

4.6 Graph Using Slope-Intercept Form

Slope-Intercept Form: $y = mx + b$

$$m = \frac{\text{rise}}{\text{run}}$$

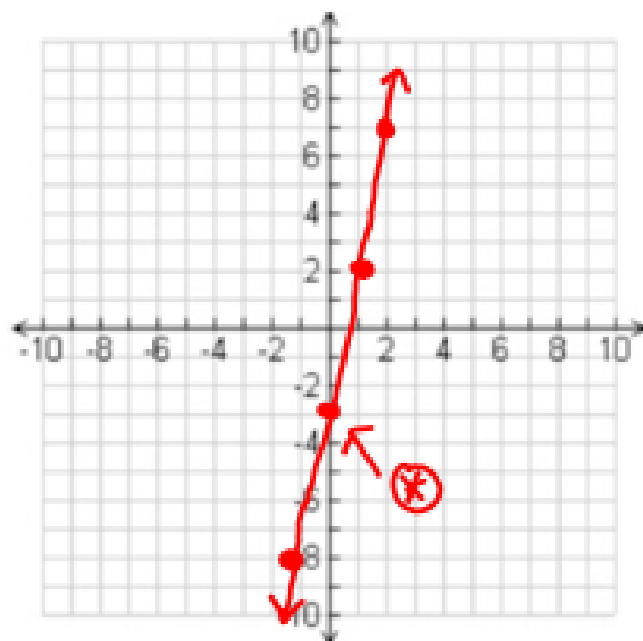
+up ; -down
right

Ex1) Graph: $y = 5x - 3$

STEP 1 Identify the slope and the y-intercept.

STEP 2 Plot the point that corresponds to the y-intercept, $(0, -3)$.

STEP 3 Use the slope to locate more points on the line from the y-intercept. Draw a line through the points.



$$\text{Slope} = \frac{5}{1} = \frac{\text{up } 5}{\text{Right } 1} \text{ or } \frac{\text{down } 5}{\text{left } 1}$$

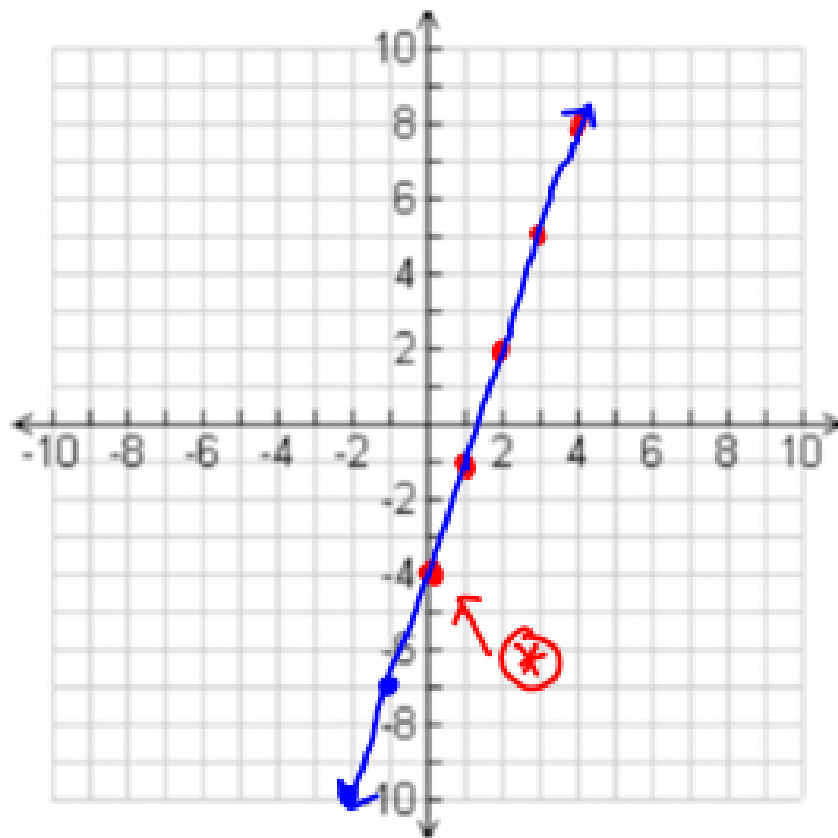
$$\text{y-int: } (0, -3)$$

Ex2) Graph the equation

a) $y = 3x - 4$.

