

SC Algebra 1
7.1 Graphing Systems of Equations

Warm Up:

Determine whether each ordered pair is a solution of $y = 3x$, a solution of $y = 2x - 2$, a solution of both equations or a solution of neither equation.

- | | | | | |
|----|----------|---|--------------------------------------|---------|
| 1. | (2, 2) | $y = 3x$
$2 = 3(2)$
$2 = 6$ | $y = 2x - 2$
$2 = 4 - 2$ | one |
| 2. | (-2, -6) | $-6 = 3(-2)$ | $y = 2x - 2$ ✓
$-6 = 2(-2) - 2$ | both |
| 3. | (2, 6) | $6 = 3(2)$ | $6 = 2(2) - 2$ | one |
| 4. | (1, 4) | $4 = 3(1)$ | $4 = 2(1) - 2$ | neither |

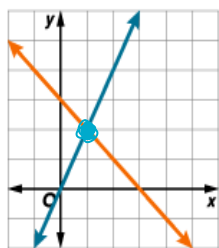
Speak Like A Mathematician

system of equations: a set of two or more equations with the same variables.

consistent: a system of equations with one ordered pair that satisfies both equations.

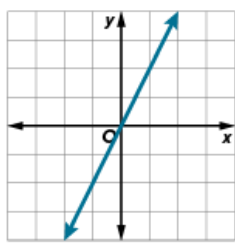
inconsistent: a system of equations with no ordered pairs that satisfies both equations.

Graphs of Systems of Equations



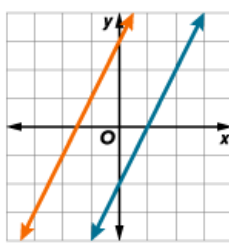
$$\begin{aligned} y &= 2x \\ y &= -x + 3 \end{aligned}$$

(1, 2)
one solution



$$\begin{aligned} y &= 2x \\ y - 4 &= 2x - 4 \\ +4 & \quad +4 \end{aligned}$$

$y = 2x$
infinitely many solutions



$$\begin{aligned} y &= 2x - 2 \\ y &= 2x + 3 \end{aligned}$$

no solution

3 Ways to Solve Systems:

1. Graphing
2. Substitution
3. Elimination

Example 1: Solving Consistent Systems by Graphing

Graph each system in the coordinate plane. Then, identify and check the solution.

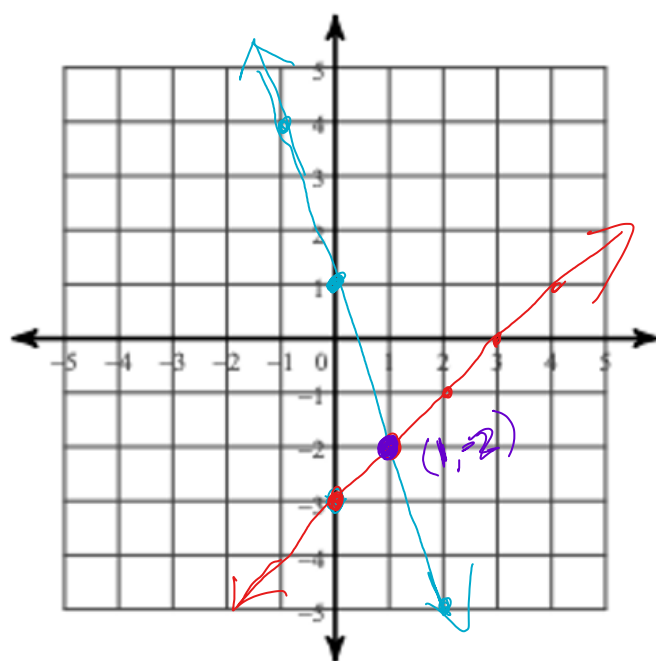
$y = -3x + 1$ (slope, y-int)
 $y = x - 3$ (slope, y-int)

