

Solving Systems of Equations by Graphing

A solution of a system of linear equations in two variables is an ordered pair (x, y) that satisfies each equation.

Example 1

Check whether

a) $(2, 2)$ **SOLUTION**

b) $(0, -1)$ **NOT A SOLUTION**

are **solutions** of the following system.

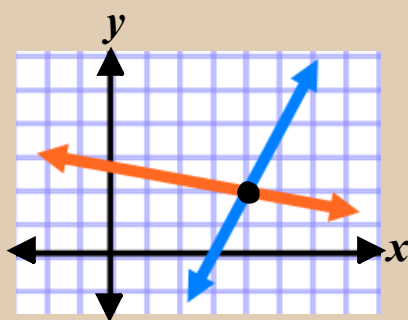
$3x - 2y = 2$

$x + 2y = 6$

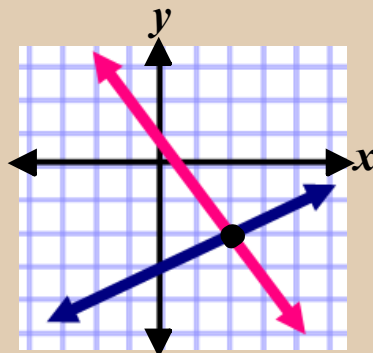
a) $(2, 2)$ $3(2) - 2(2) \stackrel{?}{=} 2$ $2 + 2(2) \stackrel{?}{=} 6$
 $6 - 4 \stackrel{?}{=} 2$ $2 + 4 \stackrel{?}{=} 6$
 $2 \stackrel{?}{=} 2$ $6 = 6 \checkmark$

b) $(0, -1)$ $3(0) - 2(-1) \stackrel{?}{=} 2$ $0 + 2(-1) \stackrel{?}{=} 6$
 $0 + 2 \stackrel{?}{=} 2$ $0 - 2 \stackrel{?}{=} 6$
 $2 = 2 \checkmark$ $-2 \neq 6$

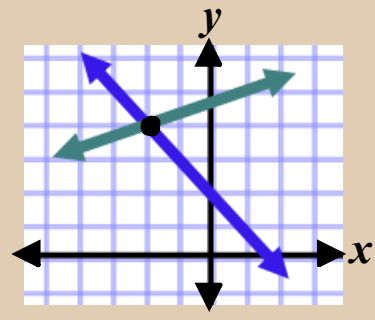
What is the solution of the following systems of equations?



$(4, 2)$



$(2, -2)$



$(-2, 4)$

Solve the system of equations by graphing.

2. ① $y = \frac{2}{3}x - 1$

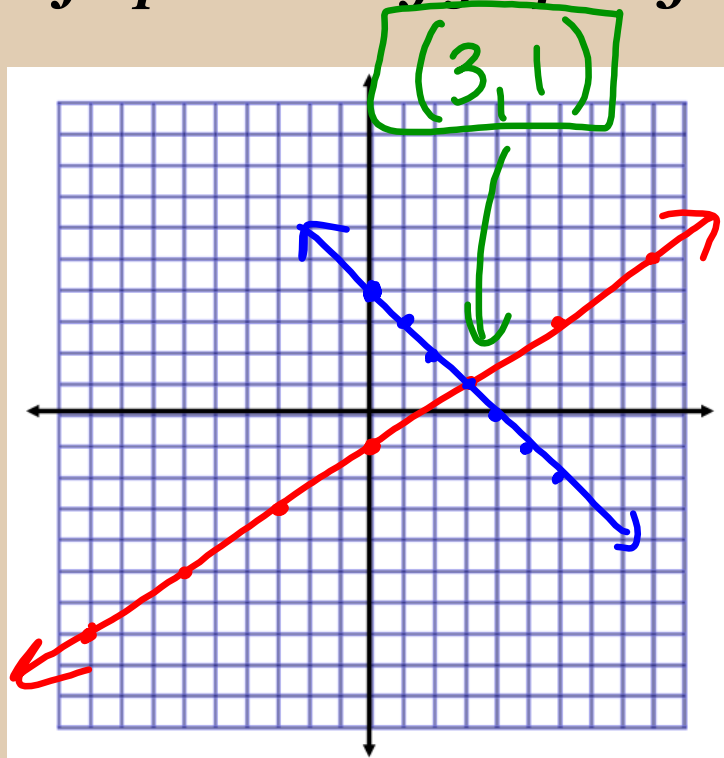
② $y = -x + 4$

① $y = \frac{2}{3}x - 1$

$m = \frac{2}{3} \rightarrow b = -1$

② $y = -x + 4$

$m = -1 = \frac{-1}{1} \rightarrow b = 4$



Solve the system of equations by graphing.

