Bell Work

- Solve the following for y:

  $$8x + 4y = 16$$

- Compare and contrast your answer with the following equation:

  $$y = 2x + 4$$

ALGEBRA 3

Day 24

Objective: To solve a system of equations by graphing (3.1) or algebraically (3.2)

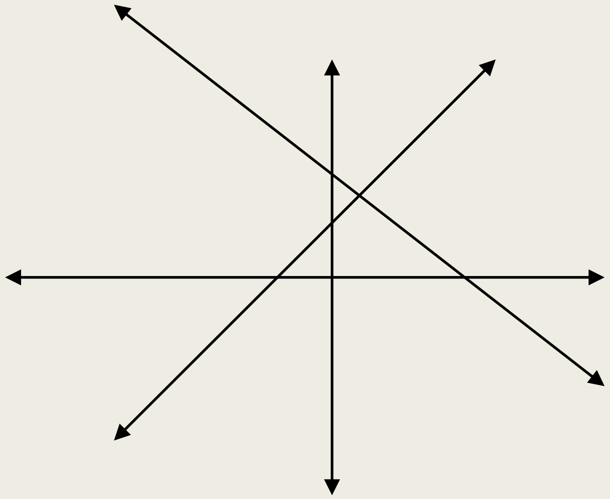
3.1 – Solving Systems Using Graphs

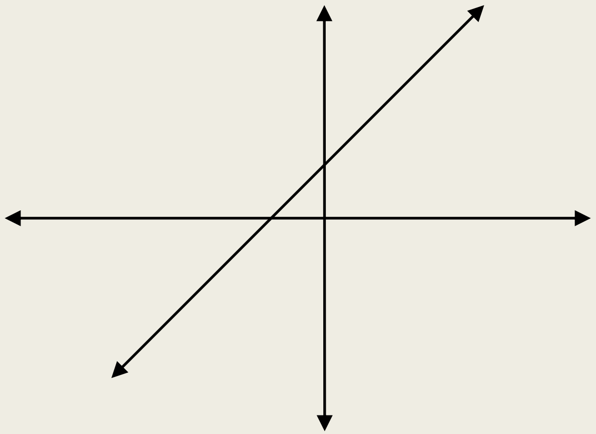
- **System of Two Linear Equations:** consists of two equations
  - *Equation 1: $Ax + By = C$;* *or* $y = m_1x + b_1$
  - *Equation 2: $Dx + Ey = F$;* *or* $y = m_2x + b_2$

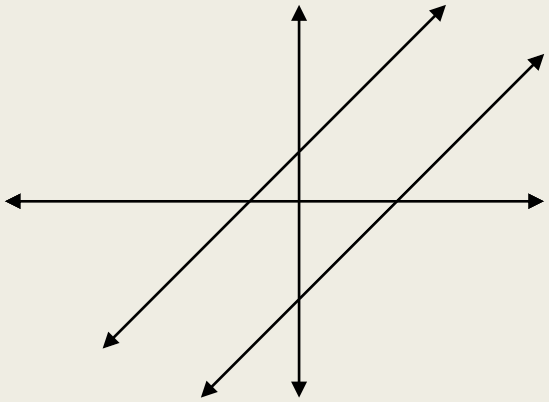
Solution: *an ordered pair (x, y) that satisfies BOTH equations*

Number of Solutions of a Linear System

Describe the number of solutions below.







Note: There are two lines here.
They are on top of each other

Steps to Solving by Graphing:

1.) Rewrite each equation of the system in slope intercept form. ($y = mx + b$)

2.) Graph each equation. (Use your calculator!)

3.) Find the intersection. (Refer to chart above for one, zero or infinite solutions).

How many solutions does each have? Identify the solution when possible.