y-int: $(0, -4)$

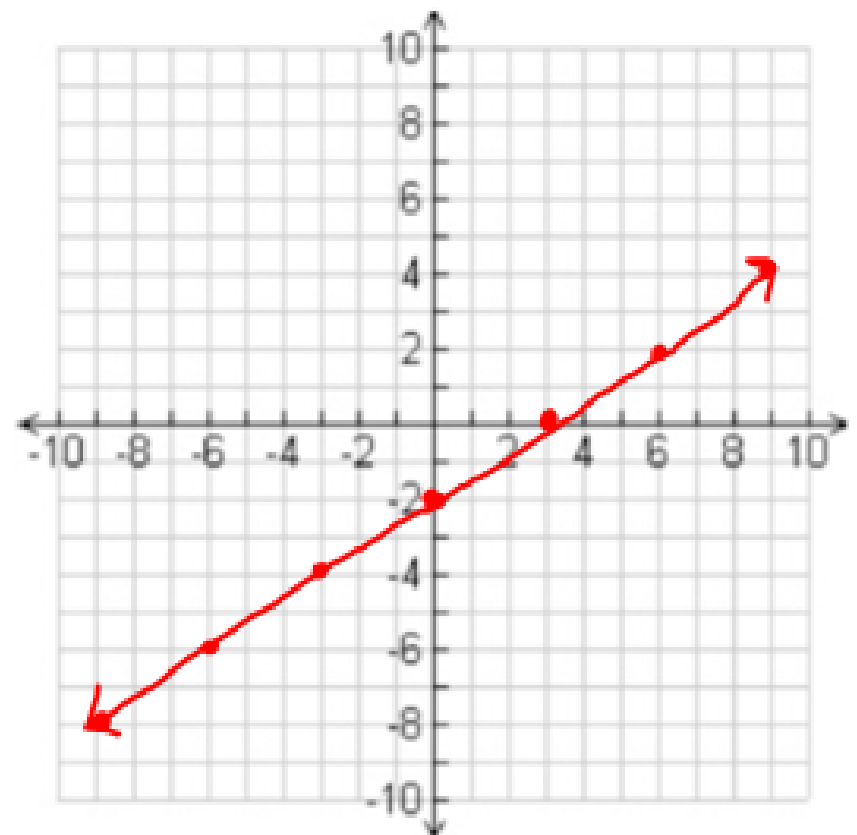
$m = \frac{3}{1} = \frac{\text{up } 3}{\text{right } 1}$ or $\frac{\text{down } 3}{\text{left } 1}$



