Name: ___________________________________

Algebra 1 Chapter 6 Notes

Date: ____________________ Period: _________

Chapter 6: Systems of Equations and Inequalities

6.1 NOTES PART 1

SOLVING SYSTEMS BY GRAPHING

Example 1: Identifying Solutions of Systems

system of linear equations: ____

____

solution of a system of linear equations: ____

____

In the following problems, you will be given an ordered pair __________ and ______ ___________________.

For an ordered pair of a linear system to be a solution, the *x* and *y* values must make BOTH equations true.

REMEMBER: When plugging in numbers, use ______________________.

1.) Plug in the _____ and _____ values into the first equation. If the equation is ________, check the second equation. If it is _________, the ordered pair is NOT A SOLUTION.

2.) Plug in the _____ and _____ values into the second equation. If the equation is ________, (thus both equations are true) the ordered pair IS A SOLUTION. If it is__________, it is NOT A SOLUTION.

Try it out! Tell whether the ordered pair is a solution of the given system.

A.) (2, -4); $\begin{cases} x - y = 6 \\ 3x - 14 = 2y \end{cases}$

B. (-8, 1); $\begin{cases} x - 2y = 10 \\ -3x + y = 25 \end{cases}$

6.1 Notes Part 2

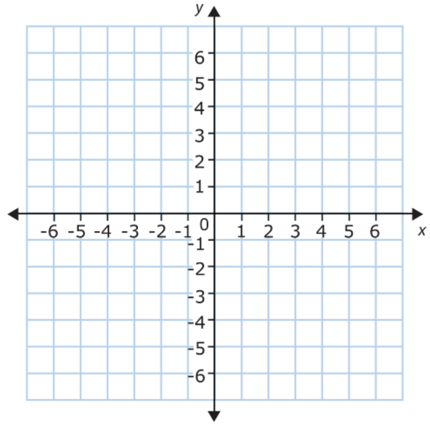
Solving Systems by Graphing

Example 2: Solving a System of Linear Equations by Graphing

To solve a system of linear equations by graphing, simply graph both lines. The point of ___________________ is the solution of the system.

Try it out! Solve each system by graphing. Check your answer.

A. $\begin{cases} y - x = 2 \\ y = 3x \end{cases}$



6.2 Notes Part 1

Solving Systems by Substitution

Example 1: Solving a System of Linear Equations by Substitution

Substitution: ____

____

*** *If one of the equations already has a variable by itself on one side, we can skip the first step.*

Step 1: Solve for ____________ variable in ____________ equation (________________________________).

Step 2: ____________________ the resulting expression into the __________ ________________.

Step 3: Solve that equation to get the value for the first variable.

Step 4: ____________________ the value you just found into *either* of the ___________________ equations.

Step 5: Write the values from steps ___ and ___ as an ______________ ________ (*x*, *y*), and __________.

Try it out! Solve each system by substitution.

A. $\begin{cases} y - x = 2 \\ y = 3x \end{cases}$

6.2 Notes Part 2

Solving Systems by Substitution

Example 2: Using the Distributive Property

Same thing as before, but after you substitute, remember to distribute!

Try it out! Solve by substitution.

A. $\begin{cases} y = 2x - 4 \\ x + 3y = -12 \end{cases}$

B. $\begin{cases} 4y - 5x = 9 \\ x - 4y = 11 \end{cases}$

6.3 Notes Part 1

Solving Systems by Elimination

Example 1: Solving a System of Linear Equations by Elimination

Step 1: Write the system so that like terms are _______________ (x's, y's, and *constants*).

Step 2: ___________________ one of the variables and ___________ for the other variable

Step 3: Substitute the value of the variable you just found into one of the _________________ equations and solve for the other variable.

Step 4: Write the answers from Steps 2 and 3 as an _______________ _________ (x, y), and ___________.

Try it out! Set up the equations so that you can use elimination.

A. $\begin{cases} y - x = -4 \\ x + 3y = 12 \end{cases}$

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

Try it out! Solve using elimination.

A. $\begin{cases} 5x + 2y = 1 \\ x - 2y = -19 \end{cases}$

B. $\begin{cases} -4x + 9y = 2 \\ -y + 4x = 14 \end{cases}$

6.3 NOTES PART 2

SOLVING SYSTEMS BY ELIMINATION

Example 2: Elimination Using Multiplication First (Multiplying by -1)

When like terms are lined up and the coefficients are the ________ number, but ___________________ signs, multiply ___________ ________ of ONLY ONE of the equations by _____.

