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.
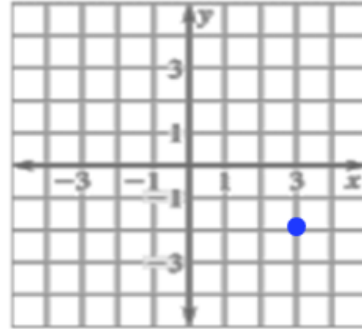
4.2: Graph Linear Equations

- Graph an equation using a table (choose appropriate values for x)
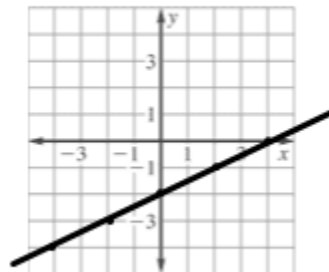
Ex: Graph $2x - 4y = 8$

First rewrite the equation so it is in function form (isolate y)
$$y = -2 + \frac{1}{2}x$$

Then choose five appropriate values for x. Since x is being divided by 2 when you isolate y, you should choose values that will get rid of the fraction (in this case, multiples of 2). Plug in the five values for x to see what comes out for y.

x	–4	–2	0	2	4
y	–4	–3	–2	–1	0

Graph the five ordered pairs.

- Identify domain and range of a function

Ex: You are transferring photos from your digital camera to a CD. Each photo on the camera takes up 2 megabytes of space. The number p photos that will fit onto a CD is given by the function $s = 2p$ where s is the amount of space on the CD. One CD can store up to 700 megabytes of data. Identify the domain and range of the function.

First decide input and output, based on what is dependent and what is independent. Since space, *s*, **depends** on how many photos, *p*, you put on the CD, photos is independent and space is dependent. This makes photos input and space output. Input = domain. Output = range.

The problem tells you that you can only fit 700 MB of data (space) which was already decided is the range, so the range can be:

DOMAIN: $0 \leq s \leq 700$
You can then use this information to figure out what the domain (number of photos can be)…

If you use 0 MB of space, that is 0 photos, if you use all 700 MB of space, and you know that each photo uses 2 MB, then divide 700 by 2 to get 350 photos. This is the maximum number of photos that you can put on a CD. So your domain would look like:

RANGE: $0 \leq p \leq 350$

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 $0.2y - 0.3x = 0.6$

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:
$0.2(0) - 0.3x = 0.6$ (replaced *y* with 0)
$\dfrac{-0.3x}{-0.3} = \dfrac{0.6}{-0.3}$ (simplify)   (divide by - 0.3)

$x = -2$

x – int:
$4x - 2(0) = -16$
$\dfrac{4x}{4} = \dfrac{-16}{4}$ (divide by 4)

$x = -4$

y – int:
$0.2y - 0.3(0) = 0.6$ (replace *x* with 0)
$\dfrac{0.2y}{0.2} = \dfrac{0.6}{0.2}$ (simplify)   (divide by 0.2)

$y = 3$

y – int:
$4(0) - 2y = -16$
$\dfrac{-2y}{-2} = \dfrac{-16}{-2}$ (divide by –2)

$y = 8$

Ex: Your earn $20 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
      Let *x* = # hours mowing lawns and *y* = # hours washing windows.
$$20x + 10y = 500$$
   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? 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). Any of the ordered pairs graphed are examples that would work.

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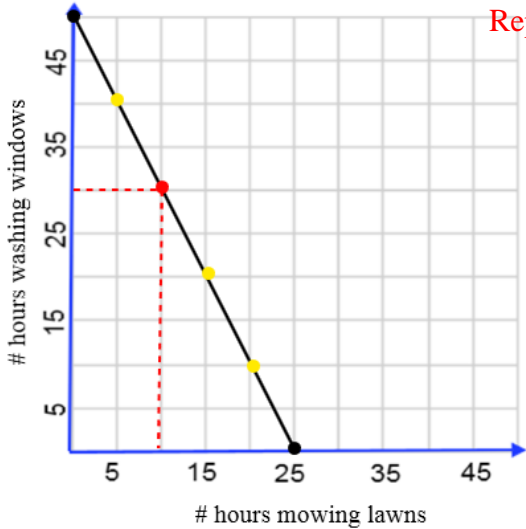
Replace y with 30.

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

You can also look at the graph and go up 10 on the y-axis. Then see that this goes with when $x = 10$

f) Identify the domain and range
Domain: $0 \le x \le 25$
Range: $0 \le y \le 50$

1.6: Functions as Rules and Tables

- Be able to identify an input output relationship as a function or not and explain why.
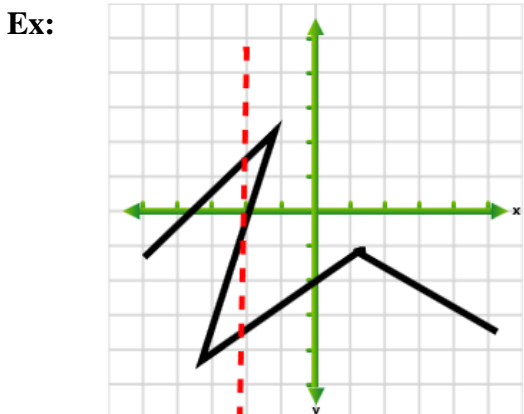
Ex:

x	y
3	1
2	1
1	1
0	1

Yes, each input has only one output.

Ex:

x	5	7	5	14
y	2	6	9	11

No, the input 5 has more than one output.

Ex:

No, it would not pass the vertical line test, meaning that the inputs here have more than one output.

- Be able to write a rule for a function given a table or graph.

Ex:

x	y
−10	7
−5	5
0	3
5	1
10	−1

$$y = -\frac{2}{5}x + 3$$

Find delta y and delta x, make into a fraction which becomes the coefficient of x. Then adjust by adding or subtracting.

Since Δy is −2 and Δx is +5, the fraction becomes −2/5. When you plug in −10 as your first x, it produces an output of 4, but you want the output to be 7, so you must add 3.