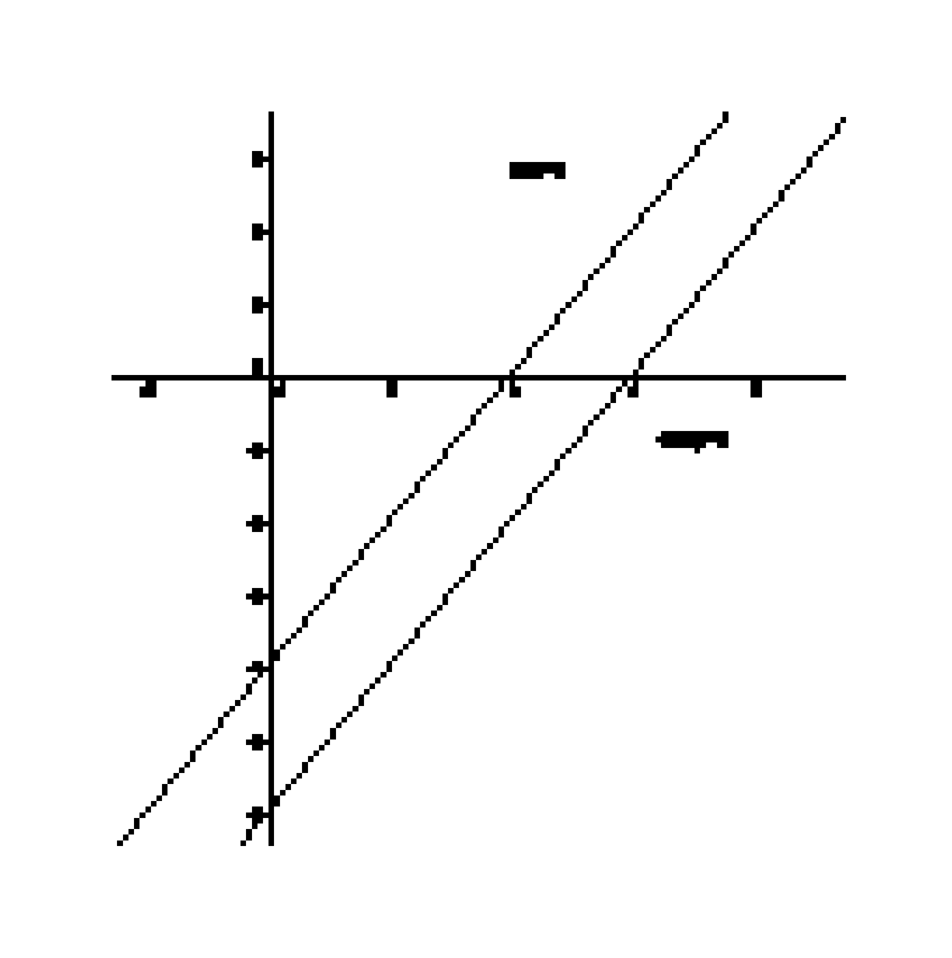
$2x – y = 4$

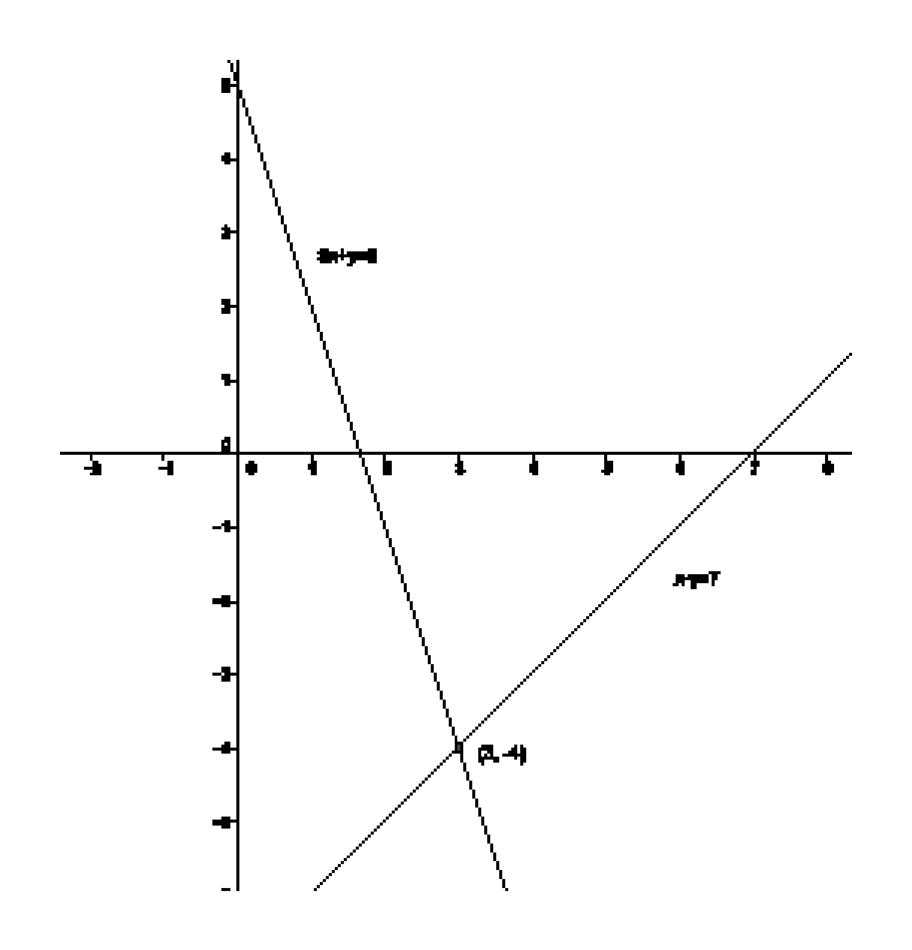
$- 2x + y = - 6$

$3x + y = 5$

$x – y = 7$

How many solutions does each have? Identify the solution when possible.





3.2 – Solving Systems Algebraically

- **System of Two Linear Equations:** consists of two equations
  - *Equation 1:* $Ax + By = C$; *or* $y = m_1x + b_1$
  - *Equation 2:* $Dx + Ey = F$; *or* $y = m_2x + b_2$

Solution: *an ordered pair (x, y) that satisfies BOTH equations*

Substitution Method
(Best used when lead coefficient is 1 or -1)

1.) Solve for the variable with coefficient of 1 or -1

2.) Substitute in the expression from Step 1 into the other equation for that variable and solve.

3.) Substitute the answer from Step 2 into the revised equation from Step 1 and solve for the other variable.

4.) Check your solution (x,y) by substituting back into the original equation.

Example

$3x + 4y = -4$

$x + 2y = 2$ ← solve for x (coefficient of 1)

Example: 3x + 4y = - 4 and x + 2y = 2

x=2-2y ← now plug 2-2y in for x in the first equation

3(2-2y)+4y=-4 ← distribute and combine like terms/solve for y

6-6y+4y => 6-2y= -4 =>

-2y= -10 => **y=5** ← plug 5 in for y into 1st equation & solve for x

x=2-2(5) => 2-10 => **x=-8** **Solution: (-8, 5)**

Elimination Method
