5-1 Systems of Equations & Solving by Graphing

Q: How can you find the solution of a system of linear equations by graphing?

❒ **System of Linear Equations:**
a set of two or more linear equations containing two or more variables.

Ex: $\begin{cases} y = 4x + 3 \\ 2x + 8y = 12 \end{cases}$

❒ **Solution of a System of Linear Equations:**
an ordered pair that satisfies each equation. It must make BOTH equations true.

IDENTIFYING SOLUTIONS TO SYSTEMS OF EQUATIONS

Tell whether the ordered pair is a solution of the given system.

1. (5, 2) $\begin{cases} \frac{2}{5}x - y = 0 \\ 3x - y = 13 \end{cases}$ (x, y)

$\frac{2}{5}(x) - (y) = 0$

$\frac{2}{5}(5) - (2) = 0$

$2 - 2 = 0$

$0 = 0$ ✓

$3x - y = 13$

$3(5) - (2) = 13$

$15 - 2 = 13$

$13 = 13$ ✓

(5,2) is a solution

2. (-2, 2) $\begin{cases} x + 3y = 4 \\ y = x + 2 \end{cases}$

$x + 3y = 4$

$-2 + 3(2) = 4$

$-2 + 6 = 4$

$4 = 4$ ✓

$y = x + 2$

$2 = -2 + 2$

$2 = 0$ ✗

(-2,2) is NOT a solution

3. (1, 3) $\begin{cases} y = -2x + 5 \\ y = 2x + 1 \end{cases}$

$y = -2x + 5$

$3 = -2(1) + 5$

$3 = -2 + 5$

$3 = 3$ ✓

$y = 2x + 1$

$3 = 2(1) + 1$

$3 \neq 2 + 1$

$3 = 3$ ✓

(1,3) is a solution

Solving a System of Equations

BY GRAPHING

1. Solve each equation for y.

   $y = mx + b$

2. Graph all equations on the same coordinate plane.

3. Look for the point of intersection.

   (where they cross)

Example:

Solve the system by graphing.

$$\begin{cases} 4y - x = 16 \\ y = \frac{3}{2}x - 1 \end{cases}$$

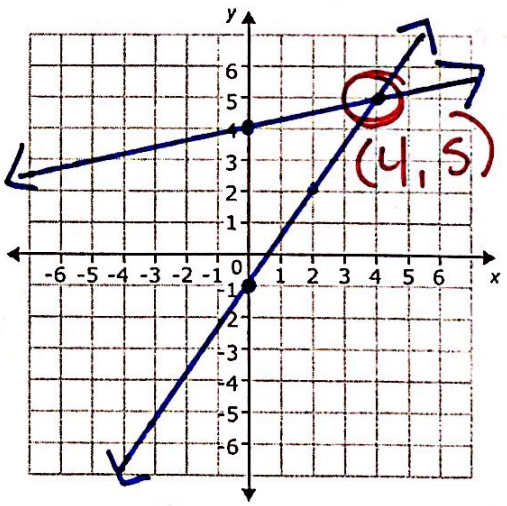
1. $4y - x = 16$

   $+x \quad +x$

   $\frac{4y}{4} = \frac{1x + 16}{4} \quad \frac{}{4}$

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

   m/slope, y-int; m/slope, y-int

2. 

3. (x, y)

   (4, 5)

CHECK:

$4y - x = 16$

$4(5) - (4) = 16$

$20 - 4 = 16$

$16 = 16$ ✓

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

$5 = \frac{3}{2}(4) - 1$

$5 = 6 - 1$

$5 = 5$ ✓