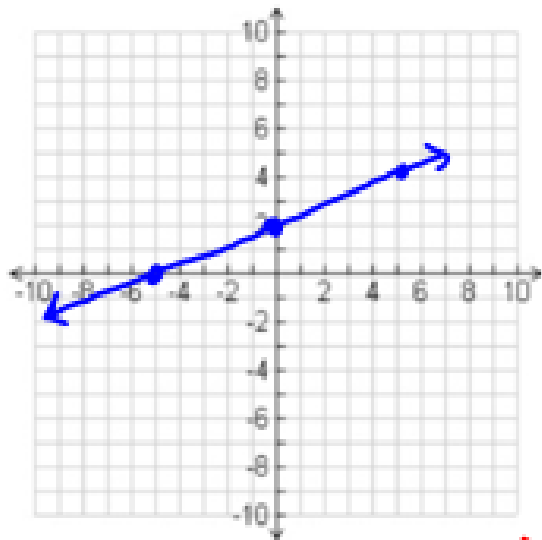
b) $y = \frac{2}{3}x - 2$

y-int: $(0, -2)$

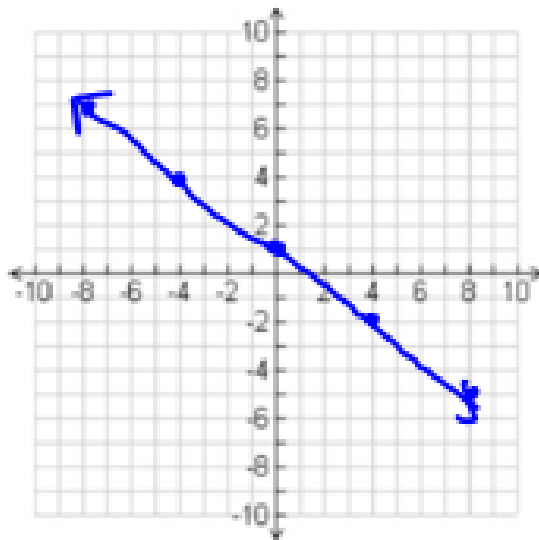
$m = \frac{2}{3} = \frac{\text{up } 2}{\text{right } 3}$



c) $y = \frac{2}{5}x + 2$ y-int: (0, 2)
 $m = \frac{2}{5} = \frac{\text{up } 2}{\text{right } 5}$

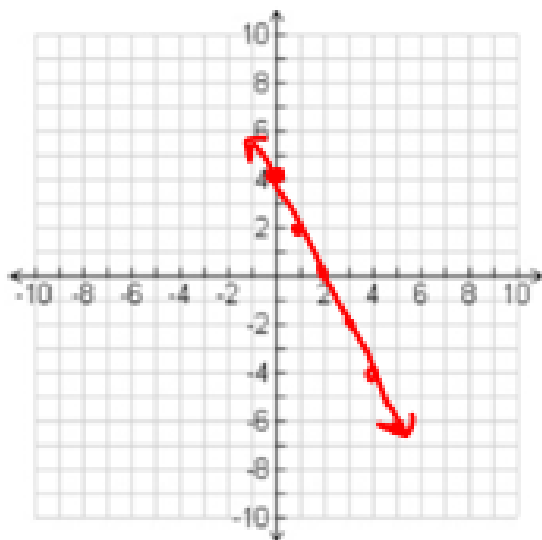


d) $y = -\frac{3}{4}x + 1$ y-int: (0, 1)
 $m = -\frac{3}{4} = \frac{\text{down } 3}{\text{right } 4}$

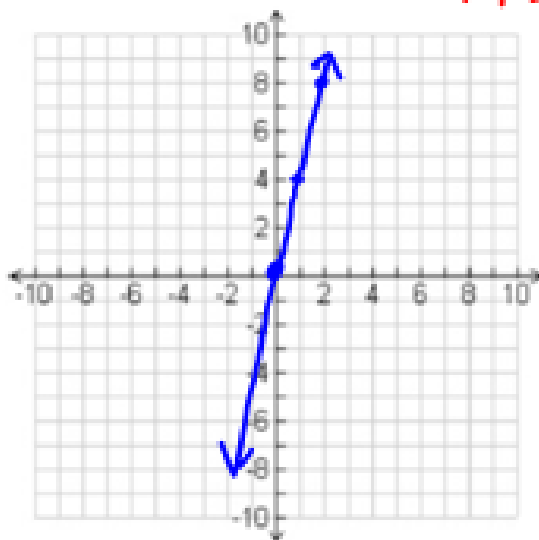


or up 3
left 4

e) $y = -2x + 4$ y-int: (0, 4)
 $m = \frac{-2}{1} = \frac{\text{down } 2}{\text{right } 1}$



f) $y = 4x + 0$ y-int: (0, 0)
 $m = \frac{4}{1} = \frac{\text{up } 4}{\text{right } 1}$



