

Learning Targets



- I can identify linear equations, intercepts, and zeros.
- I can create a table of values by plugging in x-values to the equation to find the corresponding y-values.
- I can convert an equation into slope-intercept form.
- I can graph linear equations using a table.

What is a Linear Equation?

- ✓ An equation that makes a straight line when it is graphed.

Two Common Linear Equation Forms	
Standard Form	$Ax + By = C$
Slope Intercept Form	$y = mx + b$

[Example] Choose all Linear Equations.

- A. $3x + 5y = 10$
 B. $y = 2x - 1$
 C. $x^2 + 2x - 3 = 0$
 D. $y = x^3$
 E. $6x - xy = 4$
- F. $y = \frac{2}{3}x$
 G. $y = \frac{5}{x}$
 H. $y = 3$
 I. $x = 5$
 J. $y = x$

How to graph a Linear Equation?

Standard Form	Slope Intercept Form
1. Plug in <u>$X=0$</u> to find the y-intercept	1. Solve for y (<u>isolate your y</u>)
2. Plug in <u>$y=0$</u> to find the x-intercept	2. Complete the table or do a <u>quick draw</u>
3. Connect x-intercept and y-intercept	<input type="radio"/> Quick draw: plot a y-intercept then follow the slope

[Example] Graph $2x + 4y = 16$

Standard Form

1. Plug in $x = 0$ to find the y-intercept
2. Plug in $y = 0$ to find the x-intercept
3. Connect x-intercept and y-intercept

$$2x + 4y = 16$$

$$2(0) + 4y = 16$$

$$\frac{4y}{4} = \frac{16}{4}$$

$$y = 4$$

y-intercept $\rightarrow (0, 4)$

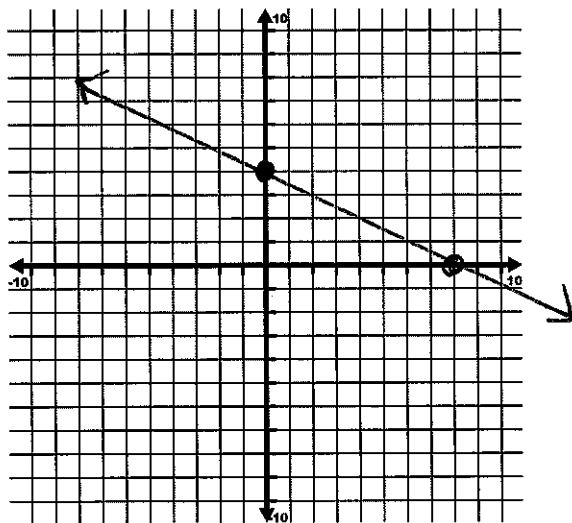
$$2x + 4y = 16$$

$$2x + 4(0) = 16$$

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

$$x = 8$$

x-intercept $\rightarrow (8, 0)$



Slope Intercept Form

1. Solve for y (meaning isolate y)
2. Complete the table or do a quick draw

$$\begin{array}{l} \cancel{2x} + 4y = 16 \\ -\cancel{2x} \end{array} \quad \begin{array}{l} | \\ -2x \end{array}$$

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

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

Quick Draw \rightarrow
(go straight to graph)

x	y
-4	6
-2	5
0	4
2	3
4	2

$$y = \frac{-1}{2}(0) + 4$$

$$y = 0 + 4$$

$$y = 4$$

$$y = \frac{-1}{2}(-4) + 4$$

$$y = 2 + 4$$

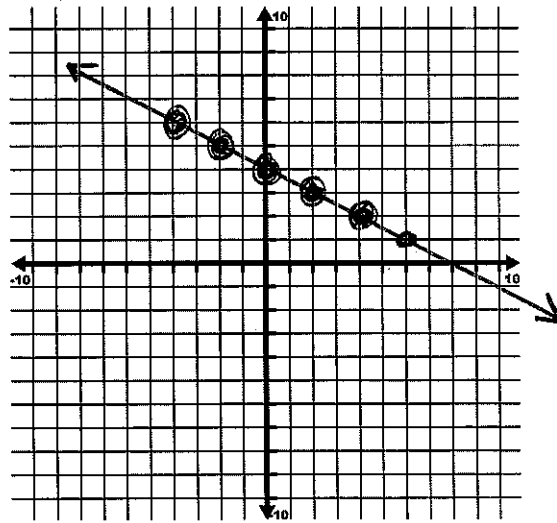
$$y = 6$$

$$y = \frac{-1}{2}(-2) + 4$$

$$y = 1 + 4$$

$$y = 5$$

Table \rightarrow
(Substitute x values)



How Does a Table Work?

