**Algebra Unit 5 Study Guide**

Graph. Solve. Describe.

These are the things that we can do in algebra.

**Describe**: describing an equation means using words (and some math symbols) to do things like:

Define variables. What are the three things we need to have a complete variable definition?

Describe the domain and range. This is related to our variable definition, but it can include ranges of values or tell us whether we are in integer land or in the real kingdom.

Characterize the answer. This is important especially when our variables use one unit but the answer expects a different one. This means we have to have a multiplication factor that gets us to the other unit.

When our problem starts in English, description is also the process of creating a function or a formula. We use the above to help us do so.

Describe doesn’t care if we have one equation or more. We go through each one individually, then work on the next. Don’t try to do it all at once.

When we have linear equations, what are the three main ways we write the equation? What do the parts tell us?

**Graph**:

When we have linear equations we need two points per equation. We have a number of ways to get those two points

Graphing inequalities:

This adds two steps: solid or dotted and shade.

Systems of inequalities:

Solving systems of inequalities is done graphically. We just go through each equation, graph it, and finally see where the overlap for all of the equations lies.

**Solve**:

If I have one equation, my solution is generally accomplished by graphing. The graph gives us the set of ordered pairs that make the equation true: it tells us the y that works for a given x.

What does it mean to “solve for x” when I have one equation?

Solve for x: $5x+4y=12$

Solve for y: $5x+4y=12$

With two equations, we have a number of ways to solve. We are looking for that one ordered pair that make both true. There are three ways below. Each way has a final step of using the first variable to find the other. DO NOT FORGET THIS STEP

*Set them equal*

This works if both equations look like functions, or if both are “solved” for the same variable. We set them equal to each other and solve for the variable.

For example:

$$y=3x-2$$

$$y=-5x+6$$

Set them equal: $3x-2=-5x+6$ now solve for x. then plug that x into the equation for y

*Substitution*

This works if only one equation is “solved”, or if they are “solved” for different variables. Pick the “solved” and substitute it in the other equation. Treat it like Star=Box where star is the variable. Wherever you see star in the other equation, replace it with the box.

 $$y=3x-2$$

$$x=5y-4$$

I make my top equation be star=box. Star is y and box is 3x-2. So in the bottom equation I replace y with (3x-2). Try it and solve (make sure you remember to go back after you find x and get y)

*Elimination*.

This always works. I want to make one of the variables in both equations have the same coefficient. I can then subtract the two equations to eliminate that variable. I am left with an equation with the other variable, which I can find.

This is easy if I already have matching coefficients. I just subtract the equations. Otherwise, I use the fact that x=2 and 5(x=2) are equivalent. Find the factors that give us common multiples of one variable. Try it:

$$2x-8y=12$$

$$3x+2y=32$$