Name_____

Algebra 2

Lesson 3-2

Solving Systems Algebraically

There are two ways to solve a system of equations algebraically:

- **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 substituted into the second equation. The new equation is now in terms of one variable; solve for the variable. This value is them put back into one of the original equations and solve for the second variable.

Example: Solve the system of equations using substitution.

$x + 3y = 7$ $2x - 4y = 24$	solve 1st equ.for x: $x + 3y - 3y = 7 - 3y$ $x = 7 - 3y$ substitute into 2nd equ. $2(7 - 3y) - 4y = 24$ distribute and combine like terms: $14 - 6y - 4y = 24$ $-10y = 10$ $y = -1$	plug y into equation and solve for x: $x + 3(-1) = 7$ $x - 3 = 7$ $x = 10$ *the solution (x,y) = (10, -1)*

Elimination requires that you line up "like" terms from each equation and "eliminate" one variable, 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.

Example: Solve the system of equations using elimination.

$x + 2y = 10$ $x + y = 6$	$x + 2y = 10$ multiply by -1 $\underline{-x - y = -6}$ add the equations $y = 4$ *the solution (x,y) = (2,4)*	plug y=4 into one of the equations and solve for x: $x + 2(4) = 10$ $x + 8 = 10$ $x = 2$ **or:** $x + 4 = 6$ $x = 2$

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:

SUBSTITUTION	**ELIMINATION**
1. rewrite one equation into one-variable 2. substitute an equation into the other equation 3. solve for the other variable 4. check answers	1. line up variables 2. eliminate one variable 3. solve resulting equation 4. solve for the other variable 5. check answers.