$(1, -2)$

$-2 = -3(1) + 1$

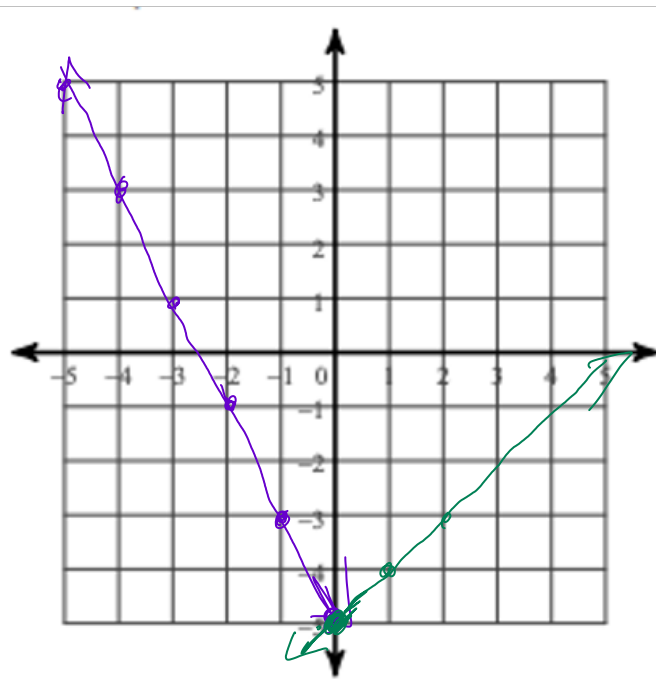
$-2 = -3 + 1$

$-2 = -2$



$-5 = -2(0) - 5$
 $y = -2x - 5$
 $y = x - 5$
 $-5 = 0 - 5$

$(0, -5)$ $\frac{2}{-1}$

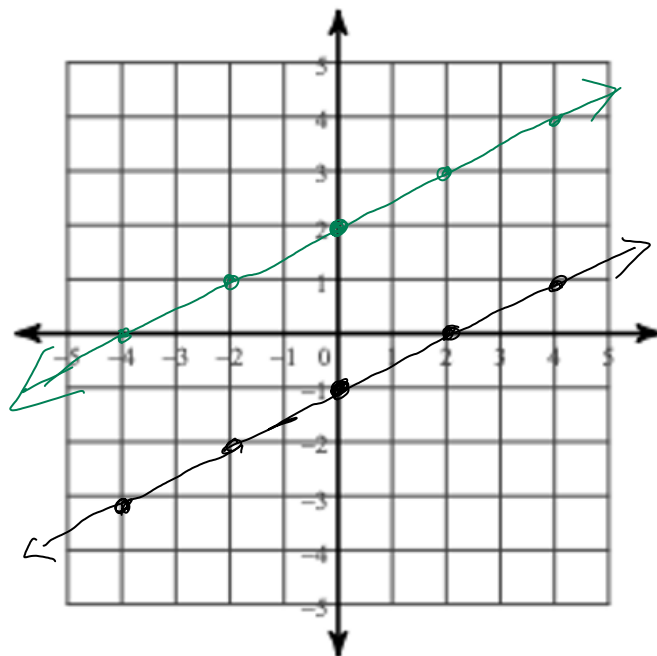


Example 2: Inconsistent Systems

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

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

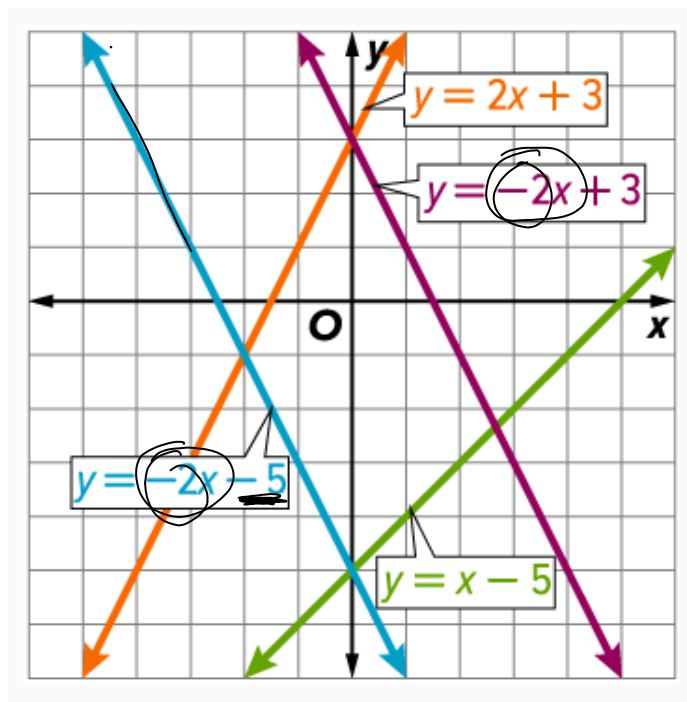
No
Solution



Complete the system with another line from the graph so that it is inconsistent. $\hookrightarrow$ no solution.

$$y = -2x - 5$$

$$y = -2x + 3$$



Example 3: Number of Solutions

Determine the number of solutions each system has.

a) $y = 8x + 3$
 $y = -8x + 5$

