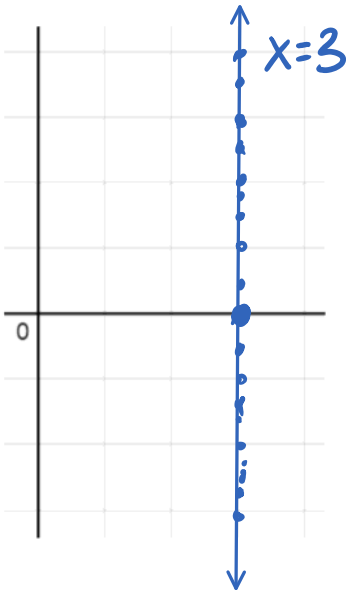
Suppose that *x* did not appear in our previous equation. *x + y = 3* would become *y = 3*. To graph this, we would have to plot all the points on a graph that have a y-coordinate of 3:



Is this equation linear?

Yes!

Now suppose *y* did not appear in our previous equation. *x + y = 3* would become *x = 3*. To graph this, we would have to plot all the points on a graph that have an x-coordinate of 3:



Is this equation linear?

Yes!

So in general, when we have an equation **x = <some number>** the line will be vertical

and when we have an equation **y = <some number>** the line will be horizontal

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Example 1: Graphing an Equation in the Form x + a = b:

Graph the equation x + 2 = 0

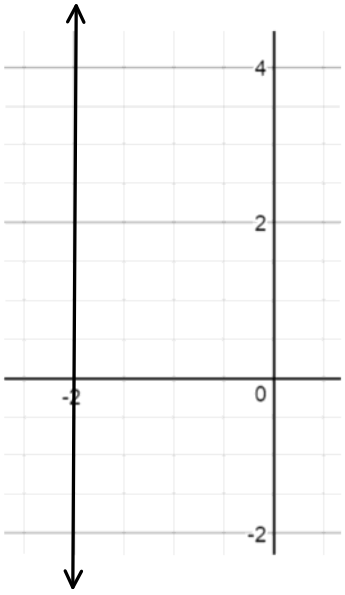
We can manipulate the equation algebraically to have only *x* on one side:

$x + 2 = 0$

$-2 \quad -2$

$x = -2$

Now we can graph as normal:



Example 2: Graphing an Equation in the Form ax + by = c:

Graph the equation 3x – 2y = 6

First make a table a values with numbers for x that **you** picked (usually, small numbers will make calculations easier). For this question, I'm going to use -4, 0, and 4.

Now substitute our x-value of -4 in to the equation and use algebra to solve for y:

$x = -4$

$3x - 2y = 6$

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

$-12 - 2y = 6$ $+12 \quad +12$

$-2y = 18$

$-2 \quad -2$

$y = -9$

when $x = -4$, $y = -9$

$\therefore (-4, -9)$

This value for y is the corresponding value for x = -4 in our table of values.

Do the same for x = 0, and x = 4:

$x = 0$

$3x - 2y = 6$

$3(0) - 2y = 6$

$-2y = 6$

$\frac{-2y}{-2} = \frac{6}{-2}$

$y = -3$

$x = 4$

$3x - 2y = 6$

$3(4) - 2y = 6$

$12 - 2y = 6$

$-12 \quad -12$

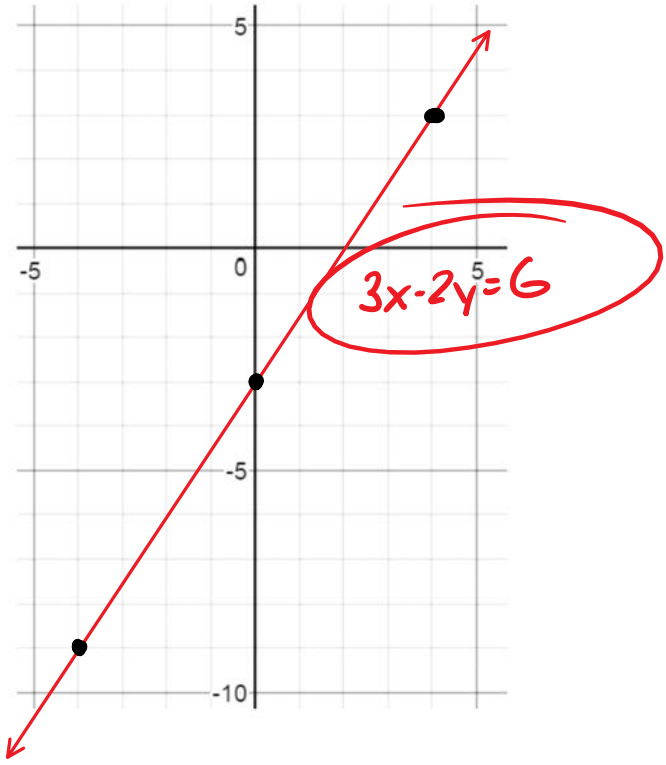
$-2y = -6$

$\frac{-2y}{-2} = \frac{-6}{-2}$

$y = 3$

Now we can fill in our table of values:

x	y
-4	-9
0	-3
4	3



Textbook Assignment: Pg.178 #4, 5, 7, 9, 11, 15