Try it out! Solve each system by elimination.

A. $\begin{cases} y + x = 7 \\ 2y + x = 9 \end{cases}$

B. $\begin{cases} 5x + 5y = 5 \\ 5x + 3y = 3 \end{cases}$

6.3 NOTES PART 3

SOLVING SYSTEMS BY ELIMINATION

Example 3: Elimination Using Multiplication First

***If like terms do not have opposite coefficients (one ________________, one ________________), multiply ______ the __________ of one or both equations by some constant.

Try it out! Solve each system by elimination.

A. $\begin{cases} 3y + 2x = 10 \\ 2y + x = 6 \end{cases}$

B. $\begin{cases} 5x - 2y = -4 \\ 8x - 7y = 24 \end{cases}$

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6.3 NOTES PART 4

SOLVING SYSTEMS BY ELIMINATION

Example 4: Choosing the Right Method

METHOD	USE WHEN…	EXAMPLE
Graphing	• Both equations are solved for *y*. • You want to estimate a solution.	$\begin{cases} y = 3x + 2 \\ y = -2x + 6 \end{cases}$
Substitution	• A variable in either equation has a coefficient of 1 or −1. • Both equations are solved for the same variable. • Either equation is solved for a variable.	$\begin{cases} x + 2y = 7 \\ x = 10 - 5y \end{cases}$ or $\begin{cases} x = 2y + 10 \\ x = 3y + 5 \end{cases}$
Elimination	• Both equations have the same variable with the same or opposite coefficients. • A variable term in one equation is a multiple of the corresponding variable term in the other equation.	$\begin{cases} 3x + 2y = 8 \\ 5x + 2y = 12 \end{cases}$ or $\begin{cases} 6x + 5y = 10 \\ 3x + 2y = 15 \end{cases}$

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6.4 Notes Part 1

Solving Special Systems

Example 1: Systems with No Solutions

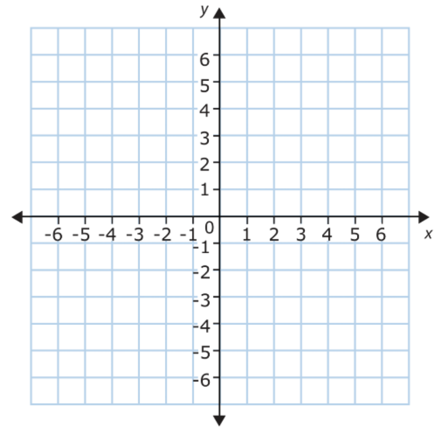
consistent: ____

inconsistent system: ____

***If you solve these systems graphically, the lines will be _________________ (never intersect)

***If you solve these systems algebraically (___________________________ or _________________________),
your final answer will be a ___________ statement.

Try it out! Solve $\begin{cases} y = x - 1 \\ -x + y = 2 \end{cases}$



6.4 Notes Part 2

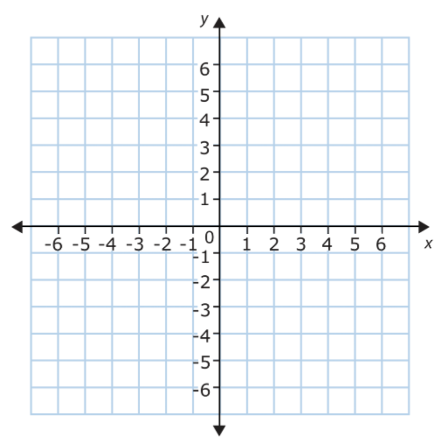
Solving Special Systems

Example 2: Systems with Infinitely Many Solutions

***If you solve these systems graphically, the lines will be __________ ____________ ____________

***If you solve these systems algebraically (___________________________ or _________________________),
your final answer will be a ___________ statement.