Starting Equation: $y + 3 = 2x$
 $\quad\quad\quad -3 \quad -3$

Step 1: Get y by itself.

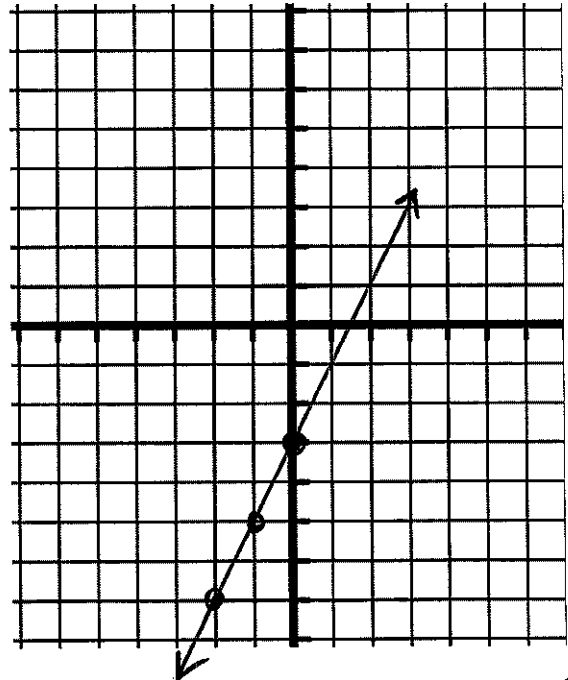
$$y = 2x - 3$$



Step 2: Plug in values for x to find y .

x	y	Work Shown
-2	-7	$y = 2(-2) - 3$
-1	-5	$y = 2(-1) - 3$
0	-3	$y = 2(0) - 3$

Step 3: Plot Points from Table on Graph



Write each linear equation in slope-intercept form (get y by itself).

Why is it important to get y by itself? to determine your y -intercept and slope (which is what you need to graph).

a) $\frac{2}{3}x + y = 7$
 $-\frac{2}{3}x \quad -\frac{2}{3}x$
 $y = -\frac{2}{3}x + 7$

c) $\frac{5y}{5} = \frac{3x + 25}{5}$
 $y = \frac{3}{5}x + 5$

b) $-9x = 18 + 6y$
 $-18 \quad -18$
 $-\frac{9x}{6} - \frac{18}{6} = \frac{6y}{6}$
 $-\frac{3}{2}x - 3 = y$

d) $-\frac{1}{2}x + \frac{2}{3}y - 8 = 0$
 $+\frac{1}{2}x \quad +\frac{1}{2}x$
 $\frac{2}{3}y - 8 = \frac{1}{2}x$
 $\quad +8 \quad +8$
 ~~$\frac{3}{2} \cdot \frac{2}{3}y$~~ $\frac{3}{2} \cdot \frac{1}{2}x + 8 \cdot \frac{3}{2}$
 $y = \frac{3}{4}x + 12$

