

Name: _____

Lesson 6.1 – Linear Equation Review

Vocabulary

Equation: a math sentence that contains an equals sign

Linear: makes a straight line (no exponents on variables)

Variables: unknown quantities represented by letters (often x and y)

Function: equations can sometimes be written as functions as well (using f(x) instead of "y").

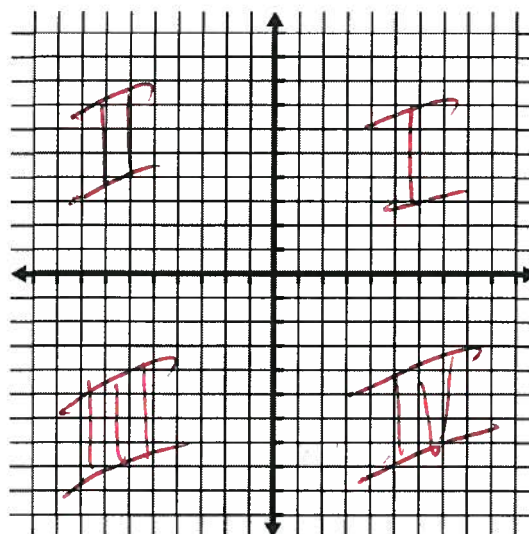
Cartesian Coordinates: to represent an equation with two variables with points (x,y) on a graph.

x-axis: is a horizontal number line, with positive values to the right and negative to the left

y-axis: is a vertical number line, with positive values going up and negative going down

Origin: the centre of the graph is called "the origin"

Quadrants: A graph has four quadrants, usually labeled with Roman numerals, as follows



Assignment:

A. Matching

Equation $\rightarrow 2x + 3$
 Expression $\rightarrow f(x) = 2x + 3$
 Function $\rightarrow y = 2x + 3$

Equation $\rightarrow 4x - 2y = 0$
 Expression $\rightarrow f(x) = 2x$
 Function $\rightarrow 4x - 2y$

B. Is it linear? Yes or No

$y = 2x + 3$ Yes

$y = 2x^2 + 3$ No

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

$y = 2x^{\frac{1}{2}} + 3$ No

$y = 0.5x + 0.3$ Yes

$y = x^{0.5} + 3$ No

$a = 2b + 3$ Yes

$y = 2x + \sqrt{3}$ Yes

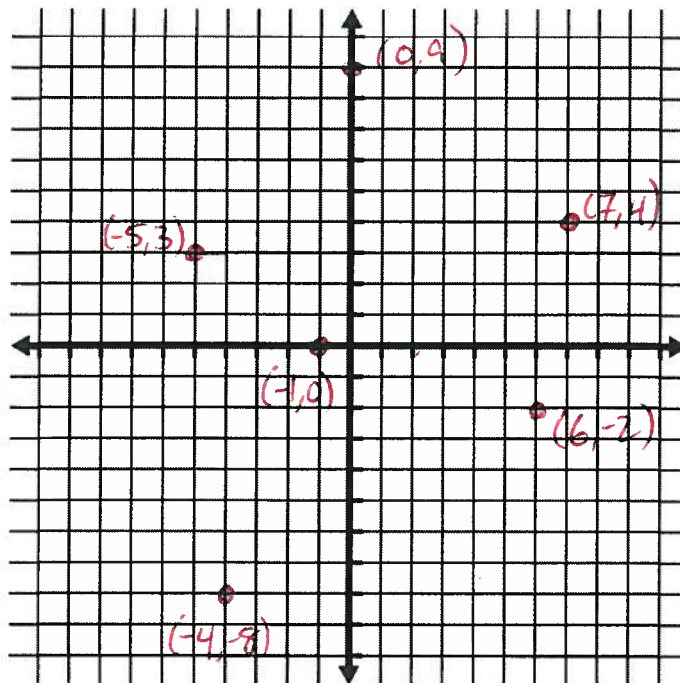
$y = \sqrt{2x} + 3$ No

$y = 2^x + 3$ No

$y = x^0 + 3$ Yes

C. Cartesian Coordinates - Label each coordinate on the graph:

(7,4), (-5,3), (-4,-8), (6,-2), (0,9), (-1,0)

