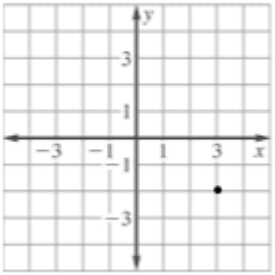
Chapter 4: Solving Linear Equations
Study Guide

4.1: Plot Points in the Coordinate Plane

- Identify/graph ordered pairs
- Identify the 4 quadrants

Ex: Write the coordinates of point graphed and identify the quadrant it lies in.



The ordered pair is (3, –2) and it is in quadrant IV.

4.2: Graph Linear Equations

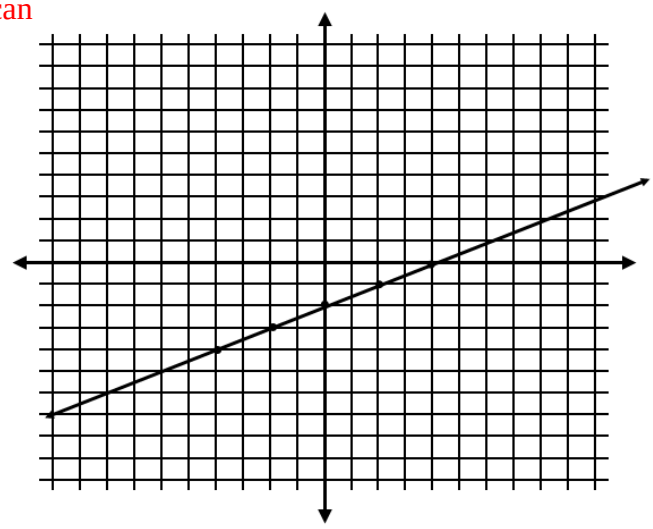
- Be able to graph an equation using a table (choose appropriate values for x)
- Be able to identify domain and range of a function

Ex: Graph $2x - 4y = 8$

First, rewrite the equation in function form so you can determine the best values to choose for x.

$$2x - 4y = 8$$
$$-2x \quad\quad -2x$$
$$\frac{-4y}{-4} = \frac{8 - 2x}{-4}$$
$$y = -2 + \frac{1}{2}x$$

x	y
−4	−4
−2	−3
0	−2
2	−1
4	0



4.3: Graph Linear Functions Using *x* and *y* intercepts

- Find *x* and *y* intercepts from an equation
- Identify *x* and *y* intercepts from a graph
- Interpret the meaning of *x* and *y* intercepts as they apply to real-world problems

Ex: Find the *x* and *y* intercepts of the equation $2y - 3x = 6$

Ex: Graph $4x - 2y = -16$ using intercepts.

*Remember that to find the *x* intercept, the *x* happens when *y* is 0 (because the line is touching the *x* – axis) so you would replace *y* with 0 and then find *x*. To find the *y* intercept, remember that it happens when *x* is 0, so to find it you replace *x* with 0 and solve for *y*.

x – int:

$2(0) - 3x = 6$ (replaced *y* with 0)

$\frac{-3x}{-3} = \frac{6}{-3}$ (simplify) (divide by −3)

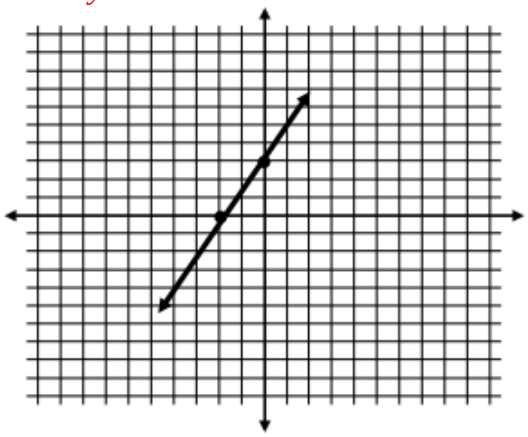
$x = -2$

y – int:

$2y - 3(0) = 6$ (replace *x* with 0)

$\frac{2y}{2} = \frac{6}{2}$ (simplify) (divide by 2)

$y = 3$



x – int:

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

$\frac{4x}{4} = \frac{-16}{4}$ (divide by 4)

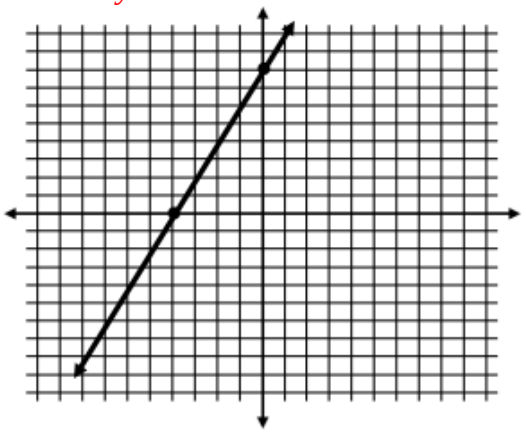
$x = -4$

y – int:

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

$\frac{-2y}{-2} = \frac{-16}{-2}$ (divide by –2)

$y = 8$



Ex: Your earn $16 an hour mowing lawns and $10 an hour washing windows. You want to make $500 in one week.

a) Write an equation to represent the situation $20x + 10y = 500$

b) Graph the equation using *x* and *y* intercepts. $x = 25$ $y = 50$

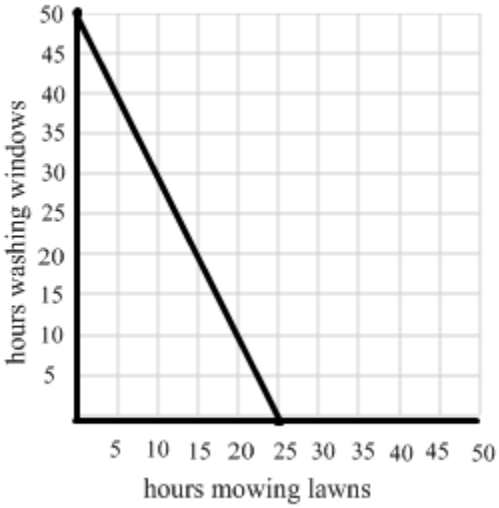
c) What do the intercepts mean in this situation? The *x* intercept means that you would have to work 25 hours if you ONLY mowed lawns. The *y* intercept means that you would have to work 50 hours if you ONLY wash windows.

d) What are three possible numbers of hours you can work at each job? Create a graph and scale each axis by five. Be sure to use a ruler and graph paper . Look for points on the line that cross a corner of the graph and then check if the numbers that go with that ordered pair work in the original equation (see part a)

e) If you work 30 hours washing windows, how many hours do you have to work mowing lawns?

Replace y with 30.

$$20x + 10(30) = 500$$
$$20x + 300 = 500$$
$$-300 \quad -300$$
$$\frac{20x}{20} = \frac{200}{20}$$
$$x = 10$$



4.4: Slope and Rate of Change

- Find slope of a line that passes through two points
- Find slope of a line that is graphed
- Identify zero slope and undefined slope

Ex: Find the slope of the line that passes through the points (6, –4), (–5 , –8)

Ex: Find the slope of the line that passes through the points (–5, 5) (2, 5)