Examples: Complete the table for each function, then graph

a) $y = -3x + 8$

x	-2	-1	0	1	2
y	14	11	8	5	2

$$y = -3(-2) + 8$$

$$y = 6 + 8$$

$$y = 14$$

$$y = -3(-1) + 8$$

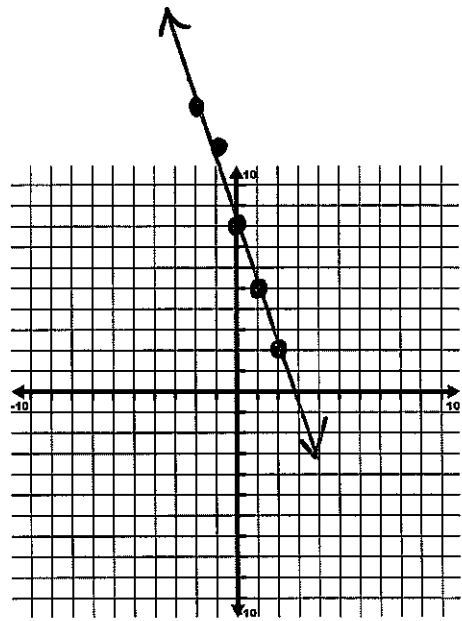
$$y = 3 + 8$$

$$y = 11$$

$$y = -3(0) + 8$$

$$y = 0 + 8$$

$$y = 8$$



b) $y - 6 = -3(x + 2)$

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

$$y - 6 = -3(0)$$

$$y - 6 = 0$$

$$+6 \quad +6$$

$$y = 6$$

$$y - 6 = -3(-1 + 2)$$

$$y - 6 = -3(1)$$

$$y - 6 = -3$$

$$+6 \quad +6$$

$$y = 3$$

$$y - 6 = -3(0 + 2)$$

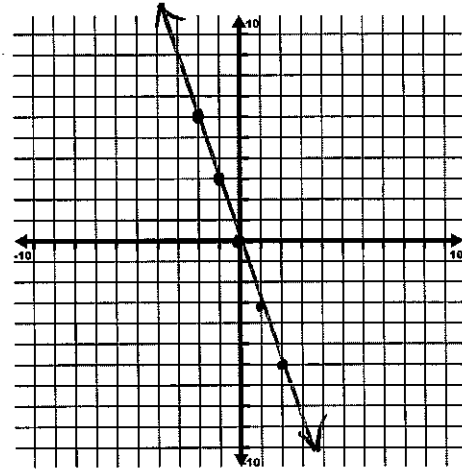
$$y - 6 = -3(2)$$

$$y - 6 = -6$$

$$+6 \quad +6$$

$$y = 0$$

x	-2	-1	0	1	2
y	6	3	0	-3	-6



c) $3 \cdot \frac{8}{3}x - \frac{4}{3}y = -4 \cdot 3$

$$8x - 4y = -12$$

$$8(-2) - 4y = -12$$

$$-16 - 4y = -12$$

$$+16 \quad +16$$

$$-4y = 4$$

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

$$y = -1$$

$$8(-1) - 4y = -12$$

$$-8 - 4y = -12$$

$$+8 \quad +8$$

$$-4y = -4$$

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

$$y = 1$$

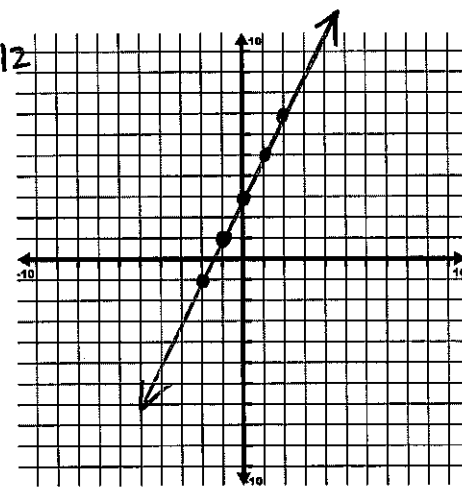
$$8(0) - 4y = -12$$

$$-4y = -12$$

$$\frac{-4y}{-4} = \frac{-12}{-4}$$

$$y = 3$$

x	-2	-1	0	1	2
y	-1	1	3	5	7



Graphing Vertical and Horizontal Lines

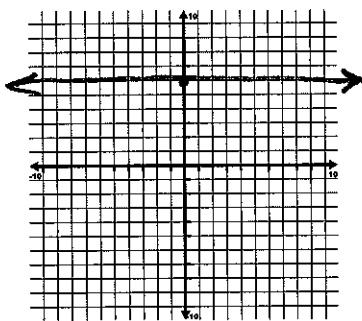


Let's memorize: HOY VUX

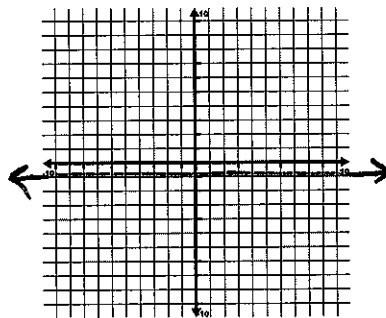
	Graph Example	Slope	Equation
Horizontal Line		$m =$ zero	$y = 3$
Vertical Line		$m =$ undefined	$x = -1$

Graph each equation on the provided coordinate plane.