Ex3) Graph the equation $2x - 3y = 3$. Solve for y

Rewrite the equation in slope-intercept form. $y = mx + b$

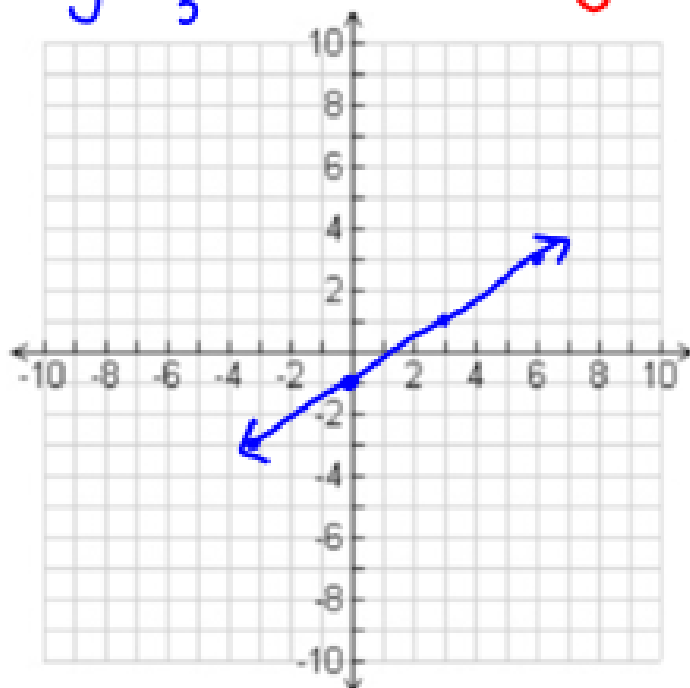
$$\begin{array}{r} 2x - 3y = 3 \\ -2x \quad -2x \\ \hline \end{array}$$

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

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

y-int: $(0, -1)$

$m = \frac{2}{3} = \frac{\text{up } 2}{\text{right } 3}$

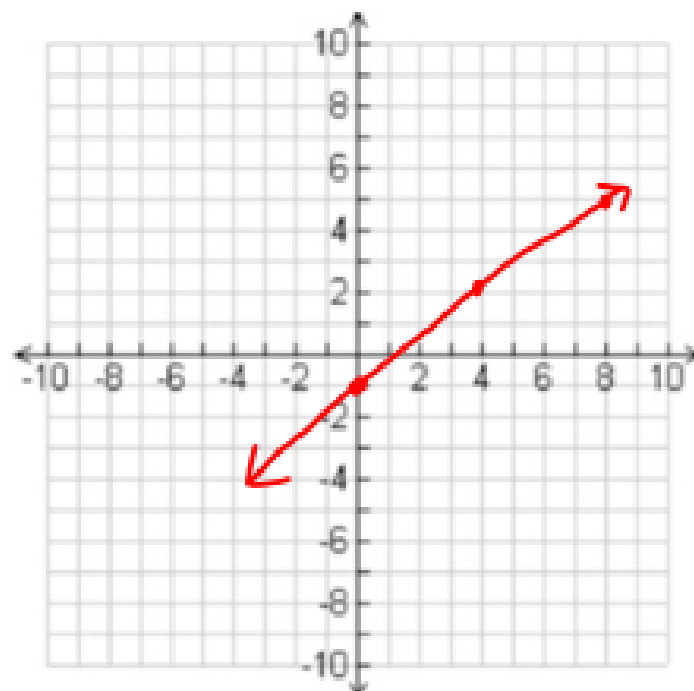


Try) $3x - 4y = 4$.

