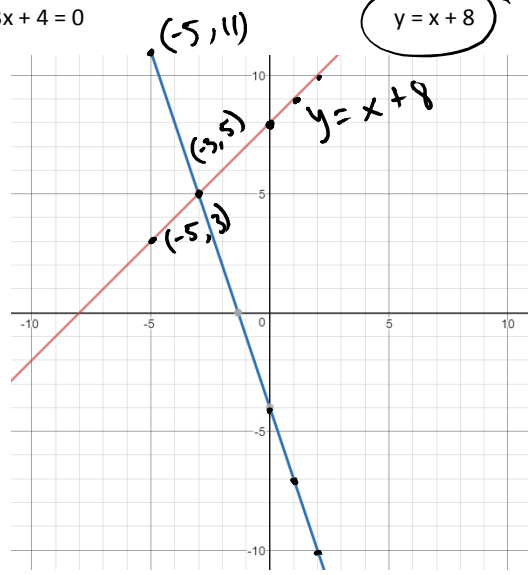
8.1: Graphing Systems of Equations

November 14, 2016 7:55 PM

Not important: Often in math a single equation is not enough to solve a problem. Systems of equations look at multiple relationships between variables to create multiple equations.

Students Try first: Graph both these equations on the same graph.

y + 3x + 4 = 0



slope-intercept form

$y = mx + b$

$y = x + 8$

$m = \frac{1}{1}$ up 1 right 1

$b = 8$

$y + 3x + 4 = 0$

$-3x \quad -3x$

$y + 4 = -3x$

$-4 \quad -4$

$y = -3x - 4$

$m = \frac{-3}{1}$ down 3 right 1

$b = -4$

each line represents valid solutions to their equations

Question: For the first equations what does y equal when x = -5?

$y = 11$

Question: For the second equation what does y equal when x = -5?

$y = 3$

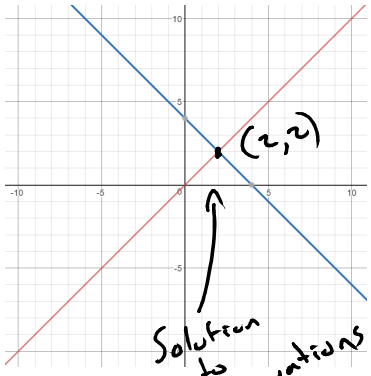
Question: What does the point (-3,5) represent?

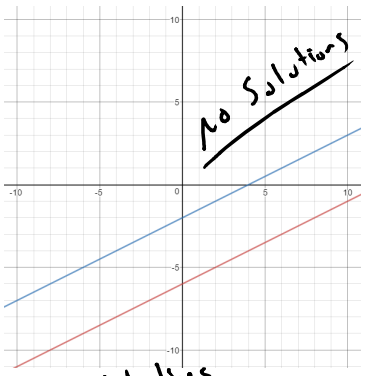
A solution to both equations

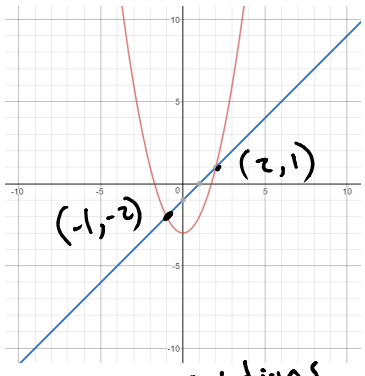
Important: The graph of an equation represents all the solutions to that equation. The intersection of the two lines is a solution to both equations.

Students try first:

Find the solution to the following graphs of equations. (Hint: find the intersections)







y-intercepts
No Solutions

Question: What would happen if the two lines where right on top of each other?

They would intersect everywhere which means infinite Solutions

* This happens when two lines have the same slope and same y-intercept.

Graph the following equations and find the solution to the system.

Q1: y = 2x - 1
2y = x + 1

$y = mx + b$

$y - y_1 = m(x - x_1)$

$y = 2x - 1$ ↑ slope, ↑ y-int

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

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

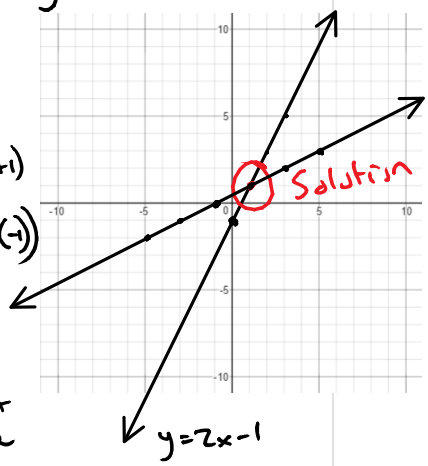
$y = \frac{1}{2}(x+1)$

$b = -1$

$y - 0 = \frac{1}{2}(x - (-1))$

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

$(x_1, y_1) = (-1, 0)$ ↑ start here



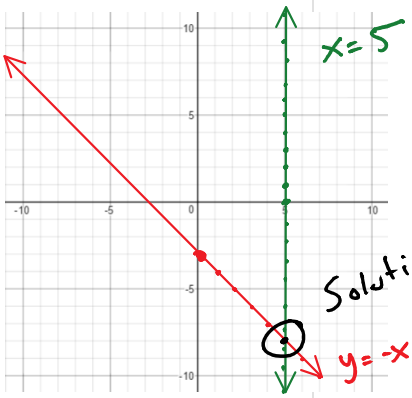
Q2: y = -x - 3
x = 5

$y = -x - 3$

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

$b = -3$

$x = 5$



Q3 y = 5x - 6
y + 1 = 5 (x - 1)

$y = 5x - 6$

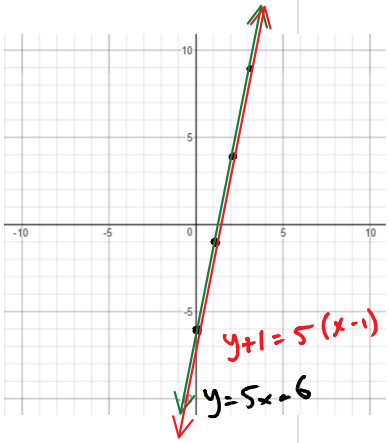
$m = \frac{5}{1}$

$b = -6$

$y - y_1 = m(x - x_1)$

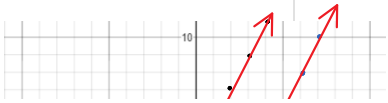
$m = \frac{5}{1}$

$(x_1, y_1) = (1, -1)$



overlapping Lines
infinite Solutions

Q4: y = 2x - 4



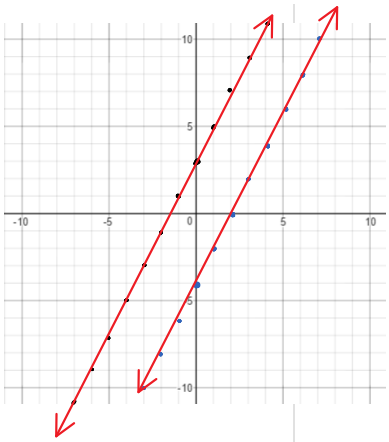
Solution

Q4: $y = 2x - 4$
$y = 2x + 3$

$y = 2x - 4$ $\quad y = 2x + 3$

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

$b = -4$ $\quad b = 3$



no Solution

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HW: 1-17 odd questions on