

Functions-Day1GraphwithIOTables.notebook

What is a linear equation (linear function)?

An equation of the 1st degree (x to the 1st power)



and graphs a line

In order to graph a linear function, it must first be written in **function form**. To do this, we solve the equation for y. (Think back to multivariable equations.)

Examples - Write each of the following in function form. (Solve for y.)

f(x) is same as y

1. $x + y = 5$

$$\begin{array}{r} -x \quad -x \\ \hline y = -x + 5 \end{array}$$

2. $-18x + 9y = 81$

$$\begin{array}{r} +18x \quad +18x \\ \hline 9y = \frac{18x}{9} + \frac{81}{9} \\ y = 2x + 9 \end{array}$$

3. $3x + y = 6$

$$\begin{array}{r} -3x \quad -3x \\ \hline y = -3x + 6 \\ y = 6 - 3x \end{array}$$

4. $y - 2x = 7$

$$\begin{array}{r} +2x \quad +2x \\ \hline y = 2x + 7 \\ y = 7 + 2x \end{array}$$



5. $14x + 7y = 28$

$$\begin{array}{r} -14x \quad -14x \\ \hline 7y = \frac{-14x}{7} + \frac{28}{7} \\ y = -2x + 4 \end{array}$$

or

$$\frac{7y}{7} = \frac{-14x + 28}{7}$$

6. $4x - 2y = 16$

$$\begin{array}{r} -4x \quad -4x \\ \hline -2y = \frac{-4x}{-2} + \frac{16}{-2} \\ y = 2x - 8 \end{array}$$

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7. $8y + 24x = 48$

$$\frac{-24x - 24x}{8} = \frac{-24x + 48}{8}$$

$$y = -3x + 6$$

or

$$y = 6 - 3x$$

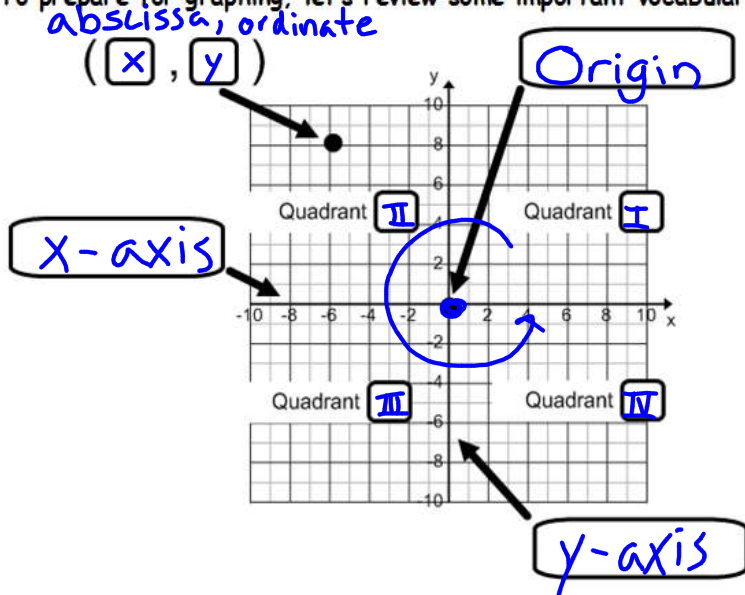
8. $x + 3y = 15$

$$\frac{-x - x}{3} = \frac{-x + 15}{3}$$

$$y = \frac{-x}{3} + 5$$

$$y = -\frac{1}{3}x + 5$$

To prepare for graphing, let's review some important vocabulary



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Graphing Linear Functions

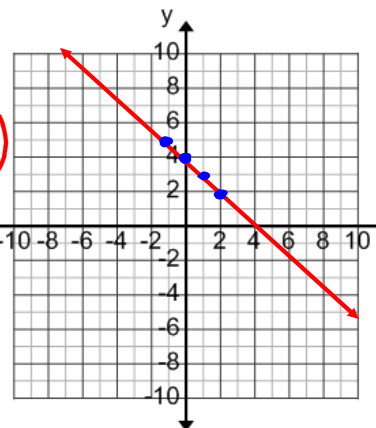
After you write an equation in function form, you can make a table of values that will help you graph the function. You choose the x values.