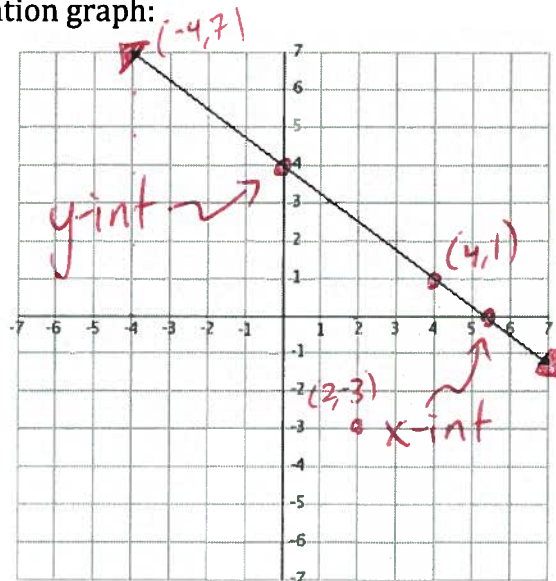


Vocabulary

x-intercept: where the line crosses the *x-axis (where $y=0$)*

y-intercept: where the line crosses the *y-axis (where $x=0$)*

Example of a linear equation graph:



Notice the arrows indicate that the lines continue forever (to infinity?)

y-intercept = 4

x-intercept = 5.5

The graph goes through quadrants ~~II~~ ~~I~~ ~~IV~~ but not quadrant ~~III~~

Does the graph go through the point (4,1)? *Yes*

Does the graph go through the point (2,-3)? *No*

Does the point (-4,7) satisfy the linear equation? *Yes*

Assignment:

	<p>y-intercept = <u>-3</u></p> <p>x-intercept = <u>1</u></p> <p>Quadrants: <u>I, III, IV</u></p> <p>Do the points satisfy equation?</p> <p>(-3,0)? <u>No</u></p> <p>(2,2)? <u>Yes</u></p> <p>(-1,-4)? <u>No</u></p>
	<p>y-intercept = <u>2</u></p> <p>x-intercept = <u>-4</u></p> <p>Quadrants: <u>I, II, III</u></p> <p>Do the points satisfy equation?</p> <p>(-1,1)? <u>No</u></p> <p>(2,3)? <u>Yes</u></p> <p>(-4,0)? <u>Yes</u></p>
	<p>y-intercept = <u>3</u></p> <p>x-intercept = <u>-1.5</u></p> <p>Quadrants: <u>I, II, III</u></p> <p>Do the points satisfy equation?</p> <p>(5,1)? <u>No</u></p> <p>(-2,-1)? <u>Yes</u></p> <p>(2,7)? <u>Yes</u></p>

Substitution:

An algebra technique

Example:Equation: $y + 2x = 3$ If $x=1$, then what is y ?

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

$$y + 2 = 3$$

$$y = 1$$

Equation: $y + 2x = 3$ If $y=0$, then what is x ?

$$(0) + 2x = 3$$

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

$$x = 3/2 \text{ or } 1.5$$

Assignment:1) Equation: $2x + y = -4$ If $y=0$, then what is x ?

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

$$\frac{2x}{2} = \frac{-4}{2}$$

$$x = -2$$

2) Equation: $3x - \frac{1}{2}y = 9$ If $y=0$, then what is x ?

$$3x - \frac{1}{2}(0) = 9$$

$$\frac{3x}{3} = \frac{9}{3}$$

$$x = 3$$

3) Equation: $3x + 2y = 6$ If $x=0$, then what is y ?

