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)

b) (0, -1)

are **solutions** of the following system.

$3x - 2y = 2$

$x + 2y = 6$

a) $(2, 2)$

$3(2) - 2(2) \stackrel{?}{=} 2$

$6 - 4 = 2$

$2 = 2$ ✓

$(2) + 2(2) \stackrel{?}{=} 6$

$2 + 4 = 6$

$6 = 6$ ✓

$(2,2)$ is a solution

b) $(0, -1)$

$3(0) - 2(-1) \stackrel{?}{=} 2$

$0 + 2 = 2$

$2 = 2$ ✓

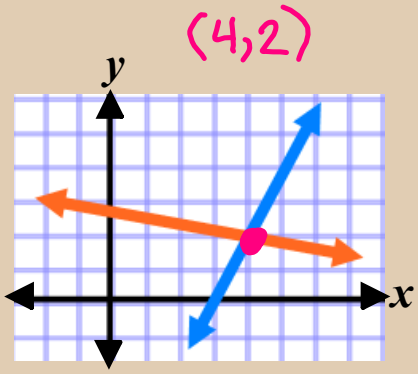
$(0) + 2(-1) \stackrel{?}{=} 6$

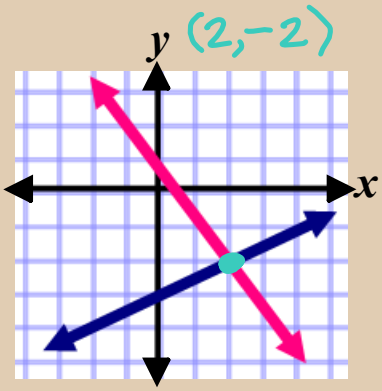
$0 - 2 = 6$

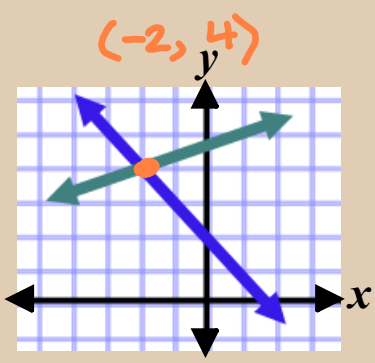
$-2 \neq 6$

$(0,-1)$ is not a solution

What is the solution of the following systems of equations?







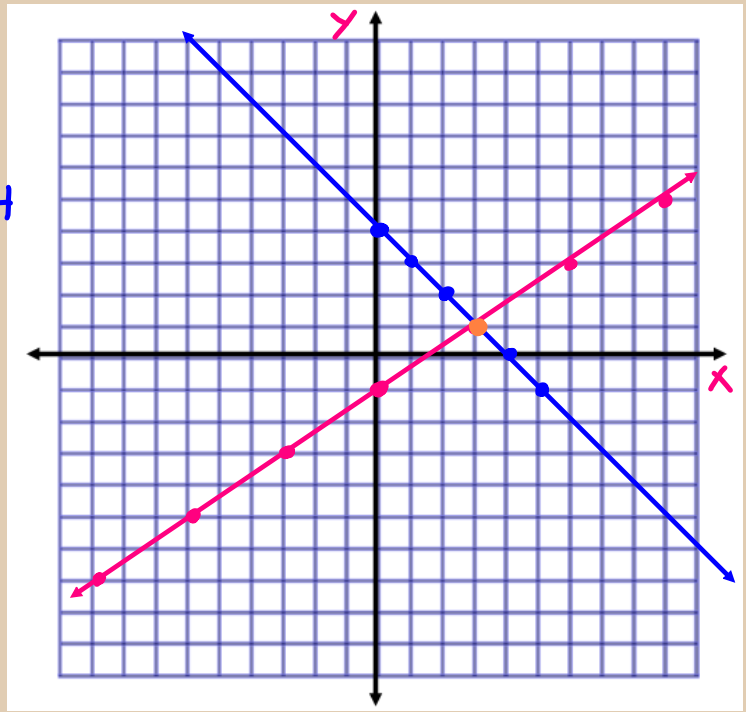
Solve the system of equations by graphing.