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

$$y = \frac{3}{4}x - 1$$

y-int: $(0, -1)$; $m = \frac{3}{4}$

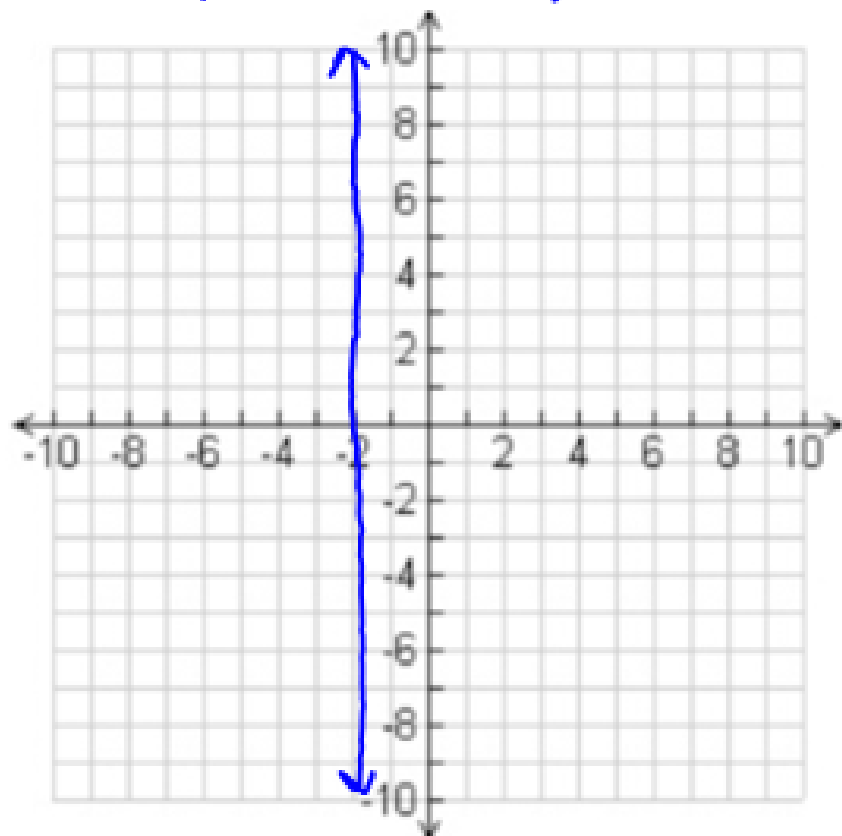


Graphs of Horizontal and Vertical Lines.

Ex4) Graph the equation

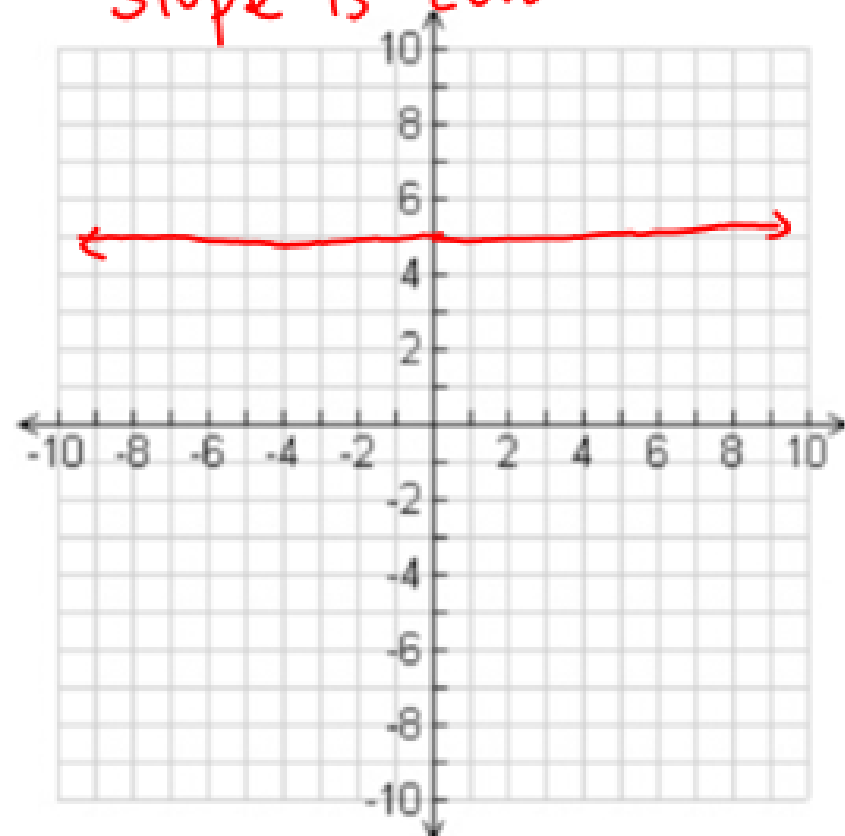
a) $x = -2$ Vertical Line

slope is undefined



b) $y = 5$ Horizontal Line

slope is zero.