Examples : Create a table of values for each function and graph.

$$1. \ x + y = 4$$

$$\frac{-x \quad -x}{y = 4 - x}$$

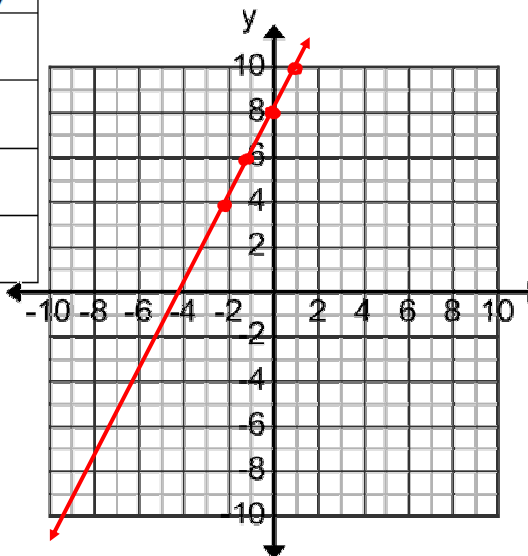
In x	Rule $4 - x$	Out y	x y
-1	$4 - (-1)$	5	$(-1, 5)$
0	$4 - 0$	4	$(0, 4)$
1	$4 - 1$	3	$(1, 3)$
2	$4 - 2$	2	$(2, 2)$



$$2. \ -2x + y = 8$$

$$\frac{+2x \quad +2x}{y = 2x + 8}$$

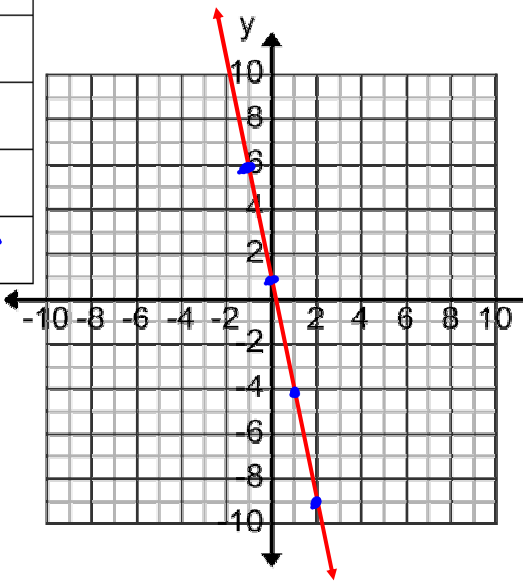
In x	Rule $2x + 8$	Out y
-2	$2(-2) + 8$	4
-1	$2(-1) + 8$	6
0	$2 \cdot 0 + 8$	8
1	$2 \cdot 1 + 8$	10



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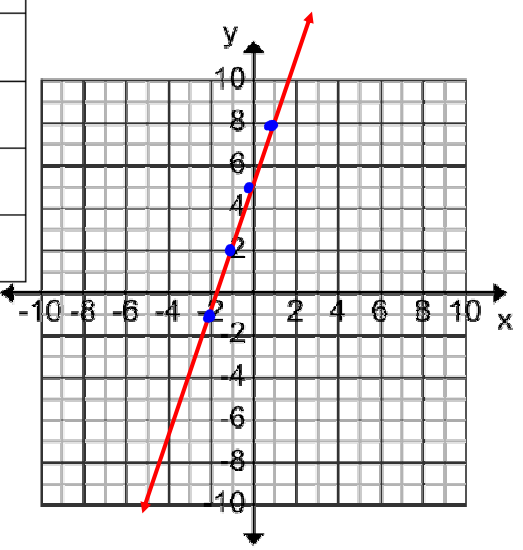
3. $5x + y = 1$
 $\frac{-5x - 5x}{-5x - 5x}$
 $y = 1 - 5x$