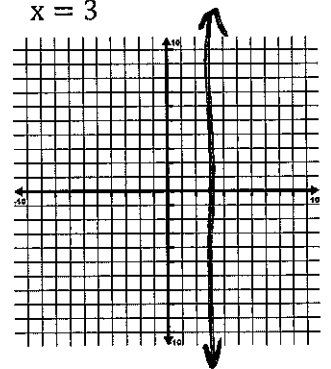
a) $y = 6$



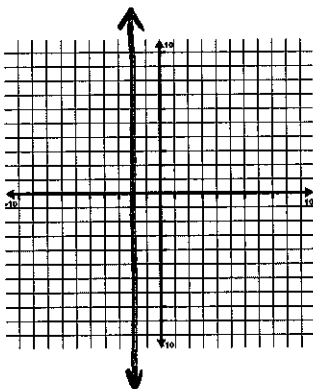
b) $y = -1$



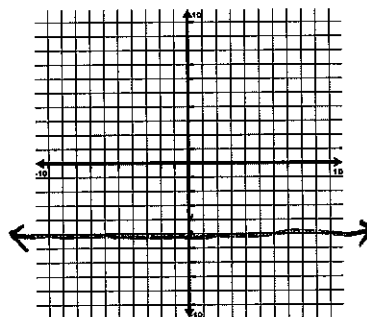
c) $x = 3$



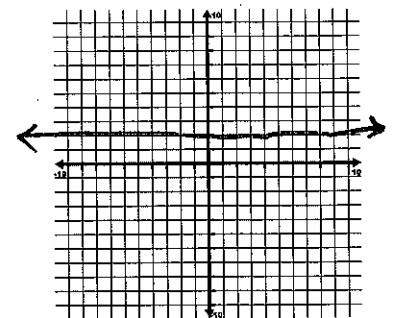
d) $x = -2$



e) $y + 5 = 0$
 $-5 \quad -5$
 $y = -5$



f) $x - 3 = -1$
 $+3 \quad +3$
 $y = 2$



Application

- a) Determine which ordered pair in the table does not belong to the equation.

$$y = -4x + 3$$

x	-2	-1	0	1	2
y	11	8	3	-1	-5

-3 -5 -4 -4

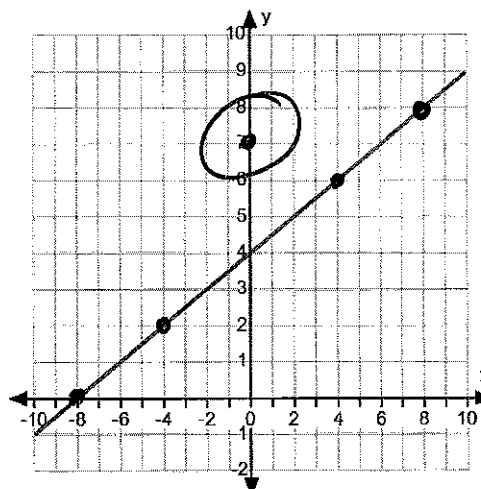
$$y = -4(-1) + 3$$

$$y = 4 + 3$$

$$y = 7$$

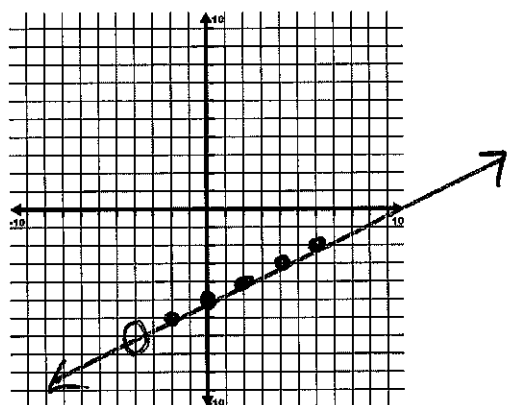
- b) Determine which ordered pair in the table does not belong to the graph.

x	-8	-4	0	4	8
y	0	2	7	6	8



- c) Prove that $(-4, -7)$ is a solution to the equation $y = \frac{1}{2}x - 5$

i) Prove graphically



ii) Prove algebraically

$$y = mx + b$$

$$-7 = \frac{1}{2}(-4) - 5$$

$$-7 = -2 - 5$$

$$-7 = -7$$

Extra Practice

- Textbook p. 155-159, 216-219, 233-235