Try it out! Solve $\begin{cases} y = 3x + 1 \\ 2y - 6x = 2 \end{cases}$



6.4 Notes Part 3

Solving Special Systems

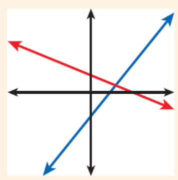
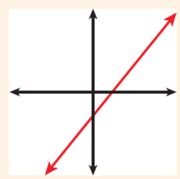
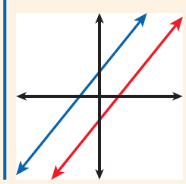
Example 3: Classifying Systems of Linear Equations

independent system: ____

____

dependent system: ____

____

CLASSIFICATION	CONSISTENT AND INDEPENDENT	CONSISTENT AND DEPENDENT	INCONSISTENT
Number of Solutions	Exactly one	Infinitely many	None
Description	Different slopes	Same slope, same y-intercept	Same slope, different y-intercepts
Graph	Intersecting lines 	Coincident lines 	Parallel lines 

***We will get more practice classifying these systems of linear equations in class. Don't worry ☺

6.5 Notes Part 1

Solving Linear Inequalities

Example 1: Identifying Solutions of Inequalities

linear inequality: ____

____

solution of a linear inequality: ____

____

Try it out! Tell whether the ordered pair is a solution of the inequality.

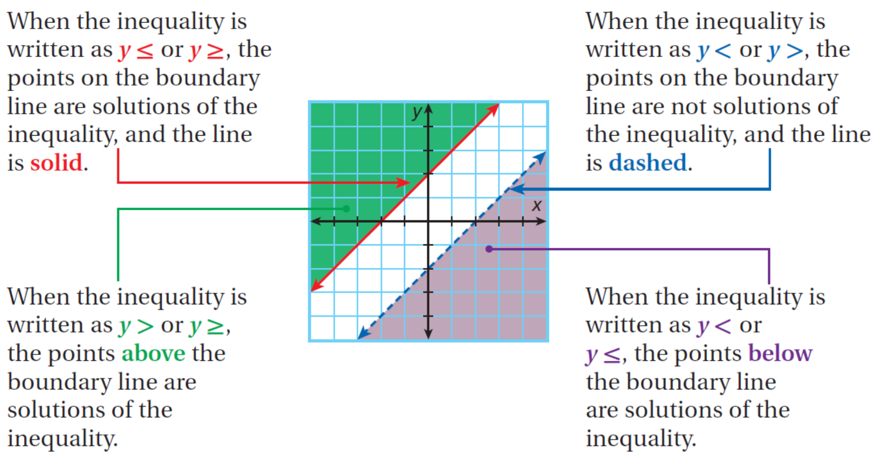
A. (3, -1); $y \geq x + 8$

B. (2, 4); $y < 5x - 3$

6.5 NOTES PART 2

SOLVING LINEAR INEQUALITIES

Example 2: Graphing Linear Inequalities in Two Variables



Step 1: Solve the inequality for _____

(slope-intercept form)

Step 2: Graph the boundary line

$\le$ *or* $\ge$ mean __________

$<$ *or* $>$ mean ___________

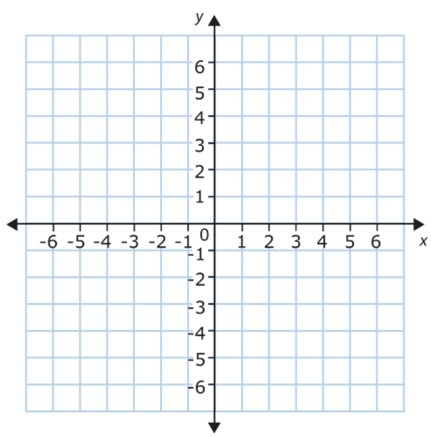
Step 3: Shade the correct region

$>$ *or* $\ge$ mean ______________

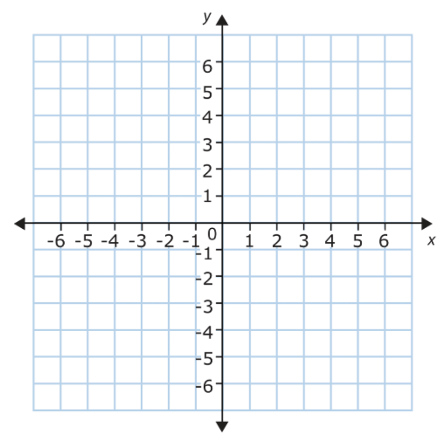
$<$ *or* $\le$ mean ______________

Try it out! Graph the solutions of each linear inequality.

A. $y > 2x - 5$



B. $x - 2y \le 0$

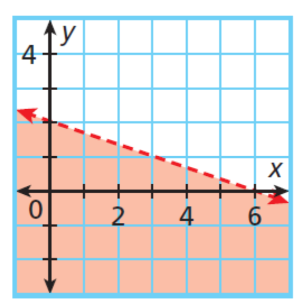


6.5 NOTES PART 3

SOLVING LINEAR INEQUALITIES

Example 3: Writing an Inequality from a Graph

Try it out! Write an inequality to represent the graph to the right.



