KEY

AA Notes – Section 6.2 – Solving Systems by Substitution

Content Standard: A.REI.6

Objectives: To solve systems of equations using substitution.

Essential Understanding:

You can solve systems of equations more than one way. Previously, we learned to solve the system by graphing. We had three possible answers, please list and explain.

- Answer: 1 solution (x, y) Why? the lines intersect
- Answer: No Solution Why? the lines are parallel & do not intersect
- Answer: Infinitely Many Solutions Why? the lines are the exact same

Today we will learn a second method, the substitution method. All of the examples we do today, could be solved by graphing; just like all of the problems we did with graphing can be solved with substitution.

Definitions:

Two or more linear equations form a system of linear equations.

The substitution method is a method you can use to solve linear systems by solving one of the equations for one of the variables. Then substitute the expression for the variable into the other equation.

Steps:

1. Solve one of the equations for either *x* or *y*. Sometimes, one of the equations is already solved for one of the variables; when that happens, use that one...part of your work is done. When both equations need to be solved, pick the easiest way (coefficients of 1 or -1 when possible).
2. Using that value for *x* or *y* (depends on which one you solved for) - **substitute** (plug it in) into the 2nd equation for that variable.
3. Now, solve for the other variable. Use the methods for solving a one variable equation that we learned back in Chapter 3!
4. Once you know the value of one variable, take that value and plug it into the original equation that you solved initially; and solve for second variable.
5. Final step, write your answer as an ordered pair *(x, y)*.

Remember, this is the same answer that we would have got if we were graphing; this is just a new method for solving systems of equations!

6.2 Examples – Day 1 – Solve each system of equations using the substitution method

1. $y = 2x$
   $7x - y = 15$

$7x - (2x) = 15$

$5x = 15$

$x = 3$

$y = 2(3)$

$y = 6$

$(3, 6)$

2. $7x - 8y = 112$
   $y = -2x + 9$

$7x - 8(-2x + 9) = 112$

$7x + 16x - 72 = 112$

$23x - 72 = 112$

$+72 \quad +72$

$\frac{23x}{23} = \frac{184}{23}$

$x = 8$

$y = -2(8) + 9$

$y = -7$

$(8, -7)$

What does the x-value represent? The x part of the lines crossing. (x, y)

What does the y-value represent? The y part of the lines crossing. (x, y)

3. $4x + y = -2$
   $-2x - 3y = 1$

When you select a variable to solve for, what are your possible choices?

x or y

Which variable appears easier to solve for? Explain.

The 1st equation, the y appears to be the easiest to solve for because it has a coefficent of 1.