Name ____________________________ Date ________________

Reporting Category 4 Notes (A.8.B.)

Systems of equations are two linear equations on the same graph. The solution to any system of linear equation is where the lines cross. There are multiple ways to find the solution. The three main methods of solving systems are substitution, elimination, & graphing. Each method is shown below.

Solving Systems using Substitution

- One of the two equations must have x or y by itself. (If both equations are solved for y, set them equal to each other.)
- Plug the value into the appropriate variable.
- Solve for one variable, then the other.

Example: $y = 3x$
$2x + y = 10$

First, we must solve the second equation for y to get $y = -2x + 10$.
Now that both equations are solve for y, we need to set them equal to each other.

$3x = -2x + 10$ → Since $y = 3x$ and $y = -2x + 10$, then $3x$ and $-2x + 10$ must also be equal. We will use this equation to solve for the x-value.

$3x = -2x + 10$ → Since we have variables on both sides of the equal sing, we must move one variable to the other side by using opposite operations.
$+2x \quad +2x$

$5x = 10$

$$\frac{5x}{5} = \frac{10}{5}$$

$x = 2$ → Once we know our x- value, we substitute this number into one of the original equations, to find the value of y.

$y = 3x$
$y = 3(2)$
$y = 6$ → The solution is (2, 6)

Name ____________________________ Date ________________

Reporting Category 4 Notes (A.8.B.)

Solving Systems of Equations by the Simple Elimination Method

Elimination is the method of combining two equations in standard form in order to:

Step One: Choose two variables.
Step Two: Write a system of equations (two equations) that describe the problem.
Step Three: **ELIMINATE** one of the variables by combining the two equations.
Step Four: Solve for the second variable.
Step Five: Solve for the first variable using substitution.

When eliminating a variable, they must 1) have the same coefficient and 2) one must be negative while the other is positive.

Example:

$$\begin{array}{r} -10x + 5y = 25 \\ \underline{10x - 2y = -16} \\ 3y = 9 \end{array}$$

In this example, it is easiest to eliminate the x. $(-10x + 10x = 0)$

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

$$y = 3$$

Now plug it back in to one of the equations to find the x.

$$-10x + 5(3) = 25$$

$$-10x + 15 = 25$$

$$\underline{\quad - 15 \quad - 15}$$

$$\frac{-10x}{-10} = \frac{10}{-10}$$

$$x = -1$$

The solution to the system is (-1, 3)

Name ______________________________ Date _________________

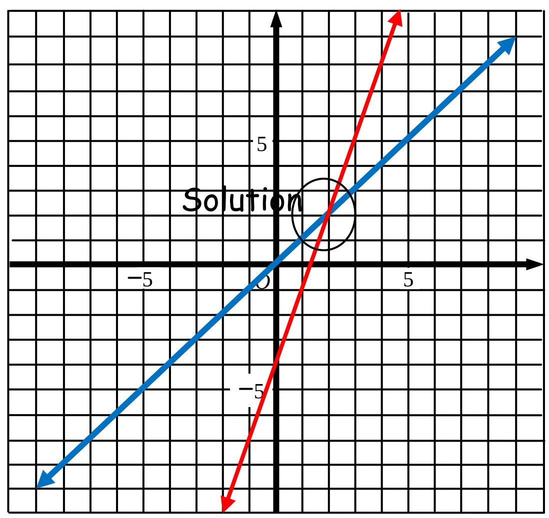
Reporting Category 4 Notes (A.8.B.)

Solving Systems of Equations by Graphing

To solve a system of equations by graphing both equations must be in slope-intercept format ($y = mx + b$). Graph both equations on the graph. The point where the two lines intersect is the solution.

Example: $y = x$

$y = 3x - 4$



The solution to the equation is (2, 2)