3. ① $y = -2x + 1$

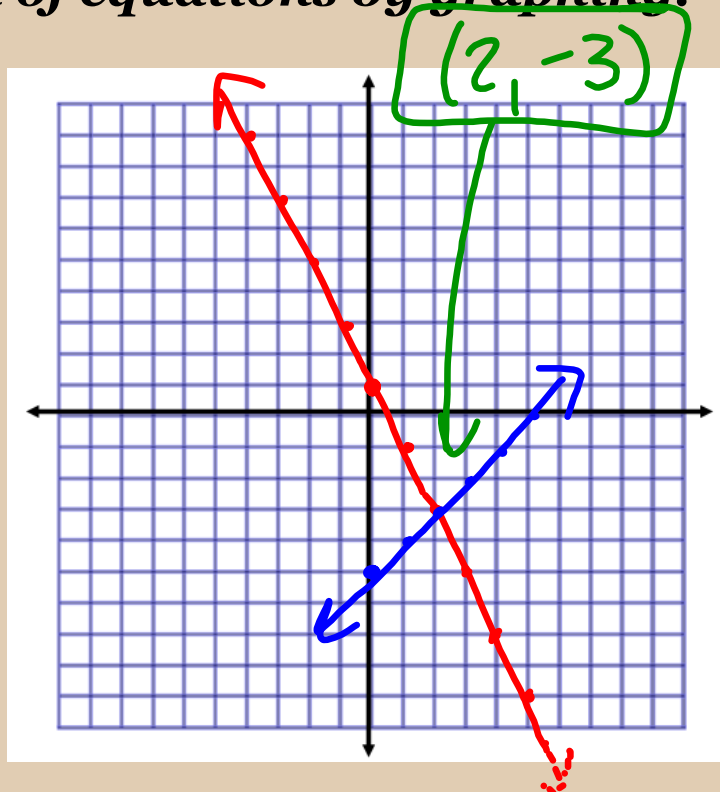
② $y = x - 5$

① $y = -2x + 1$

$m = \frac{-2}{1} \rightarrow b = 1$

② $y = x - 5$

$m = \frac{1}{1} \rightarrow b = -5$



Solve the system of equations by graphing.

4. ① $-2x + y = 0$

② $x + y = 3$

① $-2x + y = 0$
 $+2x \quad \quad +2x$

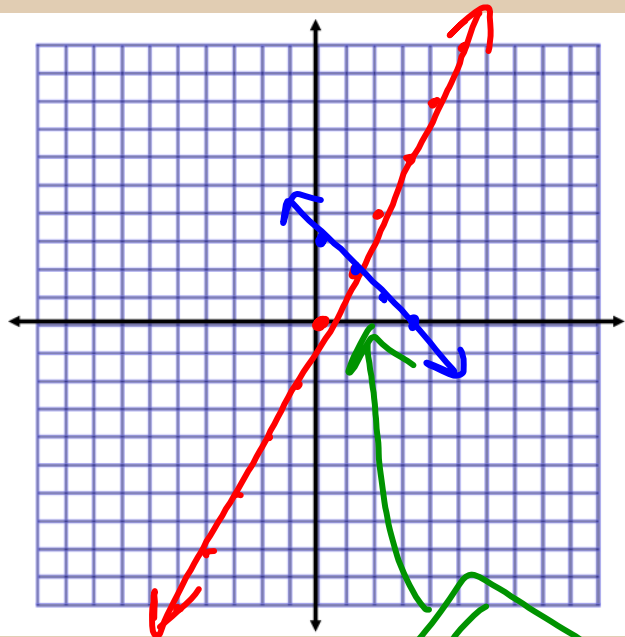
$y = 2x$

$m = 2 = \frac{2}{1} \rightarrow b = 0$

② $x + y = 3$
 $-x \quad \quad -x$

$y = 3 - x$

$m = -1 = \frac{-1}{1} \rightarrow b = 3$



$(1, 2)$

5. Your family is planning a barbeque. Hamburger costs \$3 per pound and chicken costs \$4 per pound. Your dad plans to spend \$60. Your mom buys 17 pounds of meat total. How many pounds of each did she buy?

Let $x =$ pounds of hamburger
 $y =$ pounds of chicken.