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

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

$y = -x + 4$
$m = \frac{-1}{1}$
y-int = 4

(3, 1)



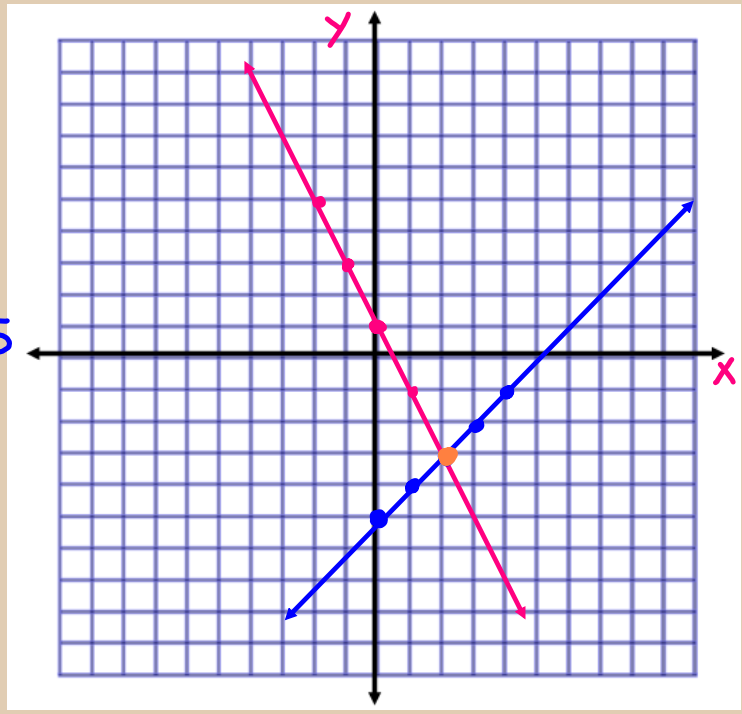
Solve the system of equations by graphing.

3. $y = -2x + 1$
$y = x - 5$

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

$y = x - 5$
$m = \frac{1}{1}$
y-int = -5

(2, -3)



Solve the system of equations by graphing.

4. $-2x + y = 0$

$x + y = 3$

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

$m = \frac{2}{1}$

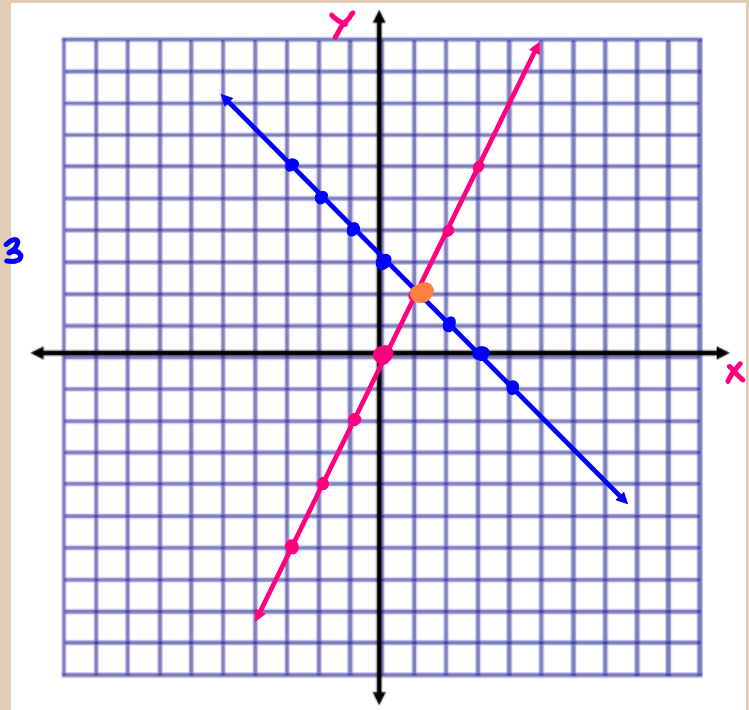
y-int = 0

$x + y = 3$, $-x \quad -x$, $y = -x + 3$

$m = \frac{-1}{1}$

y-int = 3

(1,2)



x = hamburger (lbs) y = chicken (lbs)

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?