6.6 Notes Part 1

Solving Systems of Linear Inequalities

Example 1: Identifying Solutions of Systems of Linear Inequalities

system of linear inequalities: ____

____

solution of a system of linear inequalities: ____

____

To determine whether or not an ordered pair (x, y) is a solution to a system of inequalities, you must plug in the values of ____ and ____ into ________ inequalities. The ordered pair is a solution if both inequalities are _____

Try it out! Tell whether the ordered pair is a solution of the given system.

A. (-1, -5); $\begin{cases} y < x - 3 \\ 2x - y \geq 2 \end{cases}$

B. (4, 0); $\begin{cases} x - 5 < 5y \\ x + 3 < y \end{cases}$

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6.6 Notes Part 2

Solving Systems of Linear Inequalities

Example 2: Solving a System of Linear Inequalities by Graphing

You already have learned how to graph one inequality. Now we will be graphing two on the same graph.

A solution to a system is any point that is:

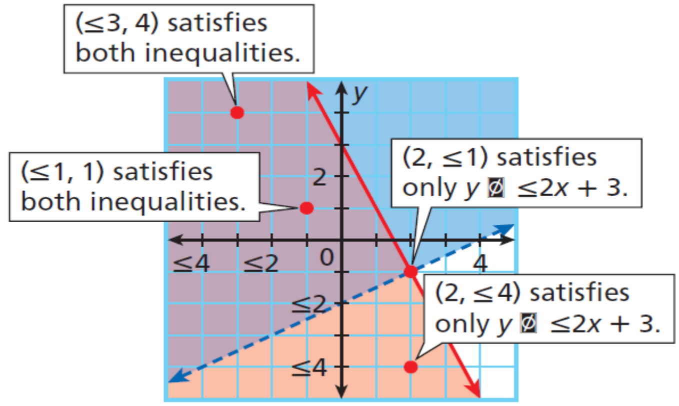
1.) in the region shaded by __________ lines

2.) on a ____________ line

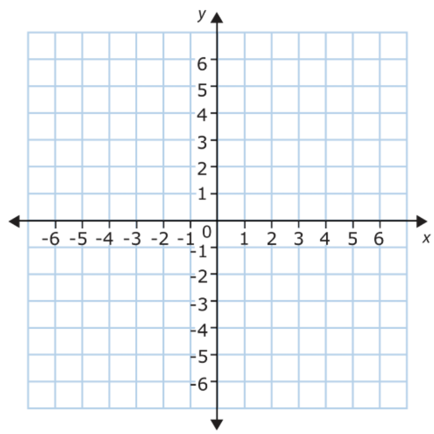
3.) at the ________________________ of two ____________ lines. (both MUST be ____________)

Try it out! Graph the system of linear inequalities. Give two ordered pairs that are solutions and two that are not.

A. $\begin{cases} 8x + 4y \le 12 \\ y > \frac{1}{2}x - 2 \end{cases}$



B. $\begin{cases} y \le 2 \\ 2y - 3x > -8 \end{cases}$

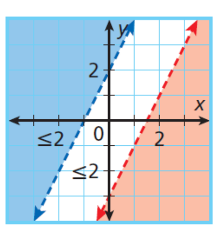


6.6 Notes Part 3

Solving Systems of Linear Inequalities

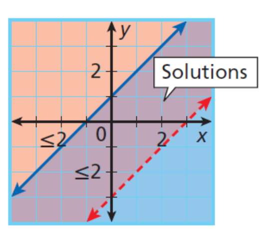
Example 3: Graphing Systems with Parallel Boundary Lines

A $\begin{cases} y < 2x - 3 \\ y > 2x + 2 \end{cases}$



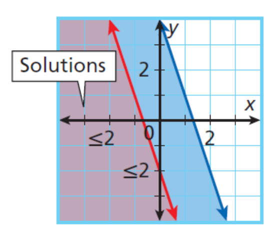
This system has no solution.

B $\begin{cases} y > x - 3 \\ y \le x + 1 \end{cases}$



The solutions are all points between the parallel lines and on the solid line.

C $\begin{cases} y \le -3x - 2 \\ y \le -3x + 4 \end{cases}$



The solutions are the same as the solutions of $y \le -3x - 2$.