## Algebra 2

## Lesson 3.2 – Solving Systems Algebraically

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There are two ways to solve a system of equations algebraically (yeah, this was taught in Algebra 1!!):

- **Substitution** substitute one equation into the other.
- Elimination get rid of one variable on both equations and solve.

Substitution requires that you solve one equation in terms of one of the variables. Then whatever the variable is equal to is <u>substituted</u> into the second equation. The new equation is now in terms of one variable; solve for the variable. This value is then put back into one of the original equations and solve for the second variable.

**Example:** Solve the system of equations using substitution.

$\begin{cases} y = x + 3\\ 5x + y = 9 \end{cases}$	$\begin{cases} 2x + y = -1\\ 6x - 3y = -33 \end{cases}$
$\begin{cases} 2x - 3y = 6\\ x + y = -12 \end{cases}$	

Elimination requires that you line up "like" terms from each equation and "eliminate" one variable by adding the two equations together, solve the resulting equation and substitute the answer into either equation to find the value into either equation to find the value of the second variable. **Note** you may need to take one equation and make an equivalent equation. When the two equations are added together a variable cancels out.

$\begin{cases} 3x + y = -9 \\ -3x - 2y = 12 \end{cases}$	$\begin{cases} 4x + 3y = -6\\ 5x - 6y = -27 \end{cases}$	
$\begin{cases} 3x + 7y = 15\\ 5x + 2y = -4 \end{cases}$	$\begin{cases} 2x - y = 3\\ -4x + 2y = -6 \end{cases}$	
	$\begin{cases} 2x - 3y = 18 \\ -2x + 3y = -6 \end{cases}$	

**Example:** Solve the system of equations using elimination.

Remember to check your answers. A graphing calculator can verify your algebraic process by showing you the point of intersection. In summary, the steps for:

## SUBSTITUTIONELIMINATION1. Solve one equation for one-variable1. line up variables2. substitute that equation into the other<br/>equation2. eliminate one variable by adding<br/>the equations3. solve for the variable3. solve resulting equation for the<br/>variable4. solve for the remaining variable4. solve for the other variable5. check answers4. solve for the other variable

5. check answers.

$\begin{cases} 3x - y = 5\\ y = 4x + 2 \end{cases}$	$\begin{cases} 2x - 3y = 4\\ 2x - 5y = -6 \end{cases}$	$\begin{cases} y = 3x - 5\\ y = 4x2 + \end{cases}$

Which method is the best for solving the following systems. Choose from graphing, substitution, or elimination. Don't solve, unless you want to. Why did you choose the system you chose?