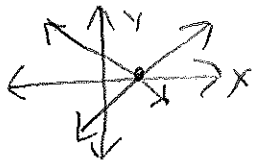
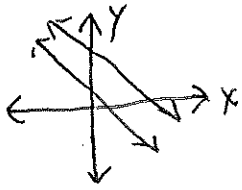
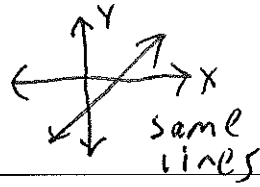
Name: Key

Solving Linear Systems: No Solution and Infinitely Many Solutions

Recall that when two lines are parallel, they will never intersect. In this case, we say that the system has **no solution**.

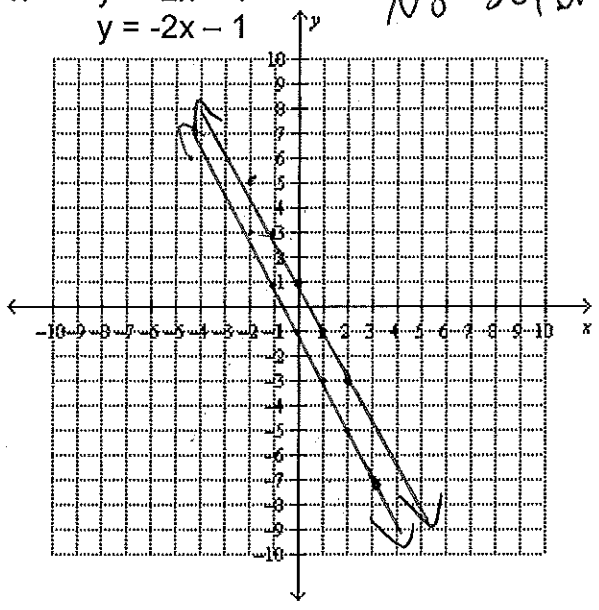
A system of linear equations has **infinitely many solutions** when the graphs of the equations are the same line. Every point on the lines represents a point of intersection. Because there are an infinite number of points on a line, there are infinitely many solutions.

	Example Graph	Example Equations	Equation Characteristics
One Solution		$y = 2x + 4$ $y = 6x + 1$	Different slopes and y-intercepts can be diff or same
No Solutions		$y = -5x + 7$ $y = -5x + 2$	Same slopes Different y-intercepts
Infinitely Many Solutions	 same lines	$y = 3x + -1$ $2y = 6x + -2$	Same slopes Same y-intercepts

Solve each of the following systems and say whether there is one solution, no solution, or infinitely many solutions. Show your work!

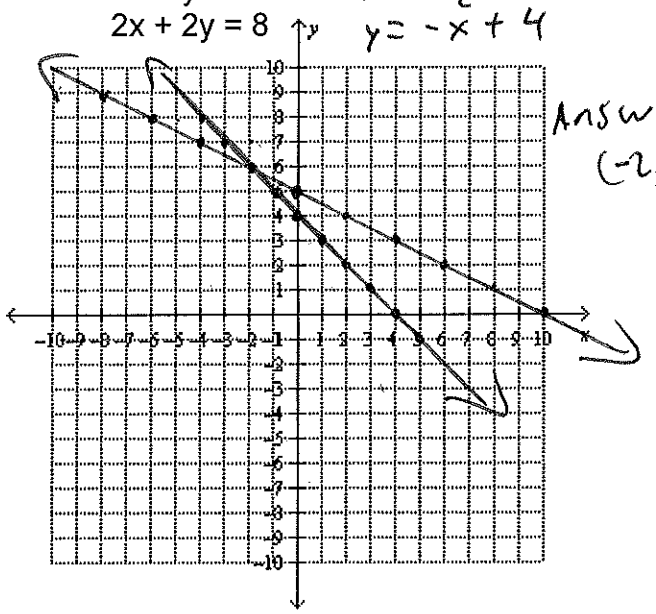
1. $y = -2x + 1$
   $y = -2x - 1$

No Solutions



2. $x + 2y = 10$
   $2x + 2y = 8$

$y = -\frac{1}{2}x + 5$
$y = -x + 4$



Answer (-2, 6)

3. How can you tell if a system has no solution WITHOUT GRAPHING?

same slope but different y-intercepts

4. Make up your own linear systems problem where the answer would be "no solution". Solve each system of linear equations. (Note: Some may have no solutions or infinitely many solutions.)

