NOTES & HOMEWORK

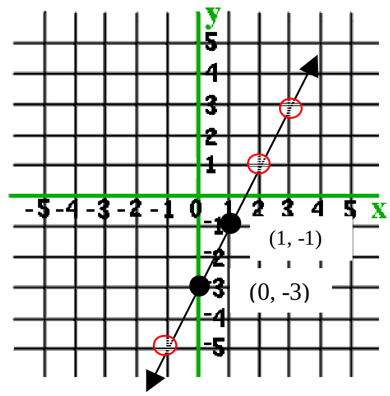
Name________________________________
Date __________________ Period ________

Solving Systems by Graphing

How can you show all of the solutions (or possible *x* and *y* values) for the linear equation $y = 2x - 3$? Graph the line, of course! Each point on the line is a solution.

Linear Equation
$y = 2x - 3$

y-intercept = -3 So, one coordinate is (0, -3)
slope = $\frac{2}{1} = \frac{\text{rise}}{\text{run}}$ So, another coordinate is (1, -1)



Use the graph to write three different solutions (or x- and y-coordinates) of the equation $y = 2x - 3$. Then show that each ordered pair makes the equation true by plugging in the (x, y) into the equation.

(2, 1)	(3, 3)	(-1, -5)
1 = 2(2) – 3	3 = 2(3) – 3	-5 = 2(-1) – 3
1 = 4 – 3	3 = 6 – 3	-5 = -2 – 3
1 = 1	3 = 3	-5 = -5

Two or more linear equations together form a <u>system of linear equations.</u>

One way to solve a system of linear equations is by graphing. Any point common to all the lines is a <u>solution of the system.</u> So, any ordered pair that makes *all* the equations true is a solution of the system.

Example 1:

Solve the system of linear equations by graphing.

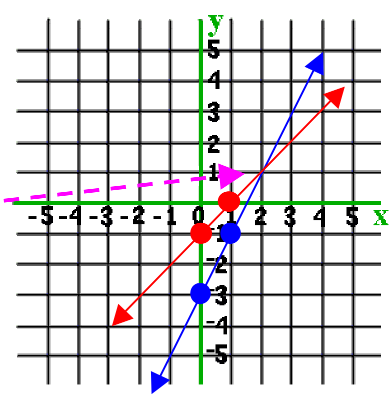
$y = 2x - 3$
$y = x - 1$

Graph both equations on the same coordinate grid.

$y = 2x - 3$ Slope is 2 or 2/1, y-intercept is –3

$y = x - 1$ Slope is 1 or 1/1, y-intercept is –1

Find the point of intersection:



The lines intersect at (2, 1), so (2, 1) is the solution of the system.

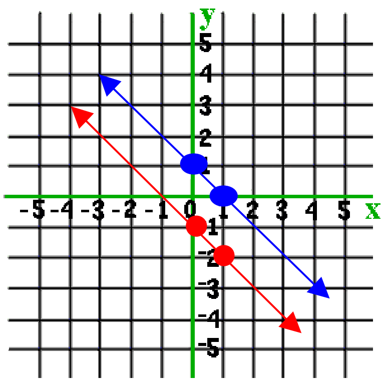
Check: See if (2, 1) makes both equations true.

1 = 2(2) – 3	1 = 2 – 1
1 = 4 – 3	1 = 1 ☺
1 = 1 ☺	

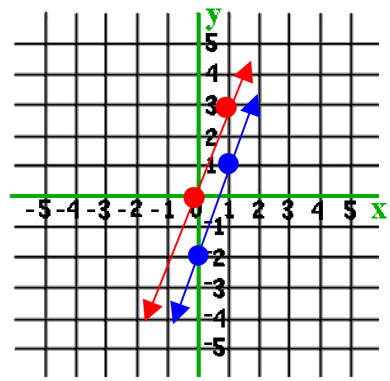
It checks, so (2, 1) is the solution of the system of the linear equations.

Solving Special Types of Systems:
A system of linear equation has no solution when the graphs of the equations are parallel.
There are no points of intersection, so there is no solution.
Lines are parallel when they have the same slope.

y = -x + 1
y = -x –1



y = 3x – 2
y = 3x



A system of linear equations has infinitely many solutions when the graphs of the equations are the same line. All points on the line are solutions of the system.

Example 2:

Solve the system by graphing. –4y = 4 + x

¼ x + y = -1

Remember to graph, you must rearrange the equation so that it is in the slope-intercept form (y = a + bx)

-4y = 4 + x
-4 -4
y = -1 – ¼ x

¼ x + y = -1
- ¼ x - ¼ x
y = -1 – ¼ x

Now, graph each line on the same coordinate plane.

Since the graphs are the same line, the system has infinitely many solutions.