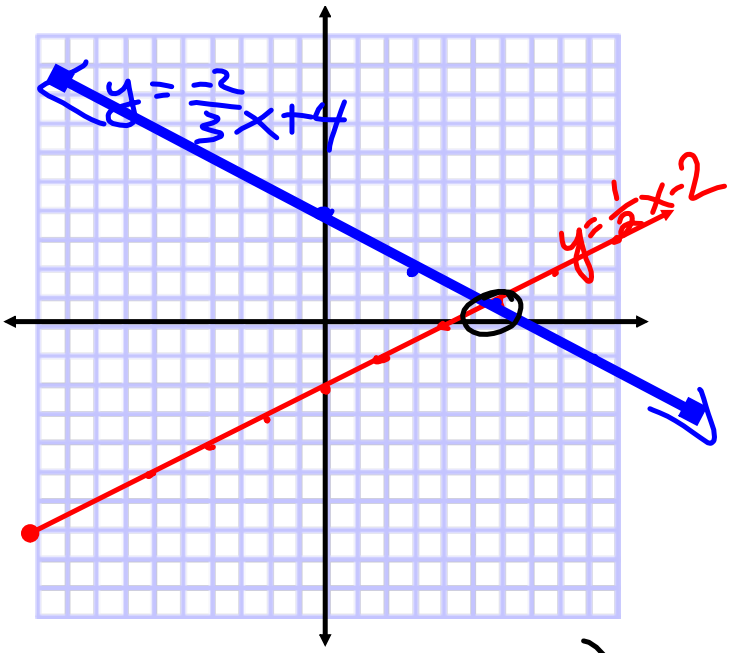
Warm Up

Solve the following system graphically

$$\begin{cases} y = \frac{1}{2}x - 2 \\ y = -\frac{2}{3}x + 4 \end{cases}$$

m= b b= m=




SOLUTION: (6, 1)

# Lesson 27: Nature of Solutions of a System of Linear Equations

$y = mx + b$

Classwork

**Exercises**

how many solutions → Find slope.

Determine the nature of the solution to each system of linear equations.

1. $\begin{cases} 3x + 4y = 5 \\ y = -\frac{3}{4}x + 1 \end{cases}$ → $3x + 4y = 5$

$-3x \quad -3x$

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

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

m

m

Same slope w/ different y-ints means NO solutions!

2. $\begin{cases} 7x + 2y = -4 \\ x - y = 5 \end{cases}$

$x - y = 5$

$-1x \quad -1x$

$-1y = -1x + 5$

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

$y = 1x - 5$

$m = 1$

$7x + 2y = -4$

$-7x \quad -7x$

$\frac{2y}{2} = \frac{-7x}{2} - \frac{4}{2}$

$y = \frac{-7}{2}x - 2$

$m = \frac{-7}{2}$

Different slopes means exactly one solution!

3. $\begin{cases} 9x + 6y = 3 \\ 3x + 2y = 1 \end{cases}$

$3(3x + 2y = 1)\ 3 \rightarrow 9x + 6y = 3$

Same slope and the same y-intercept, so this has infinite # of solutions

Determine the nature of the solution to each system of linear equations. If the system has a solution, find it algebraically, and then verify that your solution is correct by graphing.

4. $\begin{cases} 3x + 3y = -21 \\ x + y = -7 \end{cases}$

$3(x + y = -7 \cdot 3) \rightarrow 3x + 3y = -21$

Same eqn → infinite # of solutions!

5. $\begin{cases} y = \frac{3}{2}x - 1 \\ 3y = x + 2 \end{cases}$ $\frac{3y}{3} = \frac{x}{3} + \frac{2}{3}$ → $y = \frac{1}{3}x + \frac{2}{3}$

ANS: $\left(\frac{10}{7}, \frac{8}{7}\right)$

$\frac{6}{1}\cdot\frac{3}{2}x - 6 = \frac{6}{1}\cdot\frac{1}{3}x + \frac{2}{3}\cdot\frac{6}{1}$ LCD = 6

$\frac{18}{2}x - 6 = \frac{6}{3}x + \frac{12}{3}$

$9x - 6 = 2x + 4$

$-4 \quad -4$

$9x - 10 = 2x$

$-9x \quad -9x$

$-10 = -7x$

$\frac{-10}{-7} = \frac{-7x}{-7}$

$\frac{10}{7} = x$

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

$y = \frac{3}{2}\cdot\frac{10}{7} - 1$

$y = \frac{30}{14} - 1$

$y = \frac{15}{7} - 1$

$y = \frac{15}{7} - \frac{7}{7} = \frac{8}{7}$

6. $\begin{cases} x = 12y - 4 \\ x = 9y + 7 \end{cases}$

7. Write a system of equations with $(4, -5)$ as its solution.