

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 forms a 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. $y = x$

*x⁻¹
not linear*

*x⁰
linear*

*y⁰
linear equation
NOT a function*

How to graph a Linear Equation?

Standard Form	Slope Intercept 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	1. Solve for y (meaning isolate y) 2. Complete the table or do a quick draw ○ 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

Y-int
 $2(0) + 4y = 16$
 $0 + 4y = 16$
 $y = 4$

X-int
 $2x + 4(0) = 16$
 $2x + 0 = 16$
 $x = 8$

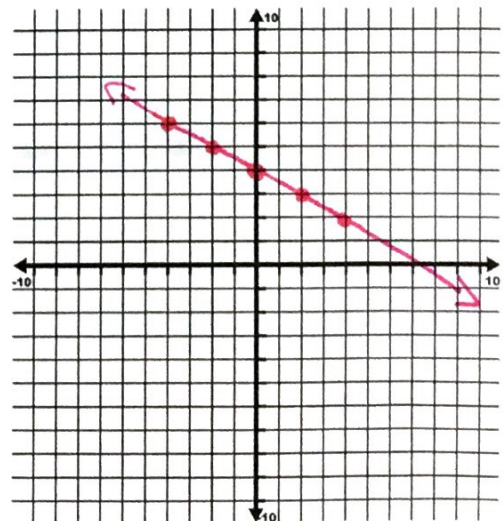
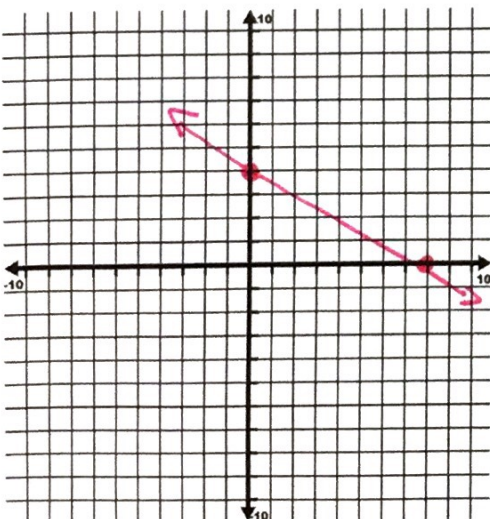
Slope Intercept Form

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

$$2x + 4y = 16$$
$$\frac{-2x}{4} \qquad \frac{-2x}{4}$$
$$4y = \frac{-2x + 16}{4}$$
$$y = \frac{-2}{4}x + \frac{16}{4}$$
$$y = -\frac{1}{2}x + 4$$

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

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



How Does a Table Work?

Starting Equation: $y + 3 = 2x$

Step 1: Get y by itself. (Slope - Intercept)

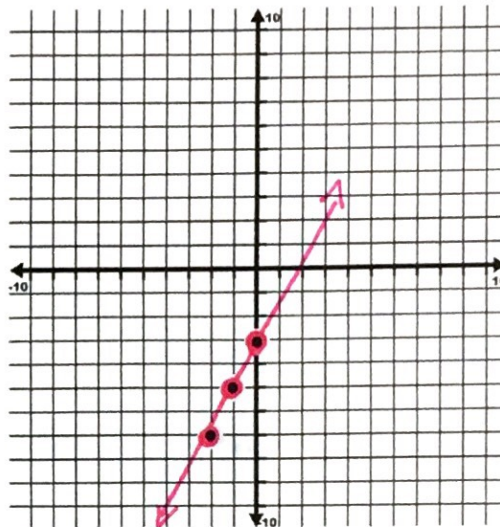
$$\begin{array}{r} y + 3 = 2x \\ -3 \quad -3 \end{array}$$

$$y = 2x - 3$$

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

x	y	Work Shown
-2	-7	$y = 2(-2) - 3 \rightarrow y = -4 - 3 \rightarrow y = -7$
-1	-5	$y = 2(-1) - 3 \rightarrow y = -2 - 3 \rightarrow y = -5$
0	-3	$y = 2(0) - 3 \rightarrow y = 0 - 3 \rightarrow y = -3$

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? It gives you the slope of the line