Ex6) Write the equation in slope-intercept form.

a) $m = 3$; y-intercept: -2

$$y = 3x - 2$$

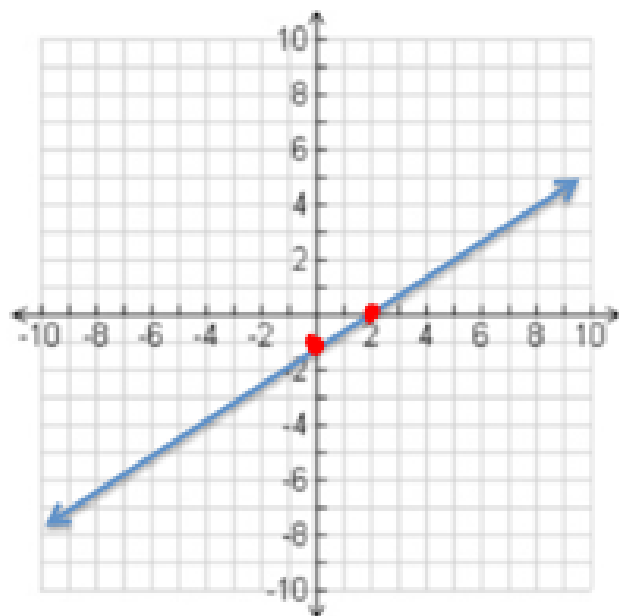
b) $m = 0.5$; $b = 1.5$

$$y = 0.5x + 1.5$$

or

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

c)



$$y\text{-int} : -1$$

$$m = \frac{1}{2}$$

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

Point-Slope Form: $y - \underline{y_1} = m(x - \underline{x_1})$ point: (x_1, y_1)

ex) $y - 2 = 5(x - 3)$

$m = 5$; point: $(3, 2)$

\uparrow
y-coord. slope \uparrow
x-coord.

⊗ Think opposite to identify the point

Ex7) Write the equation in point-slope form.

from pt-slope form.

ex) $y + 2 = 5(x + 3)$ $m = 5$; point $(-3, -2)$

a) $(-3, -11)$; $m = \frac{1}{2}$

x_1 y_1

$$y + 11 = \frac{1}{2}(x + 3)$$

b) passes through the point $(1, 3)$
& has a slope of -4 .

x_1 y_1

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

c) $(-2, 8), (-6, 0)$

Step 1: Calculate the slope. $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 8}{-6 - (-2)} = \frac{-8}{-4} = 2$

Step 2: Plug slope and one of the points into point-slope formula.

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

Ex8) Write the equation in slope-intercept form. $y = mx + b$

a) $(-2, 5)$ and $(2, -3)$

x_1 y_1

Step 1: Calculate the slope.

$$m = \frac{-3 - 5}{2 - (-2)} = \frac{-8}{4} = -2$$

Step 2: Plug slope and one of the points into point-slope formula.

$$y - 5 = -2(x + 2)$$

Step 3: Distribute & get y alone.

$$\begin{array}{r} y - 5 = -2x - 4 \\ + 5 \qquad \qquad + 5 \end{array}$$

$$y = -2x + 1$$

b) $(-1, -7)$ and $(2, 2)$

$$m = \frac{2 - (-7)}{2 - (-1)} = \frac{9}{3} = 3$$

$$y + 7 = 3(x + 1)$$

$$\begin{array}{r} y + 7 = 3x + 3 \\ - 7 \qquad \qquad - 7 \end{array}$$

$$y = 3x - 4$$

4.1-4.4 Review: Quiz on Friday

- 1) Identify whether $\{(1, 3), (2, 5), (3, 7), (4, 9)\}$ satisfy a linear function. Explain.

Yes, because x & y have the same changes.

- 2) Identify whether $x^2 - y^2 = 4$ satisfy a linear equation.