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

$$y = 3$$

4) Equation: $3x + 2y = 5$ If $x=0$, then what is y ?

$$\frac{2y}{2} = \frac{5}{2}$$

$$y = 5/2 \text{ or } 2.5$$

5) Equation: $y = 2x + 3$ If $y=0$, then what is x ?

$$(0) = 2x + 3$$

$$-3 = 2x$$

$$\frac{-3}{2} = x \rightarrow x = -3/2 \text{ or } -1.5$$

Graphing Method #1 – Using intercepts

STEP #1: Find the x and y intercepts and plot these points.

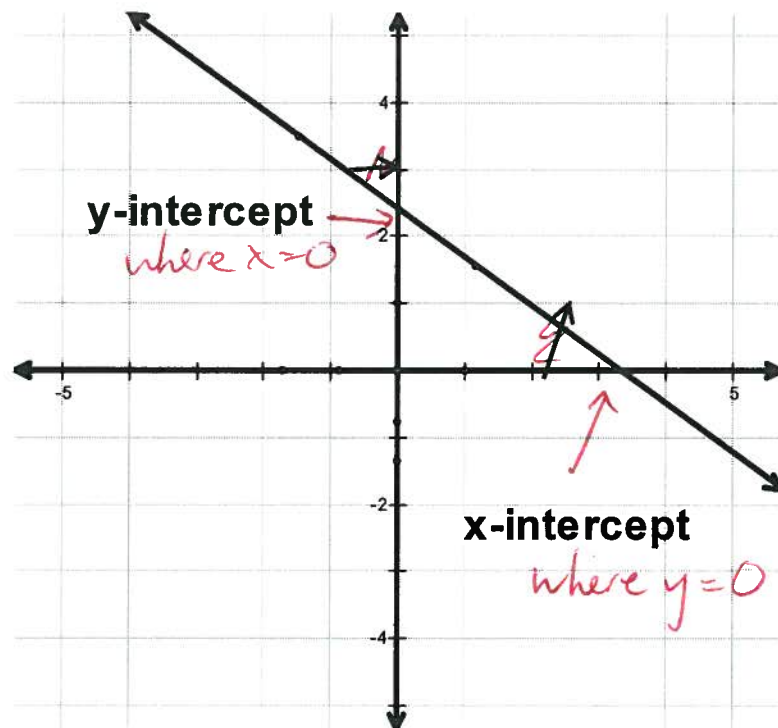
To find the **y-intercept**, set $x=0$ then solve for y

To find the **x-intercept**, set $y=0$ then solve for x

STEP #2: Find a third point by picking a random x-value and find the corresponding y-value by substitution

STEP #3: Plot these three points and sketch the straight line through these points.

Note: If the three points do not make a straight line then a mistake was made.



Example

a) $3x + 2y = 6$

Y-intercept ($x=0$)

$$3x + 2y = 6$$

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

$$2y = 6$$

$$y = 3$$

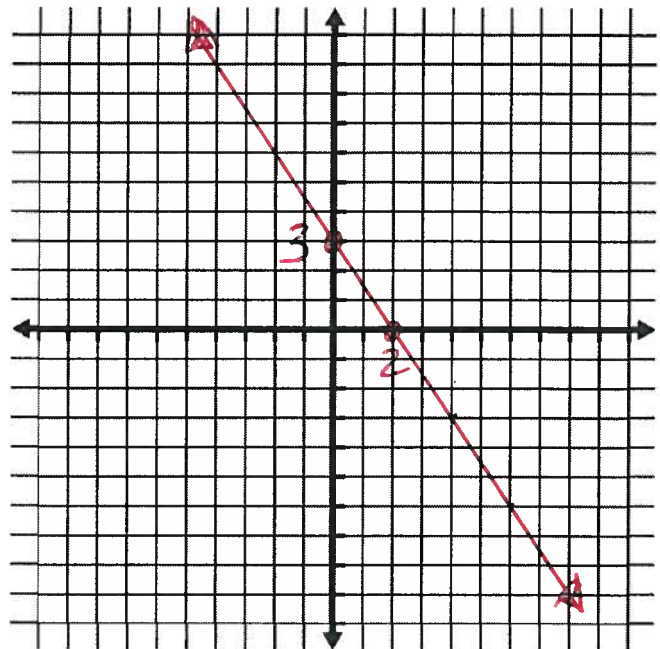
X-intercept ($y=0$)