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

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

b) $-9x = 18 + 6y$

$$-18 \quad -18$$

$$\frac{-9x - 18}{6} = \frac{6y}{6}$$

$$-\frac{3}{2}x - 3 = y \text{ or } y = -\frac{3}{2}x - 3$$

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

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

d) $-\frac{1}{2}x + \frac{2}{3}y - 8 = 0 + \frac{1}{2}x$

$$+\frac{1}{2}x$$

$$\frac{2}{3}y - 8 = \frac{1}{2}x + 8$$

$$\frac{2}{3}y = \left(\frac{1}{2}x + 8\right) \cdot \frac{3}{2}$$

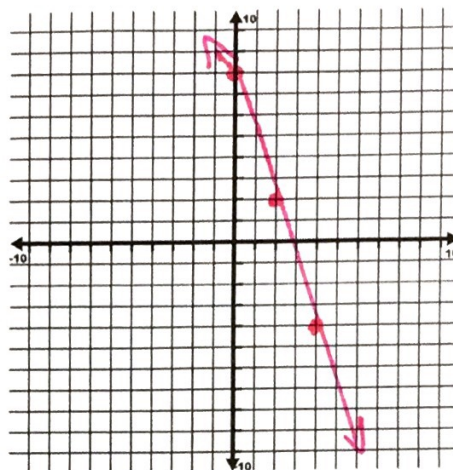
$$y = \frac{3}{4}x + \frac{24}{2}$$

$$y = \frac{3}{4}x + 12$$

Examples: Complete the table for each function, then graph

a) $y = -3x + 8$

x	0 -4	-2	0	2	4
y	20	14	8	2	-4

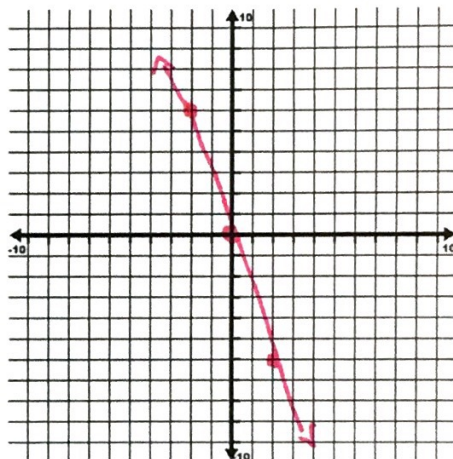


b) $y - 6 = -3(x + 2)$

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

$$y = -3x$$

x	2 -4	-2	0	2	4
y	12	6	0	-6	-12



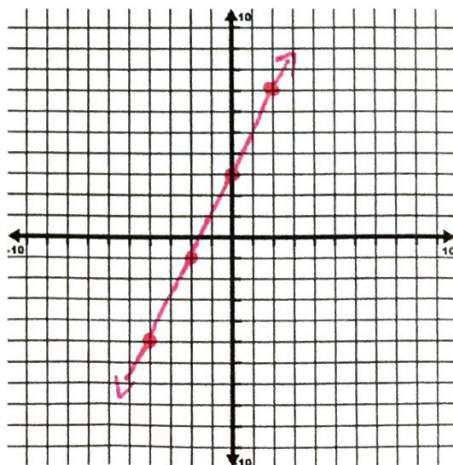
c) $\frac{8}{3}x - \frac{4}{3}y = -4$ $-\frac{8}{3}x$