In		Out
x	$1 - 5x$	y
-1	$1 - 5(-1)$	6
0	$1 - 5 \cdot 0$	1
1	$1 - 5 \cdot 1$	-4
2	$1 - 5 \cdot 2$	-9
	$1 - 10$	



4. $5y - 15x = 25$
 $\frac{5y - 15x + 15x + 25}{5 \quad 5 \quad 5}$
 $y = 3x + 5$

x	$3x + 5$	y
-2	$3(-2) + 5$	-1
-1	$3(-1) + 5$	2
0	$3(0) + 5$	5
1	$3(1) + 5$	8



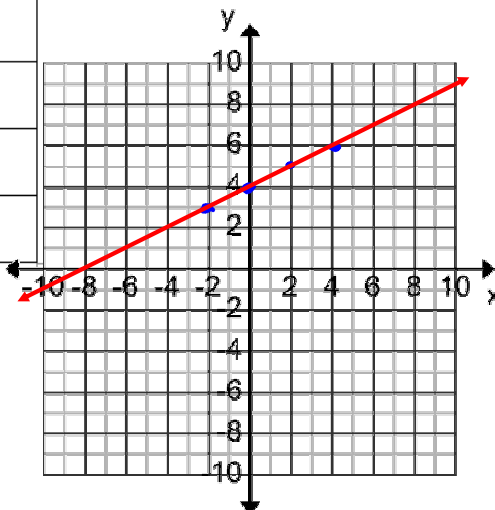
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5. $-2x + 4y = 16$

$$\frac{+2x}{4} = \frac{+2x+16}{4}$$

$$y = \frac{1}{2}x + 4$$

x	$\frac{1}{2}x + 4$	y
-2	$\frac{1}{2}(-2) + 4$	3
0	$\frac{1}{2} \cdot 0 + 4$	4
2	$\frac{1}{2} \cdot 2 + 4$	5
4	$\frac{1}{2} \cdot 4 + 4$	6



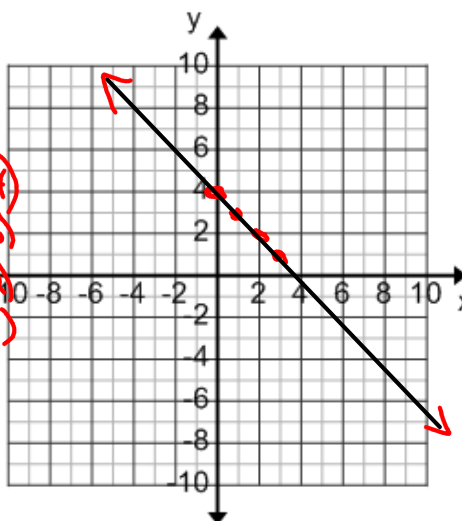
After you write an equation in function form, you can make a table of values that will help you graph the function.

Examples – Create a table of values for each function and graph.

1. $x + y = 4$

x	$y = -x + 4$	y
0	$y = -0 + 4$	4
1	$y = -1 + 4$	3
2	$y = -2 + 4$	2
3	$y = -3 + 4$	1

(0, 4)
(1, 3)
(2, 2)
(3, 1)



$$\begin{array}{r} x + y = 4 \\ -x \quad -x \\ \hline y = -x + 4 \end{array}$$

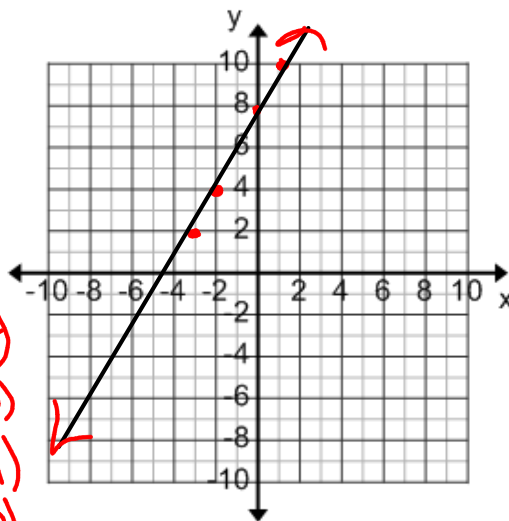
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2. $-2x + y = 8$