$y = 7x + 11$

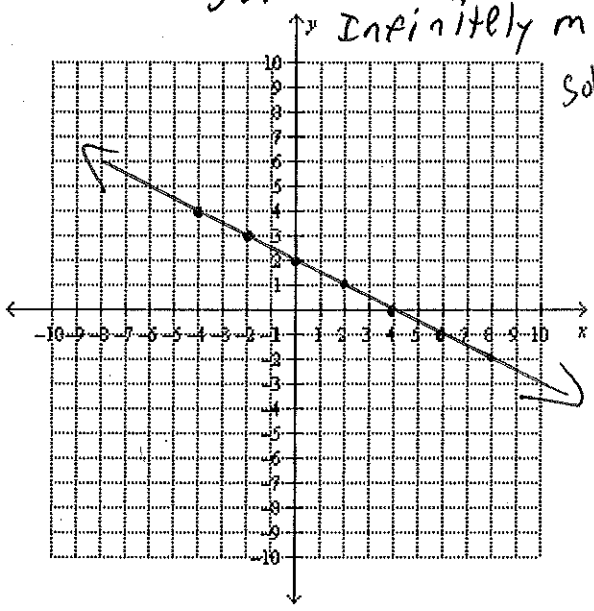
$y = 7x + -15$

5. $2x + 4y = 8$

$y = -0.5x + 2$

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

same line, Infinitely many solutions

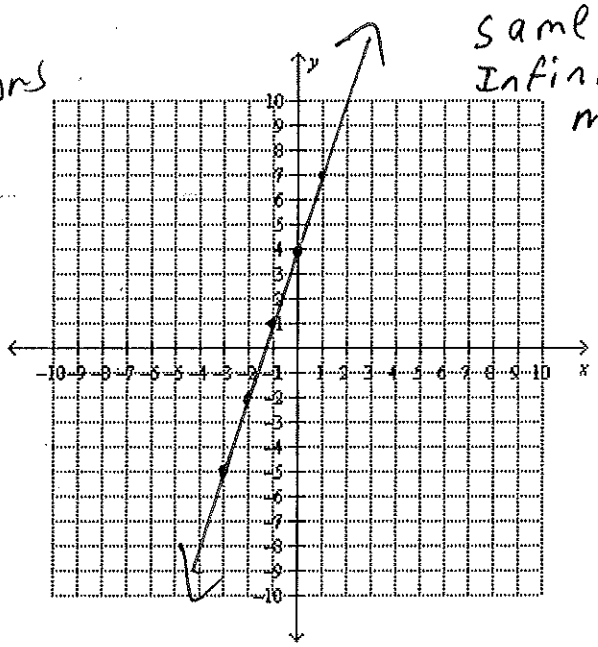


6. $y = 3x + 4$

$-12x + 4y = 16$

$y = 3x + 4$

same line Infinitely many solutions

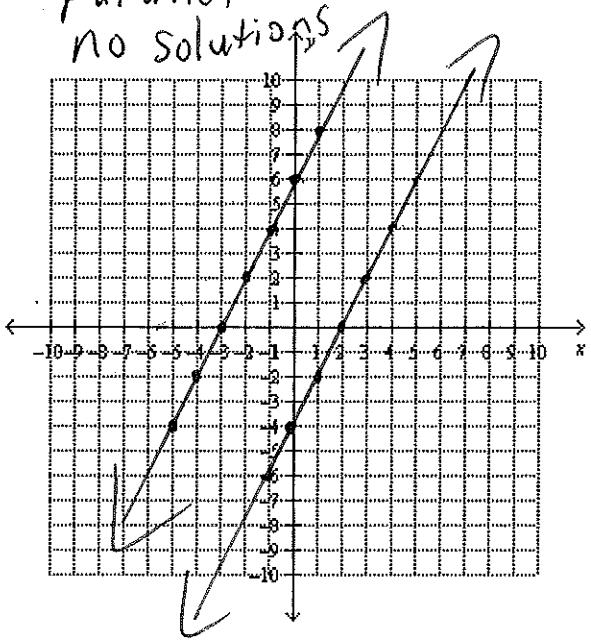


7. $y = 2x + 6$

$4x - 2y = 8$

$y = 2x + -4$

parallel no solutions



8. $y = 3x - 1$

$y = -2x + 4$

Answer (1, 2)