Algebra 1 **Name _____**
Chapter 7 Notes

Section 7.1 "Solving Linear Systems by Graphing"

System of Linear Equations: Two or more equations in the same variables, also called a _____ _____.

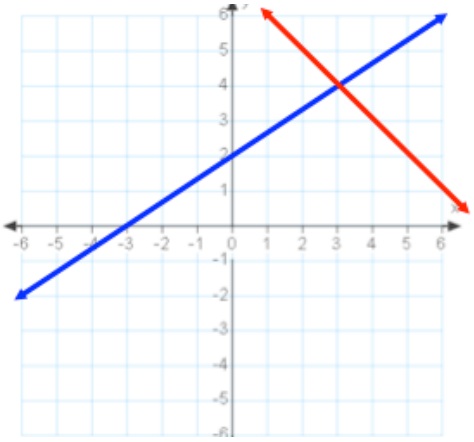
Solution of a System of Linear Equations: An ordered pair _____ that satisfies EVERY equation in the system.

Ex 1: Is (5, 2) a solution to the system: $-x + 6y = 7$ and $3x - 2y = 11$

Ex 2: Is (3, -6) a solution to the system: $4x + y = 6$ and $x + 3y = 15$

Note: The solution to a system of equations must lie on the graph of _____ equations!

Ex 3: What is the solution to the system?



Solving a Linear System Using "Graph and Check"

1) Write each equation in a form that is easy to graph (Slope-Intercept form $y = mx + b$)
2) Graph both equations in the same coordinate plane
3) Locate the coordinates of the point of intersection
4) Check the coordinates algebraically by substituting the point into both equations to verify it is a solution.

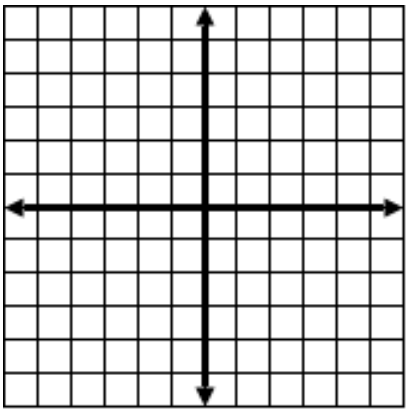
*You want to use GRAPH PAPER for these problems!

Ex 4: Solve the following system:

Equation 1: $x + y = -2$
Equation 2: $2x - 3y = -9$

step 1: $x + y = -2$ and $2x - 3y = -9$

step 2: Graph



step 3: The point of intersection

step 4: Check in both equations…

*For your homework - remember *Point-Slope Form*: $y - y_1 = m(x - x_1)$

Section 7.2 "Solving Linear Systems by Substitution"

Steps for Solving Linear Systems by Substitution:

1) Solve one of the equations for one of its variables (solve for x or for y)
   *Choose the one that looks easy!
2) Substitute that expression into the second equation and solve for the other variable
3) Use the revised equation from step 1 and plug in the value to solve for the first variable
4) Check the solution algebraically in both of the original equations to make sure it is a solution!

Ex 1: Solve the system using substitution
$x + y = -2$ and $2x - 3y = -9$

Ex 2: Solve the system using substitution
$y = 25x + 400$ and $y = 50x + 200$

Section 7.3 "Solving Linear Systems by Linear Combinations"

Linear Combination: An equation obtained by adding one of the equations (or a multiple of one of the equations) to the other equation.

Steps for Solving a Linear System by Linear Combination:

1) Arrange the equations with like terms in columns
2) Multiply one or both of the equations by a number to obtain coefficients that are opposites for one of the variables
3) Add the equations together…one of the variables should cancel
4) Solve for the remaining variable
5) Substitute the numerical answer into one of the original equations, and solve for the other variable
6) Check the solution algebraically in both of the original equations

Ex 1: Solve by linear combination

$6x + 4y = 12$
$3x - 4y = 6$

Ex 2: Solve by Linear Combination

$3x + 5y = 6$

$-4x + 2y = 5$

Ex 3: Solve by linear combination

No x and y – there is p and r! What could you do?

$3p - 2 = -r$
$-r + 2p = 3$

Section 7.5 "Special Types of Linear Systems"

There are 3 possible types of solutions to a linear system:

1) Lines Intersect at a _____ _____
- **_____ solution!**
- Equations Do Not have the same slope!
- There will be ONE (x,y) answer

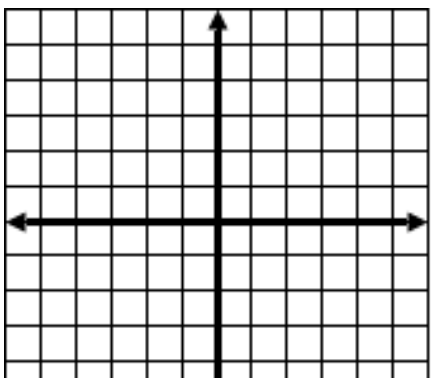
2) Lines are _____
- **____ Solution**
- No point of intersection on a graph
- The equations will have the SAME SLOPE
- When trying to solve for a variable, the answer will be a false statement such as $0 \neq 7$ or something similar

3) Lines _____ (they are the SAME line)
- **_____ Solutions**
- When reduced, the equations will be exactly the same!
- The graphs lie directly on top of each other
- When trying to solve for a variable, the answer will be a true statement such as $0 = 0$, or $9 = 9$, etc.