$$\begin{array}{r} +2x \quad +2x \\ \hline y = 2x + 8 \end{array}$$



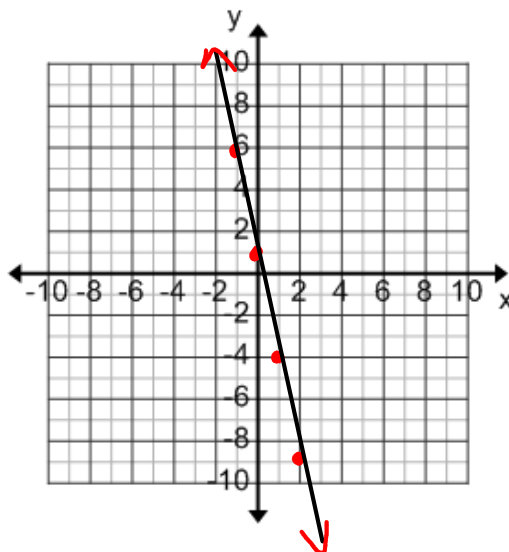
x	$y = 2x + 8$	y	
0	$y = 2 \cdot 0 + 8$	8	(0, 8)
1	$y = 2 \cdot 1 + 8$	10	(1, 10)
-2	$y = 2(-2) + 8$	4	(-2, 4)
-3	$y = 2(-3) + 8$	2	(-3, 2)



3. $5x + y = 1$

$$\begin{array}{r} -5x \quad -5x \\ \hline y = -5x + 1 \end{array}$$

x	$y = -5x + 1$	y	
-1	$y = -5(-1) + 1$	6	
0	$y = -5(0) + 1$	1	
1	$y = -5(1) + 1$	-4	
2	$y = -5(2) + 1$	-9	



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$$4. \quad 5y - 15x = 25$$

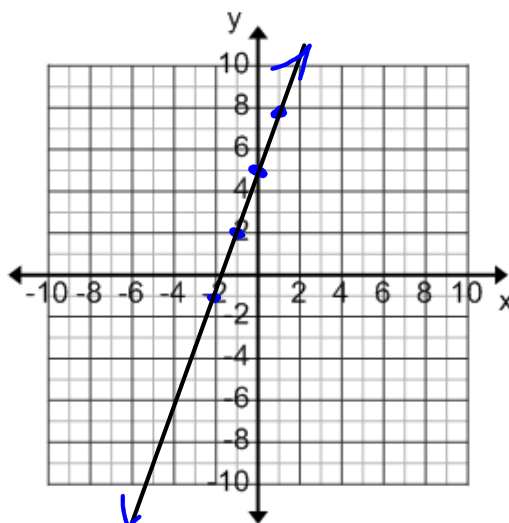
$$\quad \quad \quad +15x + 15x$$

$$\quad \quad \quad \hline$$

$$\frac{5y}{5} = \frac{15x + 25}{5}$$

$$y = 3x + 5$$

x	$y = 3x + 5$	y
-2	$y = 3(-2) + 5$	-1
-1	$y = 3(-1) + 5$	2
0	$y = 3(0) + 5$	5
1	$y = 3(1) + 5$	8



$$5. \quad -2x + 4y = 16$$

$$\quad \quad \quad +2x \quad \quad +2x$$

$$\quad \quad \quad \hline$$

$$\frac{4y}{4} = \frac{2x + 16}{4}$$

$$y = \frac{1}{2}x + 4$$

x	$y = \frac{1}{2}x + 4$	y
-2	$y = \frac{1}{2}(-2) + 4$	3
0	$y = \frac{1}{2}(0) + 4$	4
2	$y = \frac{1}{2}(2) + 4$	5
4	$y = \frac{1}{2}(4) + 4$	6

