# AA Notes – Section 6.1 – Solving Systems by Graphing

Content Standard: A.REI.6

*Objectives:* To solve systems of equations by graphing; to analyze special systems

***Definitions:***

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

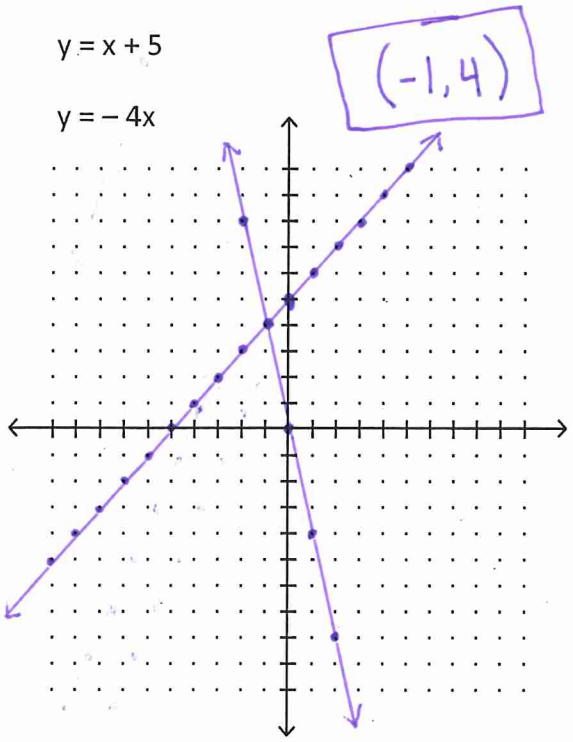
Any ordered pair that makes *all* of the equations in a system true is a <u>solution of the system of linear equations</u>.

**Solve the following systems of equations by graphing –**

Start by graphing each line on the same coordinate plane. *Hint: Make sure it is in slope intercept form.*

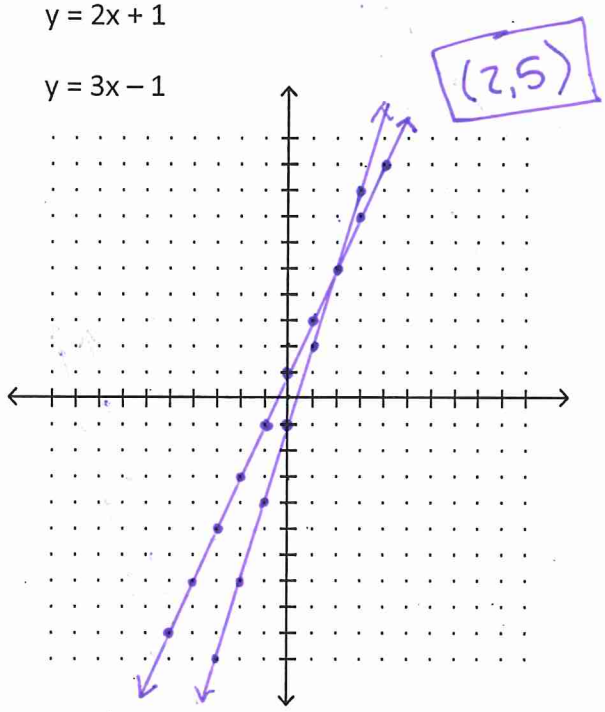
1. $y = x + 5$

   $y = -4x$




2. $y = 2x + 1$

   $y = 3x - 1$




**Put extra points on each line to help determine the intersection point*

How are the solutions to the two equations represented graphically?

Every point on each line is a solution to the respective equation.

Is it possible for two lines to have exactly two, three, or four points in common? Explain.

Not possible because a straight, if it crosses, only touches one time, not 2, 3 or 4 times.

How do you know that the lines intersect?

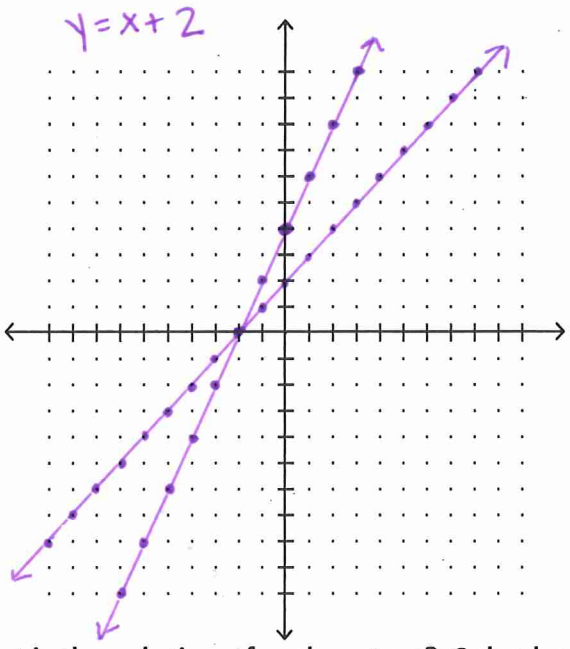
They have different slopes.