No

- 3) Find the x- and y- intercepts of $4x - 2y = 8$.

$$\text{x-int: } 4x - 2(0) = 8 \qquad \text{y-int: } 4(0) - 2y = 8$$

$$4x = 8$$

$$x = 2$$

$$(2, 0)$$

$$-2y = 8$$

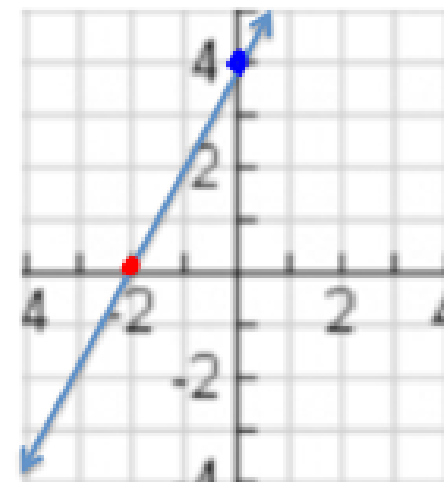
$$y = -4$$

$$(0, -4)$$

- 4) Find the x- and y-intercepts from a graph.

$$\text{x-int: } (-2, 0)$$

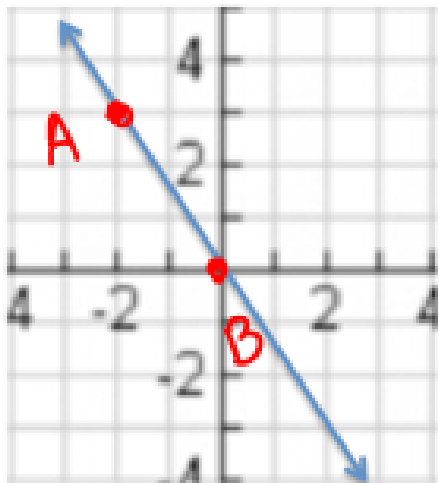
$$\text{y-int: } (0, 4)$$



5) Find the slope of $(-3, 4)$ and $(-2, -6)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-6 - 4}{-2 - (-3)} = \frac{-10}{1} = -10$$

6) Find the slope from a graph.



$$m = \frac{-3}{2}$$

down 3
right 2

7) Write $y = 3x + 4$ in **standard form**.

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

$$3x - y = -4$$

$$A = 3, B = -1, C = -4$$

$Ax + By = C$
↑
A must be '+'

8) Write the equation in **slope-intercept form**: $m = -\frac{1}{2}, b = 3$

$$y = mx + b \rightarrow y = -\frac{1}{2}x + 3$$

9) Find the slope and y-intercept of $2x - 3y = 6$

Solve for y

$$\frac{-3y}{-3} = \frac{-2x + 6}{-3}$$

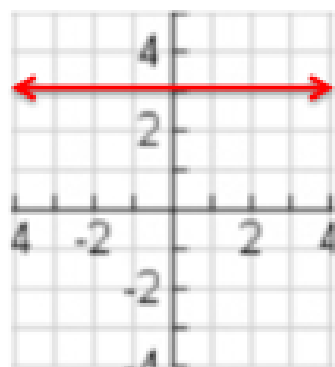
$$y = \frac{2}{3}x - 2$$

$$m = \frac{2}{3}$$

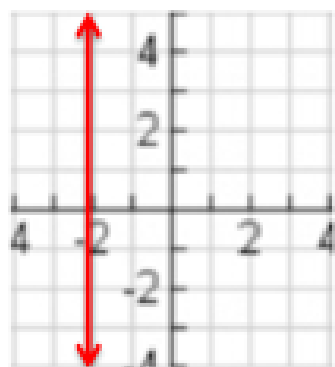
$$y\text{-int} : (0, -2)$$

$$y = mx + b$$

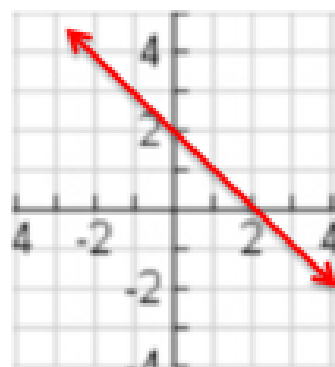
10) State the positive, negative, zero, and undefined slope.