$$3x + 2y = 6$$

$$3x + 2(0) = 6$$

$$3x = 6$$

$$x = 2$$



b) $5x + 2y - 15 = 0$

Y-intercept ($x=0$)

$$5(0) + 2y - 15 = 0$$

$$2y - 15 = 0$$

$$2y = 15$$

$$y = 7.5$$

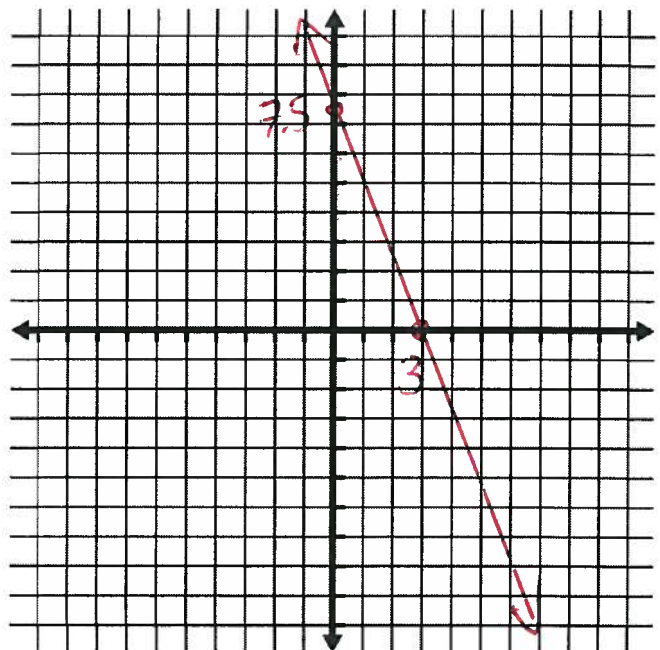
X-intercept

$$5x + 2(0) - 15 = 0$$

$$5x - 15 = 0$$

$$5x = 15$$

$$x = 3$$



Assignment:**Graph each equation using the intercept method. Show your work.**

1) $2x - y = 6$

Y-intercept ($x=0$)

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

$$-y = 6$$

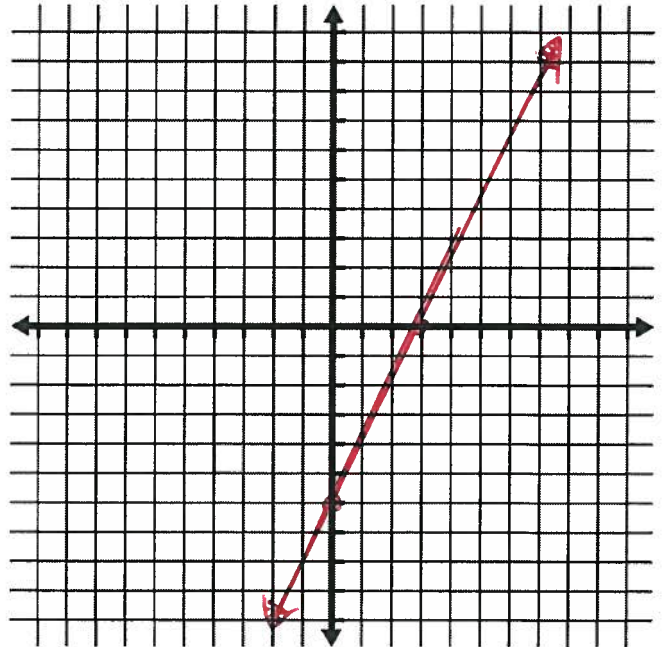
$$y = -6$$

X-intercept ($y=0$)

$$2x - (0) = 6$$

$$\frac{2x}{2} = \frac{6}{2}$$

$$x = 3$$



2) $2x + 3y = 6$

Y-intercept ($x=0$)