**What is the solution of each system? Solve by graphing.**

3. $y = 2x + 4$

$y - x = 2$

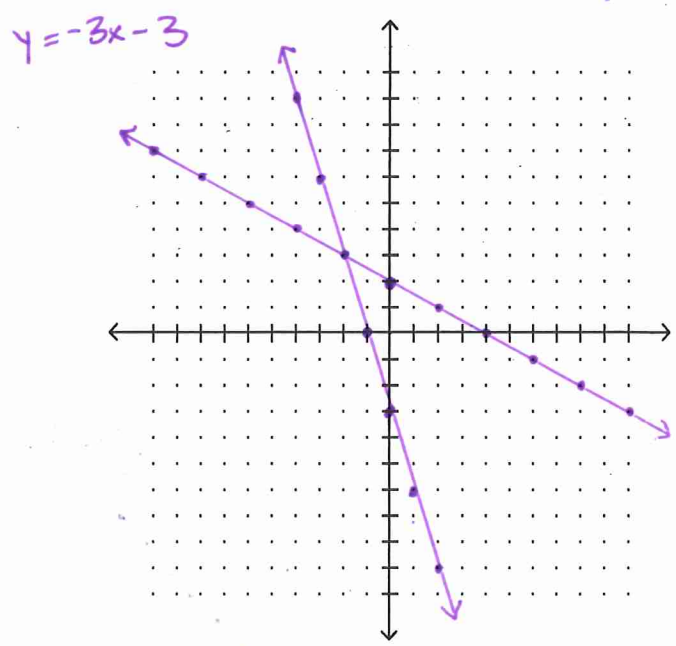
Solution: $(-2, 0)$




4. $y = -\frac{1}{2}x + 2$

$3 + y = -3x$

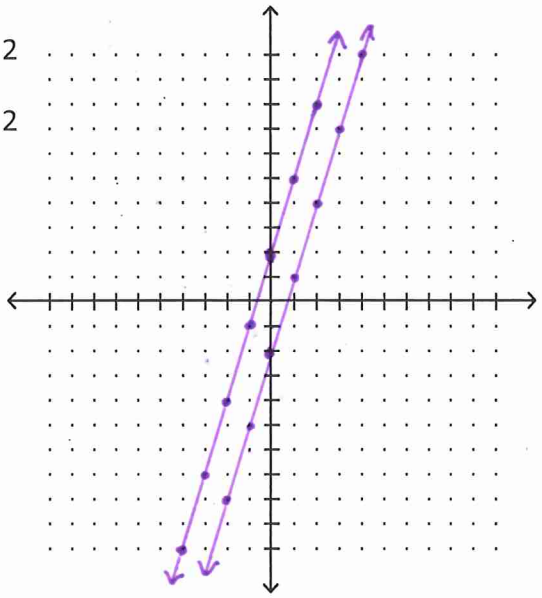
Solution: $(-2, 3)$




**What is the solution of each system? Solve by graphing.**

5. $y = 3x + 2$

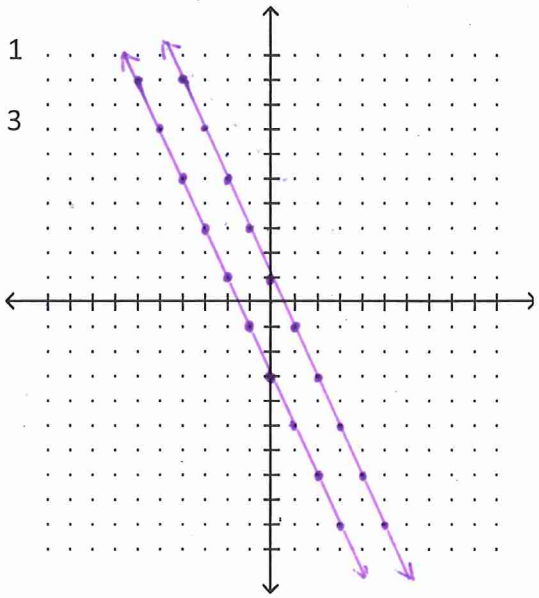
$y = 3x - 2$



No Solution

6. $y = -2x + 1$

$y = -2x - 3$



What can you tell me about these two lines graphically? Explain.

They do not intersect. They are parallel.

What can you tell me about these two lines by looking at their equations? Explain.