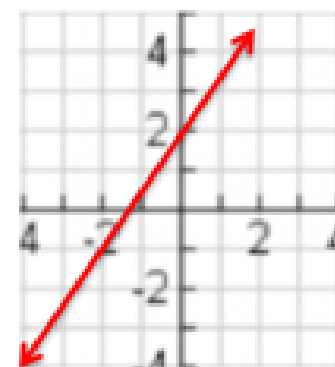
Zero



Undefined

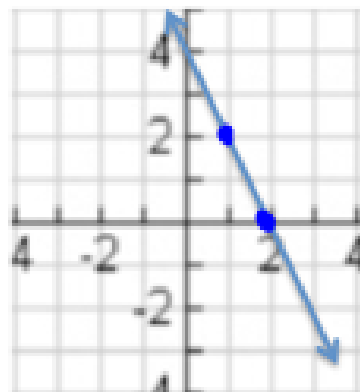


Negative



Positive

11) Write the equation in slope-intercept form from a graph.



$$y = mx + b$$

$$y = -2x + 4$$

$$b = 4$$

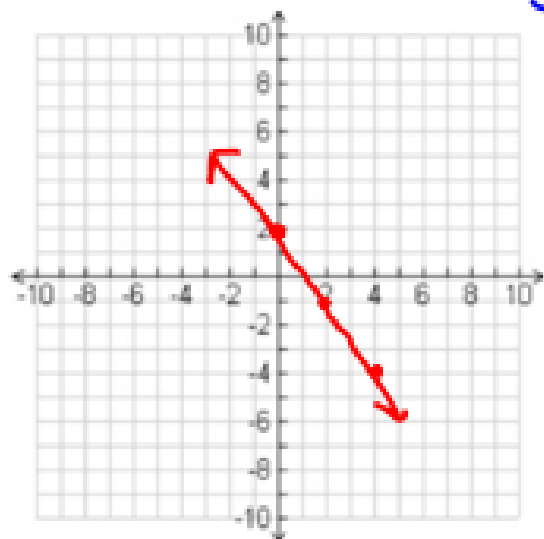
$$m = -2$$

12) Graph each equation.

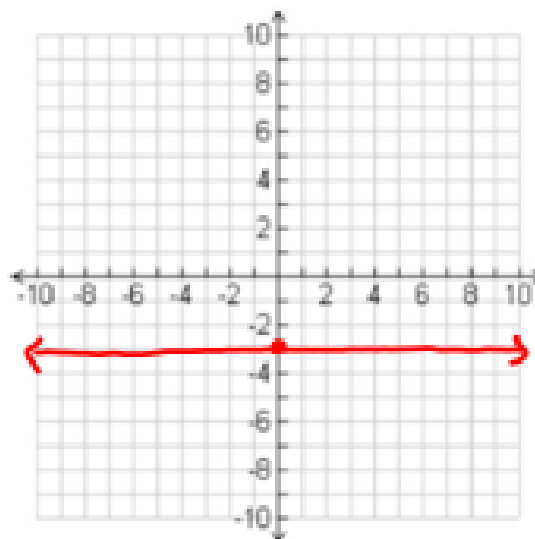
a) $y = -\frac{3}{2}x + 2$

y-int:
 $(0, 2)$

$$m = -\frac{3}{2}$$



b) $y = -3$

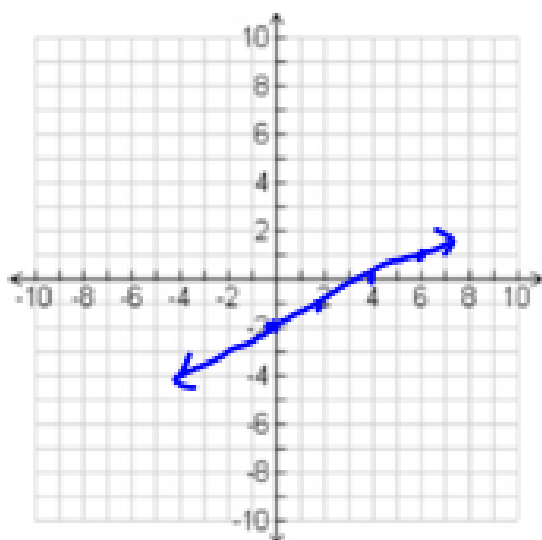


c) $x - 2y = 4$ $-2y = -x + 4$

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

y-int: $(0, -2)$

$$m = \frac{1}{2}$$



d) $y = \frac{4}{3}x + 0$

