

Name _____

Algebra 2

Lesson 3-1

Graphing Systems of Equations

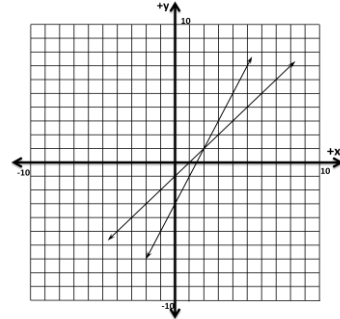
Two or more linear equations form a system of equations. The solution to a system of equations is the common point of intersection. An easy way to find a solution to a system of equations is to graph both equations and locate the (x,y) coordinates where the two lines meet.

Example: Solve the system below by graphing.

$$y = 2x - 3 \quad m=2, b=-3$$

$$y = x - 1 \quad m=1, b=-1$$

Notice that the lines intersect at $(2,1)$



- If you use a graphing calculator, press **WINDOW** and set as follows:
x-axis -- -10, 10, 1
y-axis -- -10, 10, 1
- Now press **ENTER** and **Y=** and enter equations. Press **GRAPH**. Notice where both lines intersect.
- To find the exact point value on the calculator: Press **2nd Trace – 5**. Notice flashing star and equation name in upper left corner. Arrow over so that star is close to the desired intersection. **ENTER**, arrow star on second curve over close to the intersection, **ENTER** (guess)**ENTER** intersection given: $x=2, y=1$.

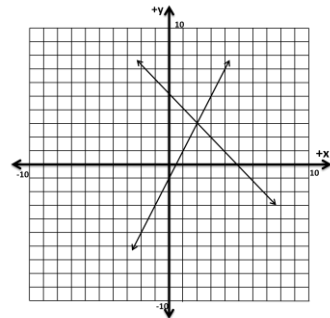
This type of system of equations is called **consistent** (it has a point of intersection) and **independent** system, (because the solution is made up of two distinct lines).

Example: solve the system below by graphing.

$$y = 2x - 1 \quad m=2, b=-1$$

$$y = -x + 5 \quad m=-1, b=5$$

Notice the lines intersect at $(2,3)$



Sometimes the two equations will not meet, that is they are parallel. In such cases the system has **NO** solution. We call this an **inconsistent** (no solution) and **independent** (two distinct lines) system. Notice that the two lines will have the same slope but different y-intercepts.

Example: Solve the system below by graphing.

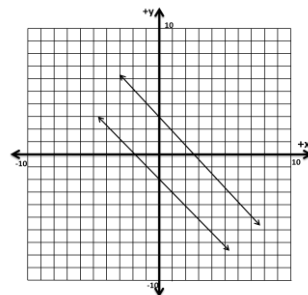
$$y + 2x = -1$$

$$y + 2x = 3$$

rearrange into
slope-intercept form \longrightarrow

$$y = -2x - 1$$

$$y = -2x + 3$$



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On occasion, a system of equations will graph the same line with two different equations. This would mean that the graph of one line is directly on top of the second graph and the two lines would intersect in an infinite number of places. That is they are graphically, the same line. We call this a **consistent** (lines meet) and **dependent** (one line).

Example: solve

$$\begin{array}{l} 3x + y = 2 \\ 2y = -6x + 4 \end{array} \xrightarrow{\substack{\text{solve into the} \\ y=mx+b \text{ form}}} \rightarrow$$

$$\begin{array}{l} y = -3x + 2 \\ y = -3x + 2 \end{array}$$