one solution

b) $y = 2x - 7$
 $y = 2x + 1$

no solution

c) $4y - 6x = 16$
 $+6x$
 $9x - 6y = -24$
 $-9x$ $-9x$

$$\frac{4y}{4} = \frac{6x + 16}{4}$$

$$y = \frac{3}{2}x + 4$$

$$\frac{-6y}{-6} = \frac{-9x - 24}{-6}$$

$$y = \frac{3}{2}x + 4$$

infinitely many

d) $y = \frac{2}{3}x - 6$ $m = \frac{2}{3}$ $b = (0, -6)$

$$6y - 4x = 9$$

 $+4x$ $+4x$

$$\frac{6y}{6} = \frac{4x + 9}{6}$$

$$y = \frac{2}{3}x + \frac{3}{2}$$

no solution

One Solution

- Different m's

No Solution

- Same m
- diff. b's

Infinitely Many

- Same m
- same b

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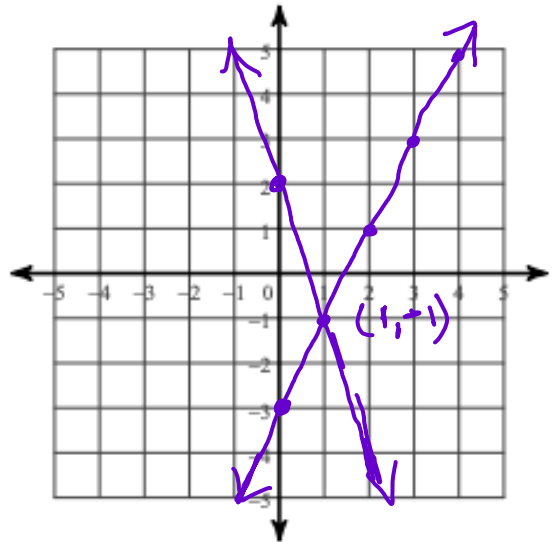
Practice:

Solve each system by graphing.

