

Lesson 8-2

Example 1

Determine whether the ordered pair $(-2, 5)$ is a solution of the system of equations.

$$\begin{aligned}2x + y &= 1 \\x - y &= -7\end{aligned}$$

Solution

Substitute -2 for x and 5 for y in both equations.

$$\begin{array}{ll}2x + y = 1 & x - y = -7 \\2(-2) + 5 \stackrel{?}{=} 1 & -2 - 5 \stackrel{?}{=} -7 \\-4 + 5 \stackrel{?}{=} 1 & -7 = -7 \checkmark \\1 = 1 \checkmark & \end{array}$$

Since $(-2, 5)$ makes both equations true, it is a solution of the system of equations.

Example 2

Solve each system of equations graphically. Check the solution.

a. $y = -3x + 7$
 $y = x - 1$

b. $y = 4x - 3$
 $y = 4x + 1$

Solution

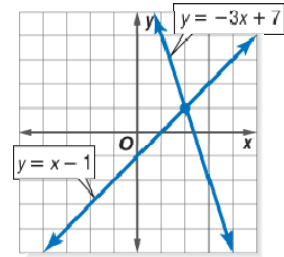
- a. First graph each equation using the slope m and the y -intercept b . Then read the solution from the graph.

$$y = -3x + 7 \quad b = 7 \quad y = mx + b$$

$$m = -3$$

$$y = x - 1 \quad b = -1$$

$$m = 1$$



The solution is $(2, 1)$, the point of intersection of the two lines.

To check the solution, substitute $(2, 1)$ in each equation.

$$y = -3x + 7 \quad y = x - 1$$

$$1 \stackrel{?}{=} -3(2) + 7 \quad 1 \stackrel{?}{=} 2 - 1$$

$$1 = 1 \checkmark \quad 1 = 1 \checkmark$$

- b. Since both equations have the same slope, $m = 4$, you do not need to graph the lines to know they are parallel. Therefore, there is no solution.

Example 3

Solve the system of equations.

$$\begin{aligned}x + 2y &= 6 \\5x + 3y &= 9\end{aligned}$$

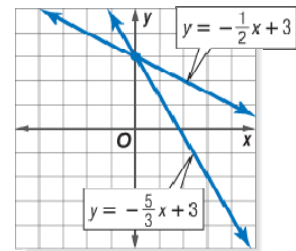
Solution

First write each equation in slope-intercept form, $y = mx + b$.

$$\begin{aligned}x + 2y &= 6 & 5x + 3y &= 9 \\2y &= -x + 6 & 3y &= -5x + 9 \\y &= -\frac{1}{2}x + 3 & y &= -\frac{5}{3}x + 3\end{aligned}$$

Then graph each equation using m and b .

$$\begin{aligned}y &= -\frac{1}{2}x + 3 & b &= 3 \\ & & m &= -\frac{1}{2} \\ y &= -\frac{5}{3}x + 3 & b &= 3 \\ & & m &= -\frac{5}{3}\end{aligned}$$



The solution is $(0, 3)$.

Example 4

GRAPHING Use a graphing utility to solve the system of equations.

$$\begin{aligned}4x + y &= 10 \\ x - y &= 5\end{aligned}$$

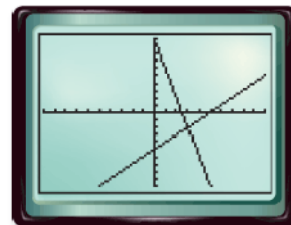
Solution

First write the equation in slope-intercept form, $y = mx + b$.

$$\begin{aligned}4x + y &= 10 & x - y &= 5 \\ y &= -4x + 10 & y &= x - 5\end{aligned}$$

Then graph both equations on your graphing utility. Use the Intersection command in the Calculate menu, or zoom in on the intersection and use the Trace feature.

The point of intersection is $(3, -2)$.



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