① $3x + 4y = 60$

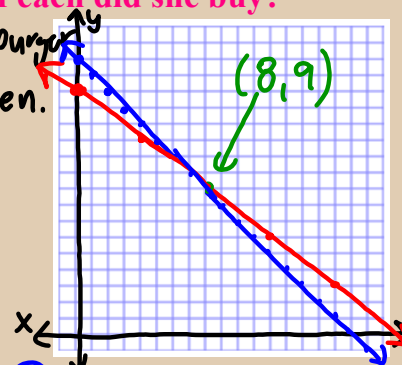
② $x + y = 17$

① $3x + 4y = 60$
 $-3x \quad \quad -3x$

$\frac{4y}{4} = \frac{60 - 3x}{4} \frac{-3x}{4}$

$y = 15 - \frac{3}{4}x$

$m = \frac{-3}{4} \rightarrow b = 15$



② $x + y = 17$
 $-x \quad \quad -x$

$y = 17 - x$

$m = -1 = \frac{-1}{1} \rightarrow b = 17$

8 lbs of hamburger
 $\& 9$ lbs of chicken

6. ① $y = -2x + 5$

What is the...

-slope? $\frac{-2}{1}$

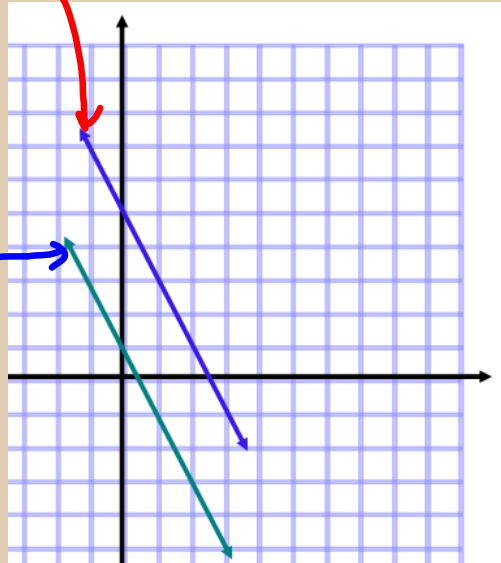
-y-intercept? 5

② $y = -2x + 1$

What is the...

-slope? $\frac{-2}{1}$

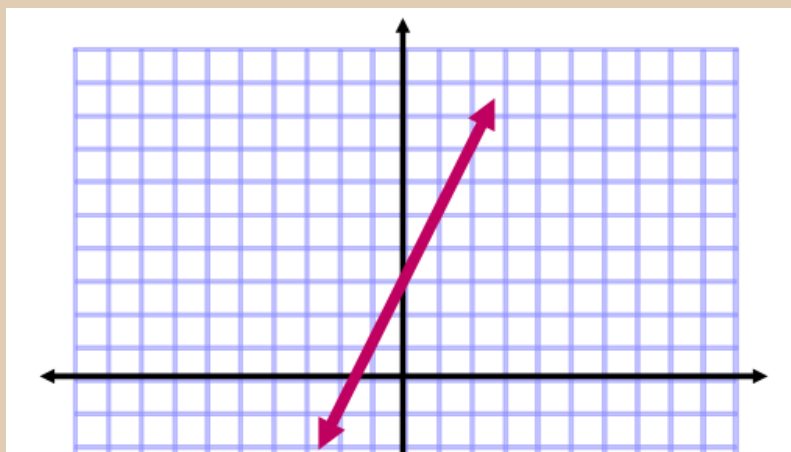
-y-intercept? 1



Answer: NO SOLUTION

7. ① $-2x + y = 3$ $y = 2x + 3$ ② $\frac{-4x - 6}{-2} = \frac{-2y}{-2}$ $y = 2x + 3$

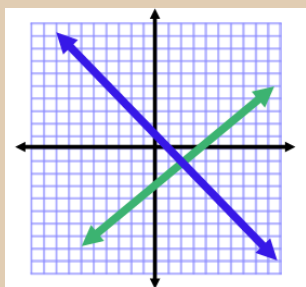
First, solve for y. Then graph.



Answer: INFINITELY MANY SOLUTIONS

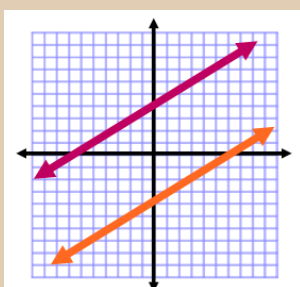
SUMMARY

If the two equations have different slopes, then the system has one solution.



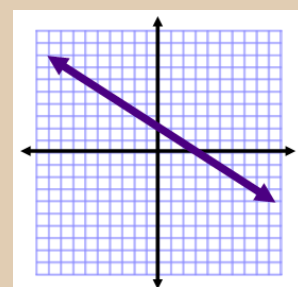
LINES INTERSECT
Exactly one solution

If the two equations have the same slope but different y-intercepts, then the system has no solution.



LINES ARE PARALLEL
No solution

If the two equations have the same slope and the same y-intercept, then the system has infinitely many solutions.



LINES COINCIDE
Infinitely many solutions