$$-\frac{4}{3}y = \left(-\frac{8}{3}x - 4\right) - \frac{3}{4}$$

$$y = \frac{24}{12}x + \frac{12}{4}$$

$$y = 2x + 3$$

x	-4	-2	0	2	4
y	-5	-1	3	7	11



Graphing Vertical and Horizontal Lines

Horizontal
O → zero slope
Y = equation
Vertical
Undefined
X = equation

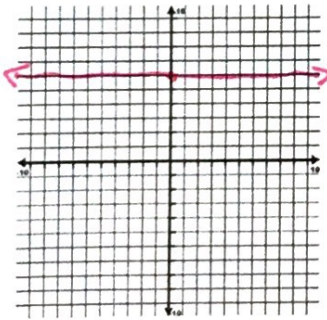


Let's memorize: **HOY VUX**

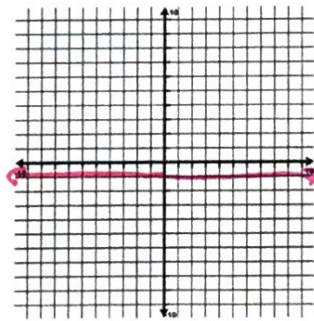
	Graph Example	Slope	Equation
Horizontal Line		$m = 0$ run but no rise $\frac{3-3}{2-1} = \frac{0}{1} = 0$	$y = 3$
Vertical Line		$m = \text{undefined}$ rise but no run $\frac{-1-0}{-1-(-1)} = \frac{-1}{0}$	$x = -1$

Graph each equation on the provided coordinate plane.

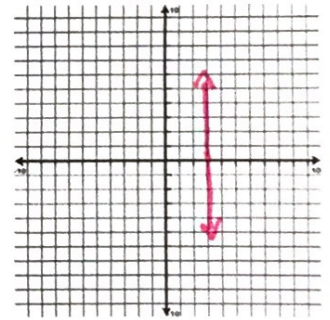
a) $y = 6$



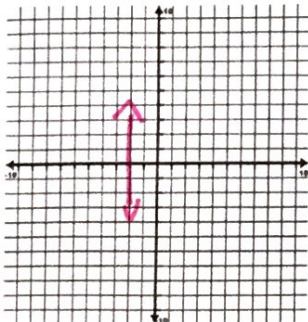
b) $y = -1$



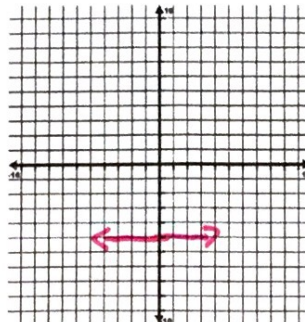
c) $x = 3$



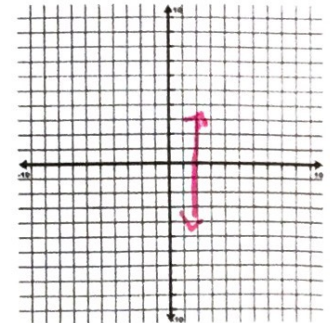
d) $x = -2$



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



f) $x - 3 = -1$
 $x = +2$



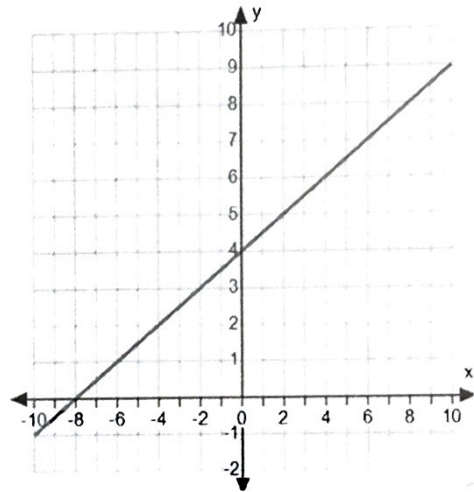
Application

- 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	7	3	-1	-5

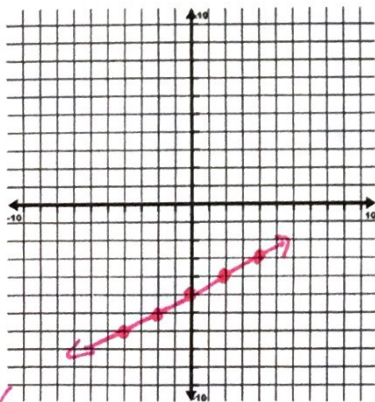
- b) Determine which ordered pair in the table does not belong to the graph.

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



x	-4	-2	0	2	4
y	-7	-6	-5	-4	-3

ii) Prove algebraically

$$y = \frac{1}{2}x - 5$$

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

$$-7 = -\frac{4}{2} - 5$$

$$-7 = -2 - 5$$

$$-7 = -7 \checkmark$$

Extra Practice

- Textbook p. 158 # 43 – 48