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

$$\frac{3y}{3} = \frac{6}{3}$$

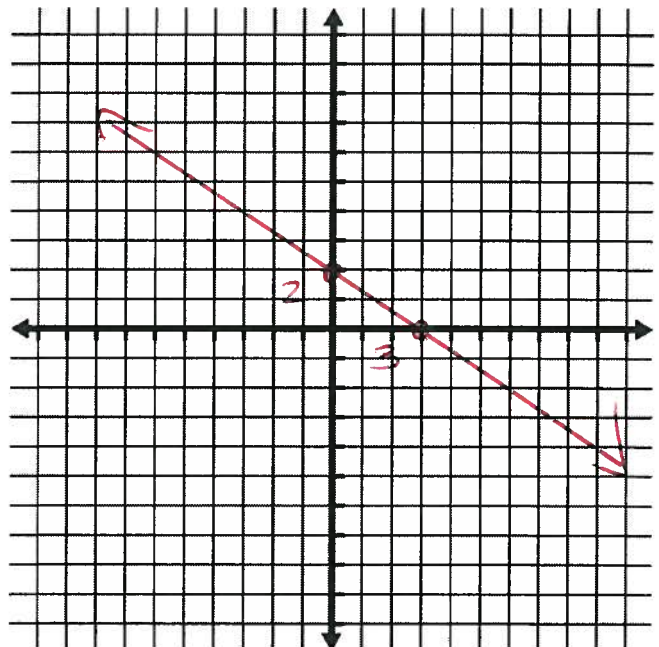
$$y = 2$$

X-intercept ($y=0$)

$$2x + 3(0) = 6$$

$$\frac{2x}{2} = \frac{6}{2}$$

$$x = 3$$



3) $2x + y = -4$

Y-intercept ($x=0$)

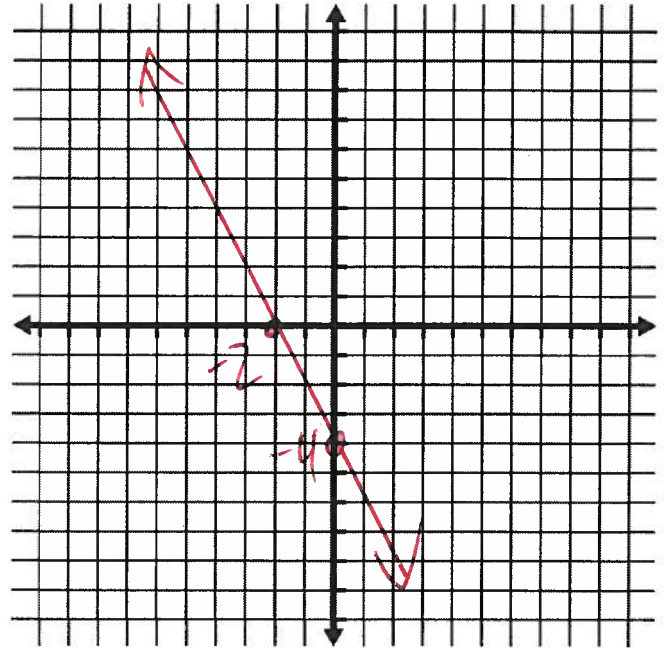
$$2(0) + y = -4$$

$$y = -4$$

X-intercept ($y=0$)

$$2x = -4$$

$$x = -2$$



4) $y = -2x - 1$

Y-intercept ($x=0$)

