

# Solving Systems of Linear Equations: Graphing



A **system of linear equations** contains two or more linear equations that use the same variables. The solution is the ordered pair that makes each equation in the system true. So, you can solve a system of linear equations by graphing the lines and finding the point where they intersect.

**Let's try an example!** Solve this system of equations by graphing. →

$$\begin{aligned} y &= x - 1 \\ x + 2y &= 4 \end{aligned}$$



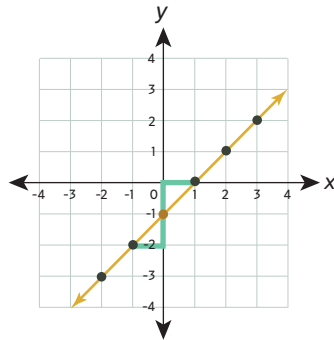
1. To help you graph the equations, make sure each equation is in slope-intercept form. The first equation is already written in slope-intercept form, but the second equation is not. Rewrite the second equation:

$$x + 2y = 4 \quad \text{Subtract } x \text{ from both sides.}$$

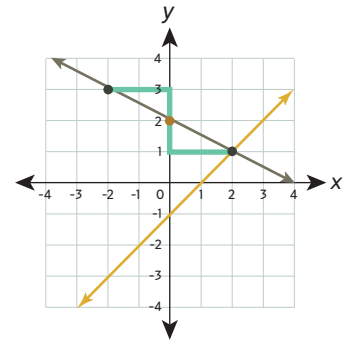
$$2y = -x + 4 \quad \text{Divide everything on each side of the equation by 2.}$$

$$y = -\frac{1}{2}x + 2 \quad \text{Now the second equation is in slope-intercept form.}$$

2. Next, use the y-intercept and the slope to graph the first equation,  $y = x - 1$ .

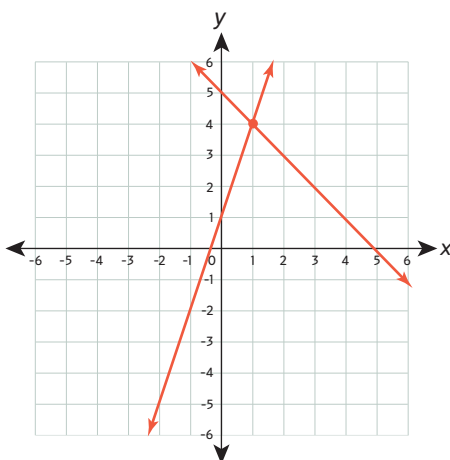


3. Then, graph the second equation,  $y = -\frac{1}{2}x + 2$ , on the same coordinate plane.



The **solution** to this system of equations is the point of intersection:  $(2, 1)$

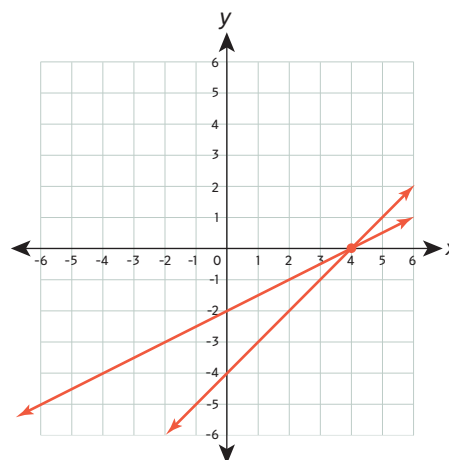
**Try it yourself!** Graph each system of equations. Then, write the solution.



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

**Solution:**

$$\left( \underline{1}, \underline{4} \right)$$



$$\begin{aligned} y &= x - 4 \\ y &= \frac{1}{2}x - 2 \end{aligned}$$

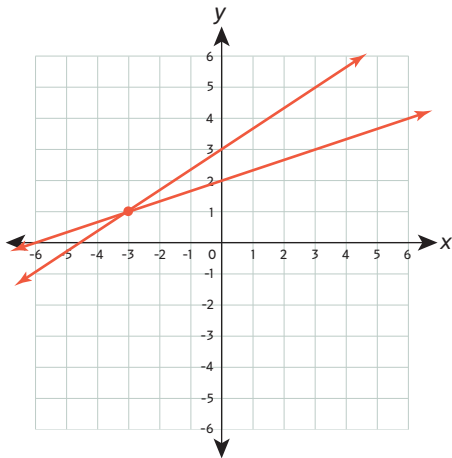
**Solution:**

$$\left( \underline{4}, \underline{0} \right)$$

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**Keep going!** Graph each system of equations. Then, write the solution.

