PRINCIPLES - LESSON 9A
SOLVING SYSTEMS OF EQUATIONS BY GRAPHING

ex1) List 5 solutions of $x + y = 10$

$x = 5$	$x = 10$	$x = -2$	$x = 6$	$x = 3\frac{1}{2}$
$y = 5$	$y = 0$	$y = 12$	$y = 4$	$y = 6\frac{1}{2}$
$(5, 5)$	$(10, 0)$	$(-2, 12)$	$(6, 4)$	$(3\frac{1}{2}, 6\frac{1}{2})$

There are an infinite number of solutions!

SYSTEMS OF EQUATIONS

ex2) Solve: $\begin{cases} x + y = 10 \\ x - y = 2 \end{cases}$

In a system of equations, a solution must work in EVERY equation in the system.

The ONLY solution is (6, 4).

Check (6,4) in first equation:

$x + y = 10$

$6 + 4 \stackrel{?}{=} 10$

$10 = 10$ ✓

Check (6,4) in second equation:

$x - y = 2$

$6 - 4 \stackrel{?}{=} 2$

$2 = 2$ ✓

SOLVING SYSTEMS OF EQUATIONS BY THE GRAPHING METHOD

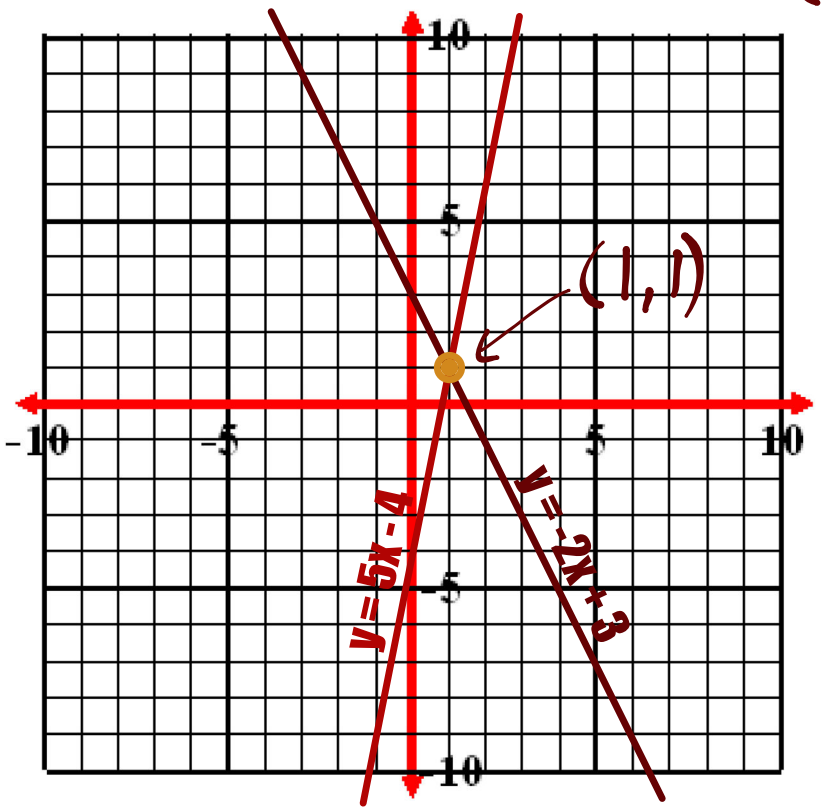
ex3) Solve by graphing:

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

Both equations are in slope-intercept form. ($y = mx + b$)

Since the graph of an equation is a picture of all solutions to the equation, the solution to the system is any point that is on both graphs.

In other words, the solution to the system is the point (or points) where the graphs INTERSECT.



(1,1) is the solution to the system.