*remember the formula for slope given two points is:

$$\frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{-8 - (-4)}{-5 - 6}$$

$$= \frac{-4}{-11}$$

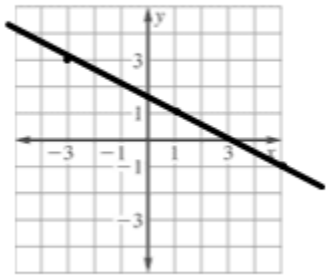
$$= \frac{4}{11}$$

$$\frac{5 - 5}{2 - (-5)}$$

$$= \frac{0}{7}$$

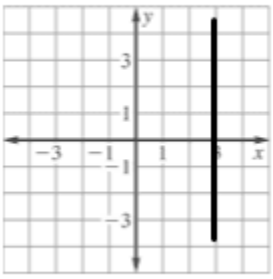
$$= 0$$

Ex: Find the slope of the line



*Remember that the slope formula for a graphed line is $\frac{\text{rise}}{\text{run}}$

Ex: Find the slope of the line



*remember vertical lines have an undefined slope

Count the boxes up and down and left to right. Rise = 2, run = 4, so slope = $-\frac{1}{2}$

4.5: Graphing Lines Using Slope-Intercept Form

- Identify slope and y-intercept of a line by looking at the equation
- Write equations in slope intercept form
- Use equations in slope-intercept form to graph a line

Ex: Identify the slope and y-intercept

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

Slope = $-\frac{3}{4}$

y – intercept: –1

Ex: Write the following equation in slope-intercept form then identify slope and y intercept

$4x - 9y = 18$

*remember that slope – intercept form occurs when y is isolated. So you need to isolate y.

$4x - 9y = 18$

$-4x \quad -4x$

$\frac{-9y}{-9} = \frac{18 - 4x}{-9}$

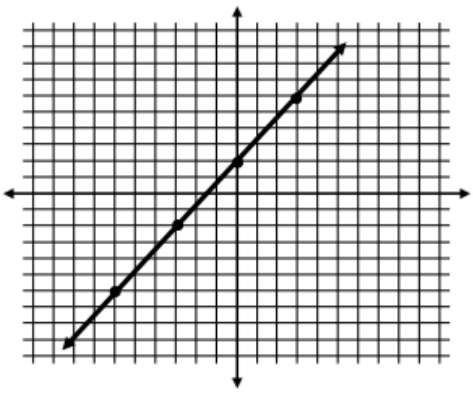
$y = -2 + \frac{4}{9}x$

slope = $\frac{4}{9}$ y – int: –2

Ex: Graph the following equation using slope-intercept form:

$4x - 3y = -6$ *put in slope – intercept form first.

$y = \frac{4}{3}x + 2$ Graph the y – intercept first by going up 2 on the graph . Then move where the slope tells you to, which is up 4 and to the right 3 spaces.



4.6: Direct Variation

- Decide if a function represents direct variation from an equation

- Decide if a function represents direct variation from a graph

Ex: Does the following represent direct variation? Yes or no? If no, explain why not, if yes, identify *a*.

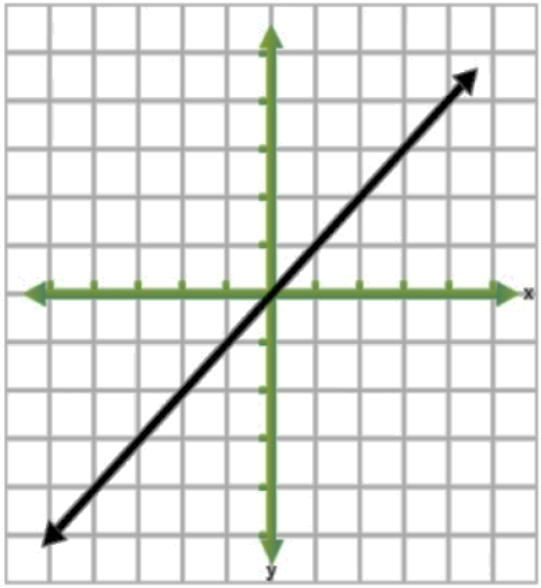
$2x + 4y = 8$

$\frac{4y}{4} = \frac{8 - 2x}{4}$ *Isolate *y*

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

No, *b* isn't 0

Ex: Does the following graph represent direct variation? Why or why not?



Yes, it passes through the origin.