(Best used with coefficients other than 1 or -1)

1.) Multiply one or both of the equations by a constant to obtain coefficients that differ only in sign for one of the variables
(i.e. *equal coefficients, but opposite signs*)

2.) Add the revised equations (known as **<u>Equivalent Systems</u>**) from Step 1. Combining like terms will eliminate one of the variables. Solve for the remaining variable. (One variable will cancel out!)

3.) Substitute the value obtained in Step 2 into either of the original equations and solve for the other variable.

4.) Check solution (x, y) by substituting back into original equations

Example:

(None of coefficients are 1 or -1 so elimination is easiest)

$2x - 4y = 13$

$4x - 5y = 8$

Example: $2x - 4y = 13$ and $4x - 5y = 8$

$2x - 4y = 13$ ← multiply by -2 so coefficients of x will be same # but opposite signs

$4x - 5y = 8$ ← nothing needs to change here

$-4x+8y=-26$ ← Now add the two equations together (combine like terms)

$\underline{\ 4x-5y = \ 8}$

$3y = -18$ ← Solve for y

$y = -6$ ← Now plug y back into either equation; then solve for x

$2x-4(-6)=13$ => $2x+24=13$ => $2x= -11$ => **$x= -11/2$ or -5.5**

- **Solution: $(-5.5, -6)$**

For Next Time

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Mixed Review

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