They have the same slopes therefore they are parallel.

What can you tell me about the solution for these two examples?

Since the intersection is the solution to both equations there is not a solution because they do not intersect.

**What is the solution of each system? Solve by graphing.**

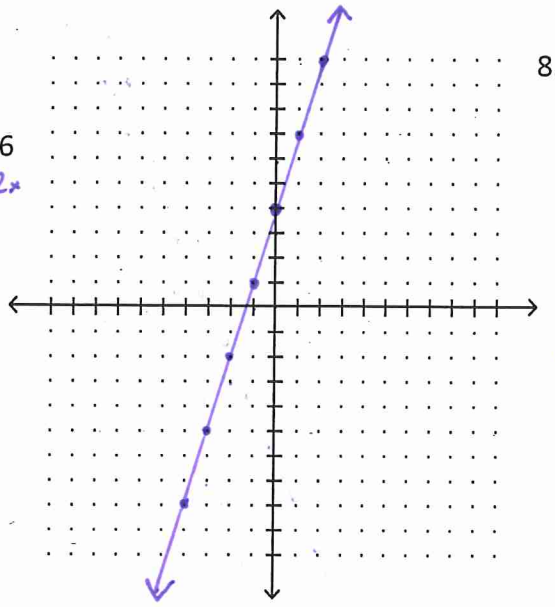
7. $y = 3x + 4$

$-12x + 4y = 16$

$+12x \quad +12x$

$\frac{4y}{4} = \frac{12x}{4} + \frac{16}{4}$

$y = 3x + 4$



Infinite Solutions

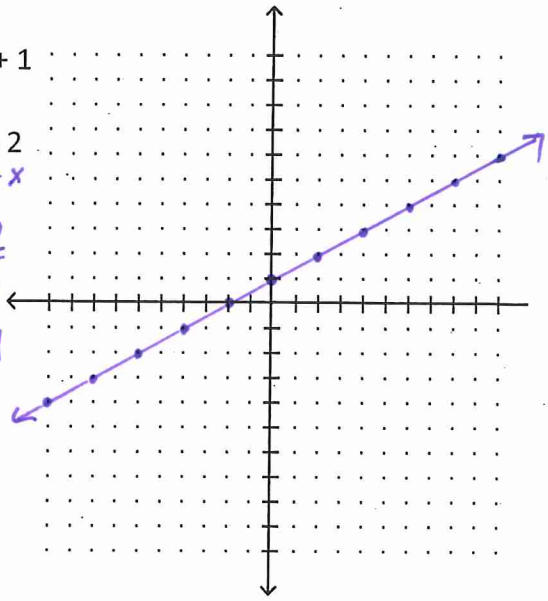
8. $y = \frac{1}{2}x + 1$

$2y - x = 2$

$+x \quad +x$

$\frac{2y}{2} = \frac{x}{2} + \frac{2}{2}$

$y = \frac{1}{2}x + 1$



What can you tell me about these two lines graphically? Explain.

They are the same line.

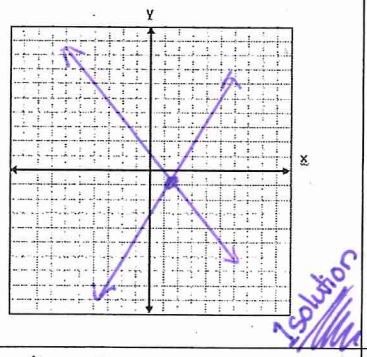
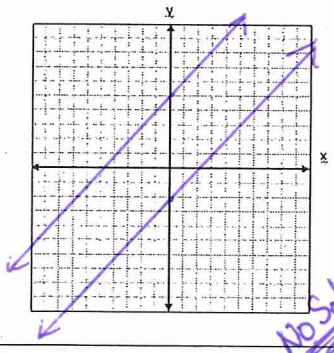
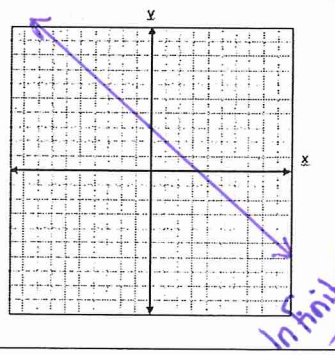
What can you tell me about these two lines by looking at their equations? Explain.

They have the same slope & the same y-intercept, therefore, they are the same line.

What can you tell me about the solution for these two examples?