$$y = -2(0) - 1$$

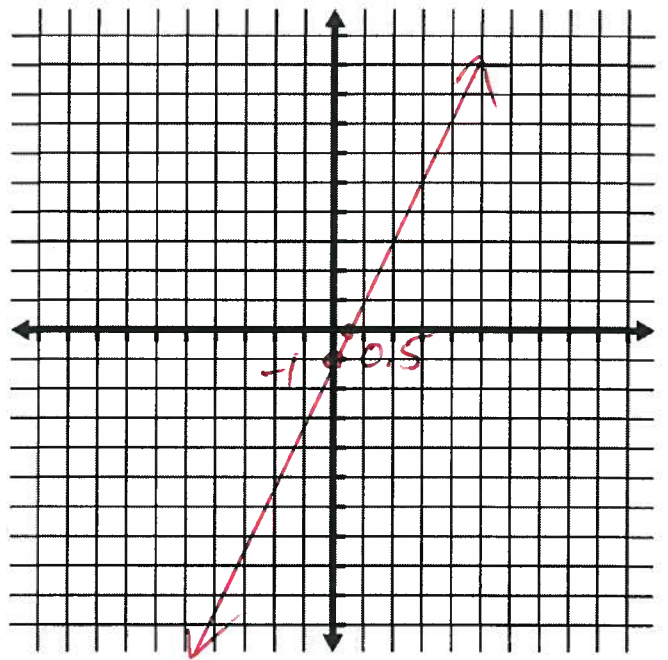
$$y = -1$$

X-intercept ($y=0$)

$$0 = -2x - 1$$

$$-1 = -2x$$

$$\frac{1}{2} = x \text{ OR } 0.5$$



Practice Quiz:

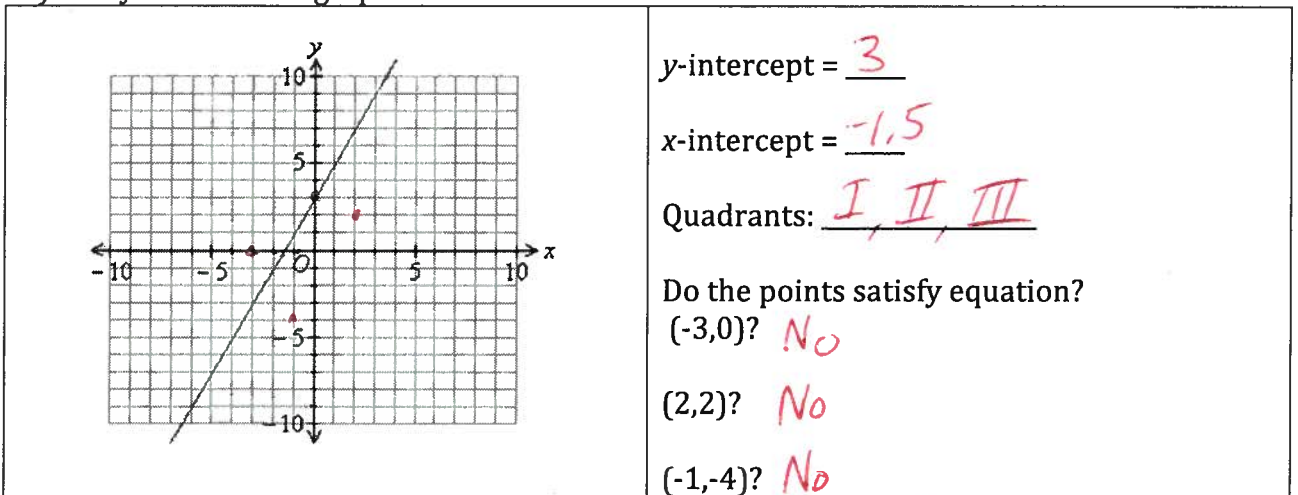
1) Is it a linear equation?

a) $x + 2y = 2$ *Yes*

b) $0.5x + 2.1y = (\sqrt{3})^2$ *Yes (exponent not on variable)*

c) $y = 2x^2 + 1$ *No (exponent on variable)*

2) Analyze the linear graph



3) Equation: $\frac{1}{2}x + y = -4$ If $y=0$, then what is x ?

*$\frac{1}{2}x + (0) = -4$
 $\frac{1}{2}x = -4$
 $x = -8$*

4) Graph the following equation using the intercept method. Show your work.

$x + 2y = 2$

y-intercept (x=0)

$(0) + 2y = 2$

$2y = 2$

$y = 1$

x-intercept (y=0)

$x + 2(0) = 2$

$x = 2$