1) $y = 2x - 3$

$y = -3x + 2$

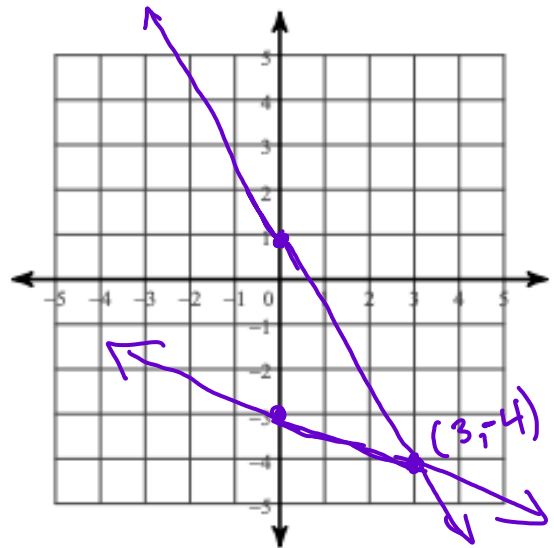
$(1, -1)$



2) $y = -\frac{5}{3}x + 1$

$y = -\frac{1}{3}x - 3$

$(3, -4)$



3) $5x + y = 4$

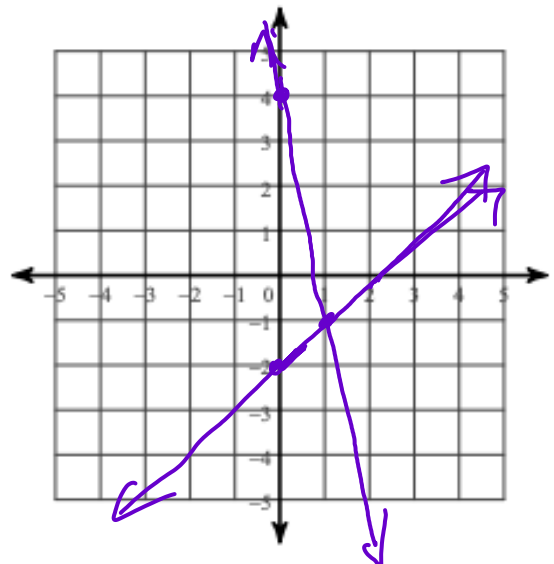
$y = -5x + 4$

$x - y = 2$

$-x \quad -x$

$y = x - 2$

$(1, -1)$



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Solve each system by graphing.

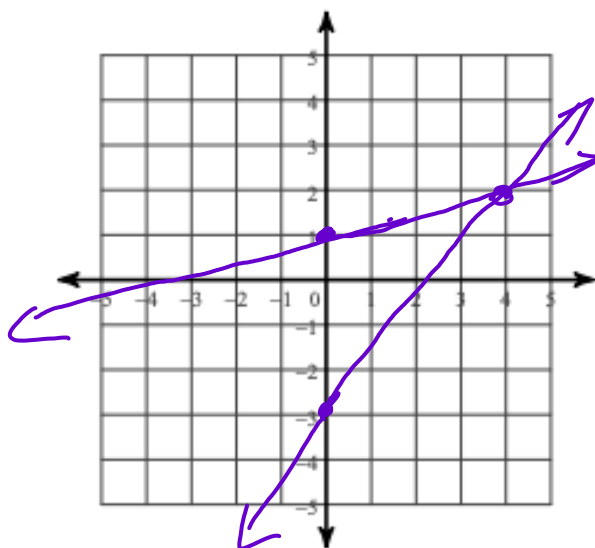
4) $x - 4y = -4$ $-4y = -x - 4$

$5x - 4y = 12$ $y = \frac{1}{4}x + 1$

$-4y = -5x + 12$

$y = \frac{5}{4}x - 3$

$(4, 2)$



5) $-2x - y = 1$

$-6x = 3y + 3$

$-3y + 6x - 3y + 6x$

$\frac{-3y}{-3} = \frac{6x+3}{-3}$

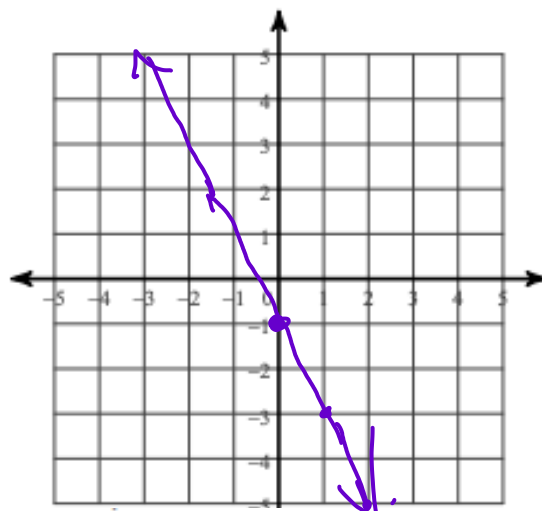
$y = -2x - 1$

$-y = +2x + 1$

$y = -2x - 1$

same line

Inf. Many Solutions



6) $x - 2y + 8 = 0$

$-6 - 2y = -x$

$\frac{-2y}{-2} = \frac{-x+6}{-2}$

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

$-2y = -x - 8$
 $y = \frac{1}{2}x + 4$

No Solution