money: $3x + 4y = 60$, $-3x \quad -3x$

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

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

$m = -\frac{3}{4}$

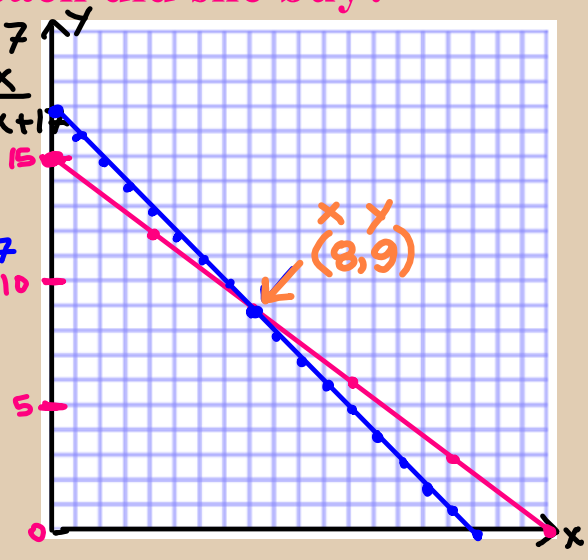
y-int = 15

lbs of meat: $x + y = 17$, $-x \quad -x$

$y = -x + 17$

$m = \frac{-1}{1}$

y-int = 17



8 lbs of hamburger

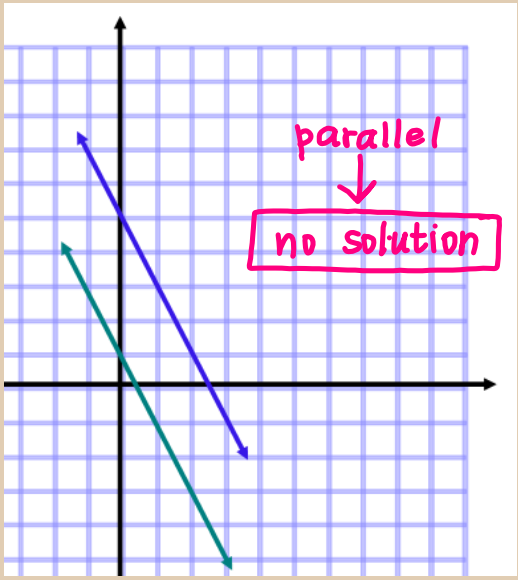
9 lbs of chicken

6. $y = -2x + 5$

What is the...
-slope? −2
-y-intercept? 5

$y = -2x + 1$

What is the...
-slope? −2
-y-intercept? 1



Answer:

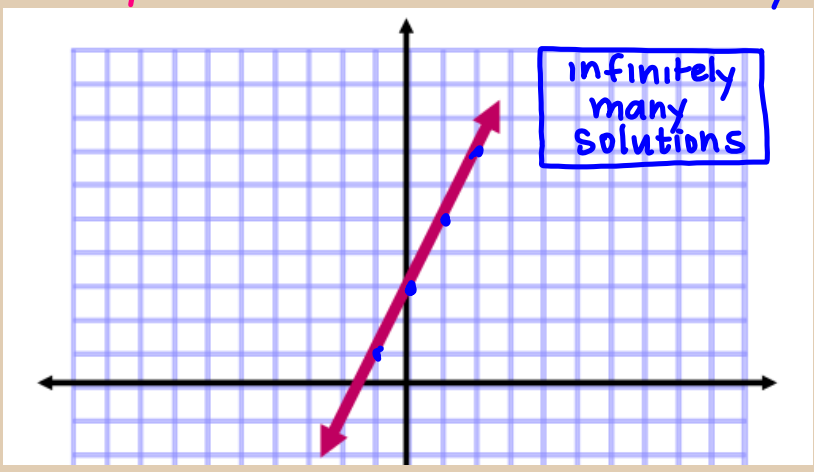
7. $-2x + y = 3$ (+2x, +2x)

$y = 2x + 3$

$\frac{-4x - 6}{-2} = \frac{-2y}{-2}$

$2x + 3 = y$

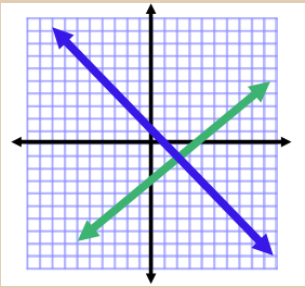
First, solve for y. Then graph.



Answer:

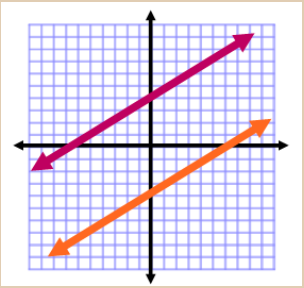
SUMMARY

If the two equations have <u>different</u> slopes, then the system has one solution.



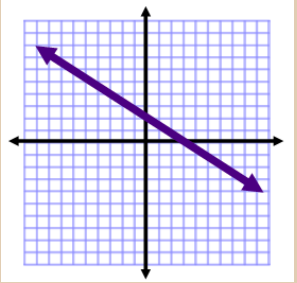
<u>LINES INTERSECT</u>
Exactly one solution

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



<u>LINES ARE PARALLEL</u>
No solution

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



<u>LINES COINCIDE</u>
Infinitely many solutions