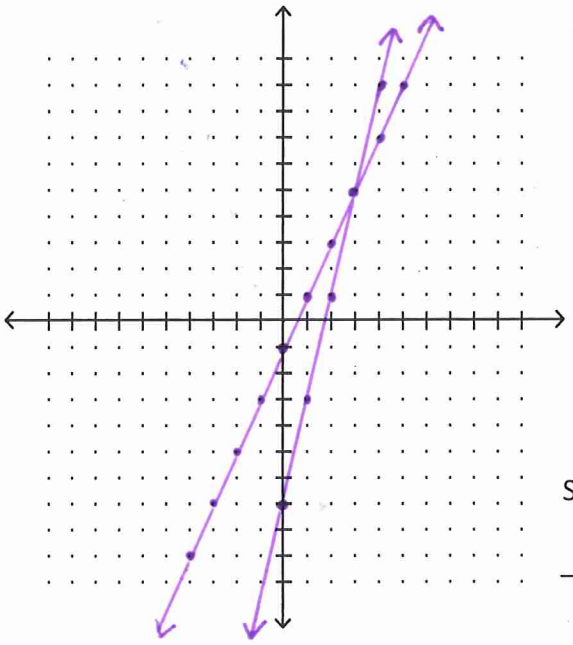
Since the lines overlape, every point is an intersection point therefore, All the points are a solution.

***Concept Summary: Systems of Linear Equations***

| different slopes | same slope, different y-intercepts | same slope & same y-intercept |
|---|---|---|
|  1 solution |  No Solution |  Infinite Solutions |
| The lines intersect at one point. The lines have different slopes. | The lines are parallel. The lines have the same slope and different y-intercepts. | The lines are the same. The lines have the same slope and y-intercept. |
| *One Solution (x, y)* | *No Solution* | *Infinitely Many Solutions* |

**Solve each system by graphing.**

9. $y = 2x - 1$ & $y = 4x - 7$

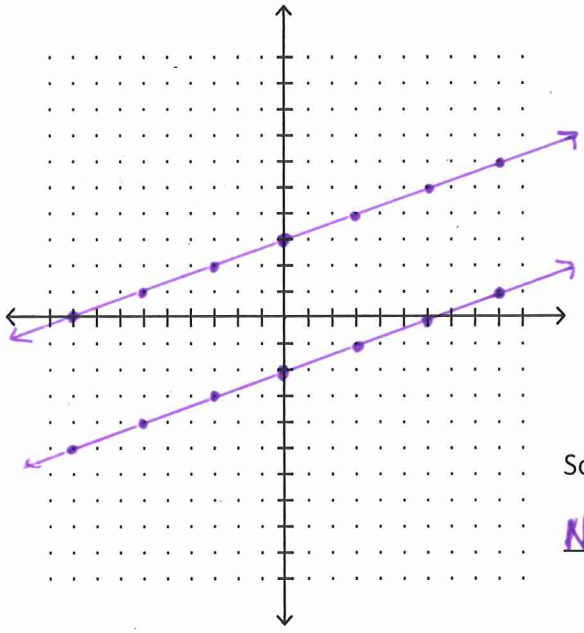


Solution: (3, 5)

10. $\frac{3y}{3} = \frac{x}{3} + \frac{9}{3}$ & $\frac{-6y}{-6} = \frac{-2x}{-6} + \frac{12}{-6}$

$y = \frac{1}{3}x + 3$ $\quad$ $y = \frac{1}{3}x - 2$

Same slopes



Solution: No Solution

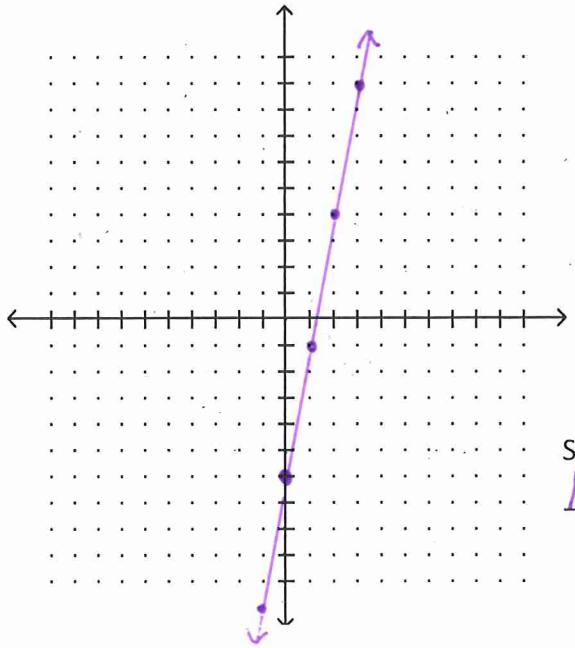
11. $y = 5x - 6$ & $12 + 2y = 10x$

$-12 \quad -12$

$\frac{2y}{2} = \frac{10x}{2} - \frac{12}{2}$

$y = 5x - 6$

Same equation



Solution: Infinite Solutions