SOLVING SYSTEMS OF EQUATIONS BY THE GRAPHING METHOD

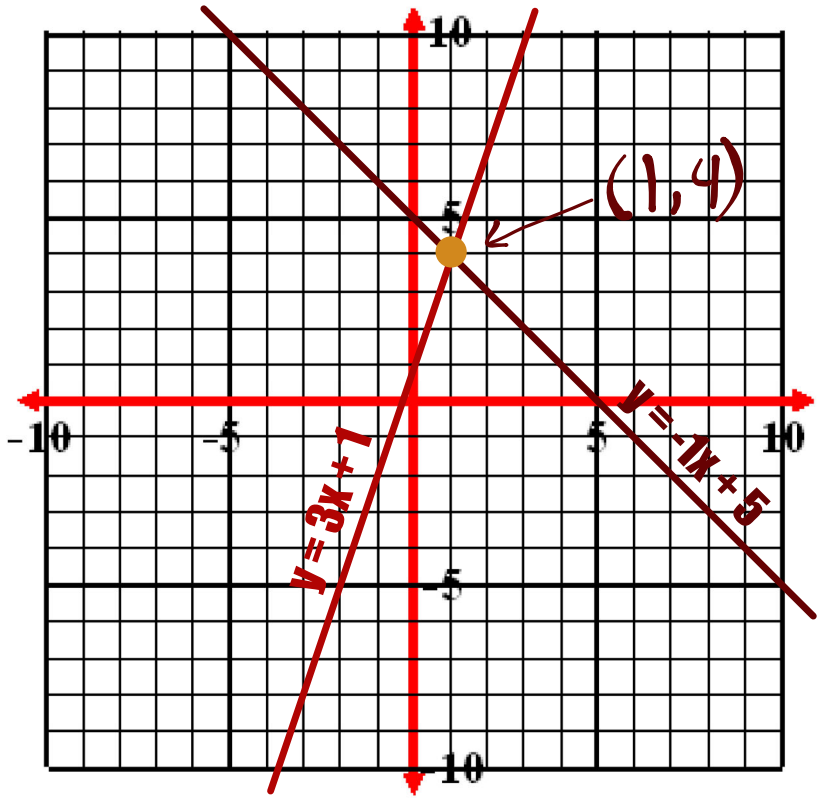
ex4) Solve by graphing:

$$\begin{cases} -3x + y = 1 \\ y + x = 5 \end{cases}$$

Solve both equations for y!

$-3x + y = 1 \Rightarrow y = 3x + 1$

$y + x = 5 \Rightarrow y = -1x + 5$



(1, 4) is the solution to the system.

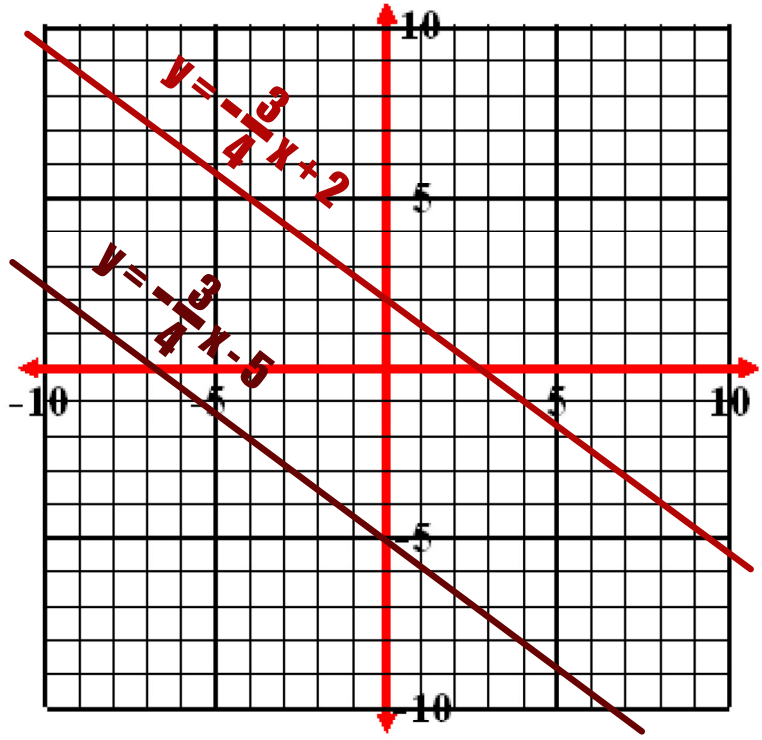
SOLVING SYSTEMS OF EQUATIONS BY THE GRAPHING METHOD

ex5) Solve by graphing:

$$\begin{cases} y = -\frac{3}{4}x + 2 \\ 6x + 8y = -40 \end{cases}$$

Solve the equation for y!

$6x + 8y = -40 \Rightarrow y = \frac{-3}{4}x - 5$



Since there is no point that lies on both graphs, this system has NO SOLUTION.