Solve the following systems using graphing, substitution, or linear combination. Tell whether there is ONE solution, NO solution, or INFINITE solutions.

Ex 1: Solve
$-2x + y = 3$ and $-4x + 2y = 6$

Ex 2: Solve by graphing
$x - 2y = 5$ and $-2x + 4y = 0$



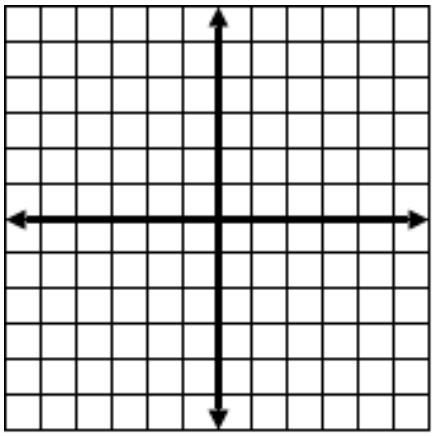
Ex 3: Solve
$2x + y = 4$ and $4x - 2y = 0$

Ex 4:
$\frac{3}{4}x + \frac{1}{2}y = 10$ and $\frac{-3}{2}x - y = 4$

Section 7.6 "Solving Systems of Linear Inequalities"

*Recall how to graph inequalities: $\frac{1}{2}x + y \leq 3$

- First, change the inequality to look like slope-intercept form:
- Second, graph the line
  (solid or dashed, depending on the sign)
- Test a point for shading:



*Graphing Systems of Linear Inequalities is the SAME process, except now you are looking for where the shaded regions *OVERLAP*

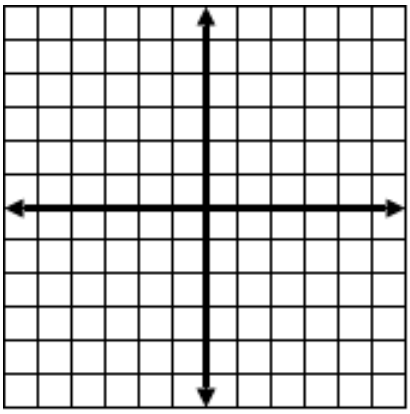
*That area is made up of all points that are solutions to the system!

Solve the following systems of Linear Inequalities by Graphing:

Ex 1: $y \leq -1/2x + 3$

$x \geq -1$

$y \geq 2$

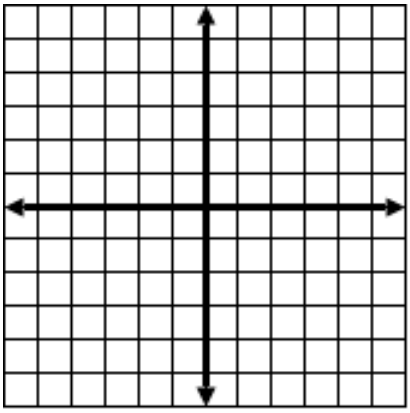


Ex 2: $x \geq 1$

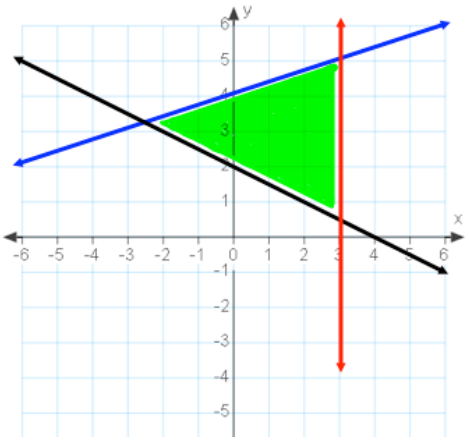
$x - 2y \leq 3$

$3x + 2y \geq 9$

$x + y \leq 6$



Ex 3:
Write the system of linear inequalities graphed.



Ex 4:
Your English teacher is giving you a 55-problem test. Some of the problems are worth 2 points and some of the problems are worth 3 points. The test is a total of 140 points.
Q: How many 2-point problems and 3-point problems are there?

1st: Set up two equations using x and y

2nd: Solve the system using substitution or elimination (linear combo)