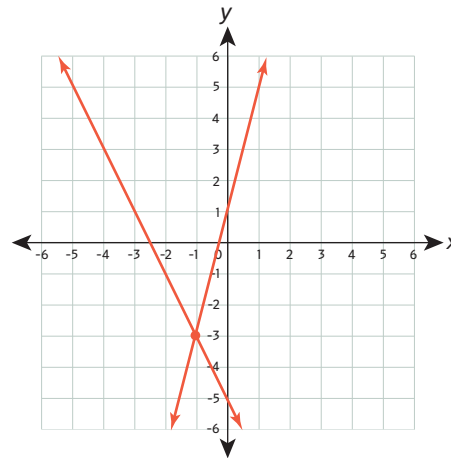


$$y = \frac{2}{3}x + 3$$

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

**Solution:**

$$\left( \underline{-3}, \underline{1} \right)$$

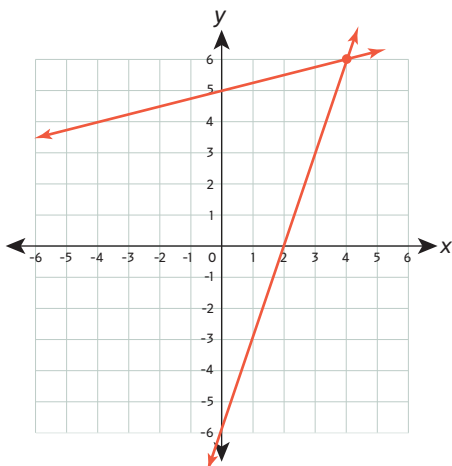


$$y = -2x - 5$$

$$y = 4x + 1$$

**Solution:**

$$\left( \underline{-1}, \underline{-3} \right)$$

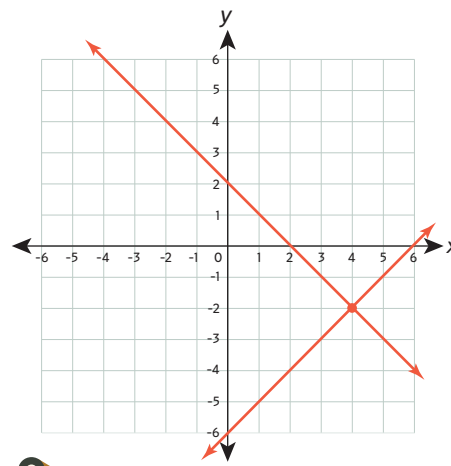


$$y = 3x - 6$$

$$y = \frac{1}{4}x + 5$$

**Solution:**

$$\left( \underline{4}, \underline{6} \right)$$

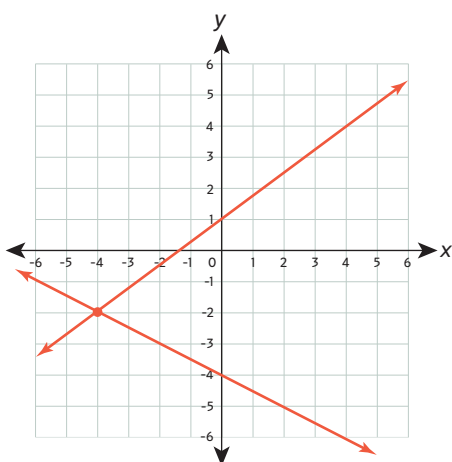


$$x + y = 2$$

$$y = x - 6$$

**Solution:**

$$\left( \underline{4}, \underline{-2} \right)$$

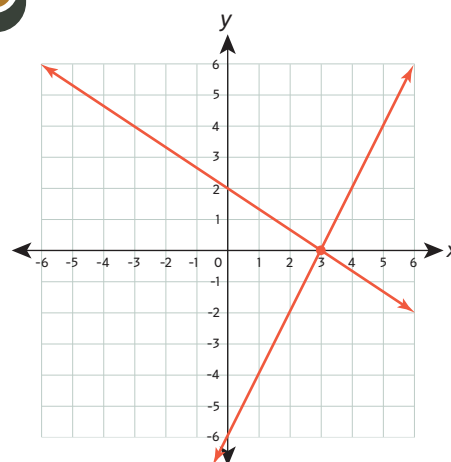


$$y = \frac{3}{4}x + 1$$

$$x + 2y = -8$$

**Solution:**

$$\left( \underline{-4}, \underline{-2} \right)$$



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

$$-6x + 3y = -18$$

**Solution:**

$$\left( \underline{3}, \underline{0} \right)$$