SOLVING SYSTEMS OF EQUATIONS BY THE GRAPHING METHOD

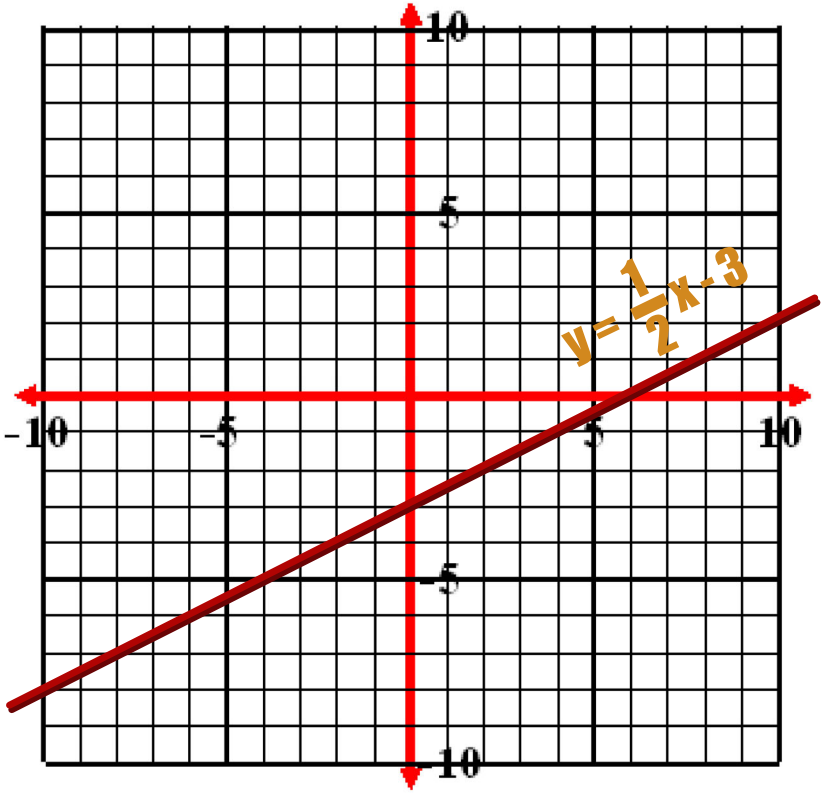
ex6) Solve by graphing:

$$\begin{cases} -6y + 3x = 18 \\ x - 2y = 6 \end{cases}$$

Solve both equations for y!

$-6y + 3x = 18 \Rightarrow y = \frac{1}{2}x - 3$

$x - 2y = 6 \Rightarrow y = \frac{1}{2}x - 3$



These 2 equations are the same!

This system has infinite number of solutions. Every point on the line is a solution to the system

All points on the line $y = \frac{1}{2}x - 3$ are solutions to this system.

SOLVING SYSTEMS OF EQUATIONS BY THE GRAPHING METHOD

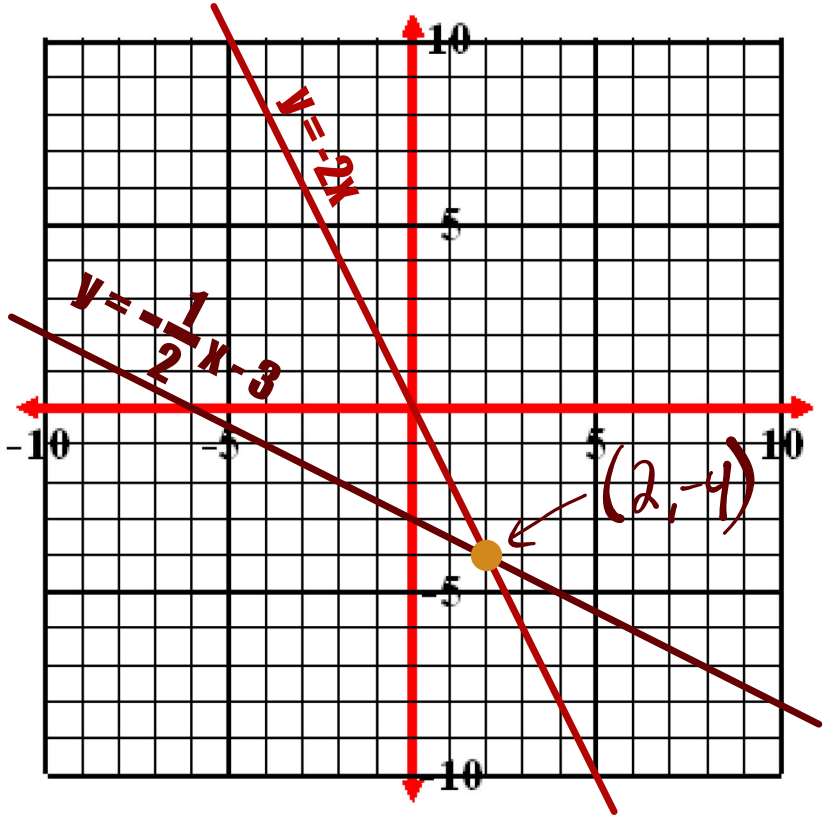
ex7) Solve by graphing:

Solve both equations for y!

$$\begin{cases} y + 2x = 0 \\ 2y = -x - 6 \end{cases}$$

$y + 2x = 0 \Rightarrow y = -2x$

$2y = -x - 6 \Rightarrow y = -\frac{1}{2}x - 3$



(2,-4) is the solution to the system.