# Algebra Review on Solving Systems of Linear Equations

Name_____ Date_____

GRAPHING

1) Make sure each equation is in slope – intercept form: $y = mx + b$

2) Graph each equation on the same coordinate plane.

3) The point where the lines intersect is the solution.

- If the lines are parallel and don't intersect then there is NO SOLUTION.
- If the lines coincide (same equation so one line lies on top of the other) then there are INFINITELY MANY SOLUTIONS.

Example: $\begin{array}{l} y - x = 4 \\ y + x = 2 \end{array}$
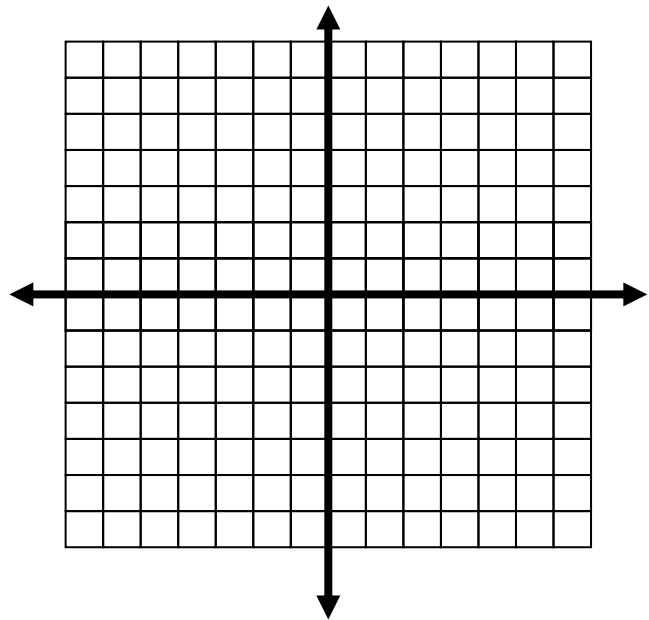
SUBSTITUTION

1) Solve one equation for either X or Y.
2) Substitute the expression from Step 1 into the other equation and solve for the remaining variable.
3) Substitute the value from Step 2 into the equation from Step 1 and solve for the variable.
4) Your solution is an ordered pair (x, y).
- If the variable cancels out while in the process of solving, look at what remains on each side of your equation.
  - If what remains is TRUE $(4 = 4)$ then your answer is INFINITELY MANY SOLUTIONS.
  - If what remains is FALSE $(0 \neq 4)$ then your answer is NO SOLUTION.

1.
$$x + 6y = 18$$
$$2x - 3y = -24$$

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

ELIMINATION

1) Arrange the equations with like terms in columns.
2) You want one variable to have opposite coefficients. So if necessary, multiply one or both of the equations by a number to create opposite coefficients for a variable.
3) Add the two equations together (adding like terms in columns) to eliminate a variable.
4) Solve for the variable that remains.
5) Substitute the value from Step 4 into one of the original equations to solve for the other variable.
6) The solutions will be an ordered pair (x, y).
   - If both variables cancel out while in the process of solving, look at what remains on each side of your equation.
     - If what remains is TRUE $(4 = 4)$ then your answer is INFINITELY MANY SOLUTIONS.
     - If what remains is FALSE $(0 \neq 4)$ then your answer is NO SOLUTION.

1. $x - y = 7$
   $2x + y = -10$

2. $2x + 5y = -2$
   $5x - 2y = 24$

Practice Solving Algebraically (Substitution or Elimination)

1.
$$2x + y = 11$$
$$x + y = 9$$

2.
$$2x + 3y = 8$$
$$5x - y = 3$$

3.
$$y + 2x = 5$$
$$-3y - 6x = -15$$

4.
$$4x - 9y = 1$$
$$-5x + 6y = 4$$