

## Lesson 8-3

## Example 1

Solve the system of equations. Check the solution.

$$2x - 2y = 4$$

$$x + y = 6$$

## Solution

$$\begin{aligned} x + y &= 6 \\ y &= -x + 6 \end{aligned}$$

Solve the second equation for  $y$  in terms of  $x$ .

$$\begin{aligned} 2x - 2y &= 4 \\ 2x - 2(-x + 6) &= 4 \\ 2x + 2x - 12 &= 4 \\ 4x &= 16 \\ x &= 4 \end{aligned}$$

Write the first equation.  
Substitute  $(-x + 6)$  for  $y$ .  
Solve for  $x$ .

Choose one of the original equations.

$$\begin{aligned} x + y &= 6 \\ 4 + y &= 6 \\ 4 - 4 + y &= 6 - 4 \\ y &= 2 \end{aligned}$$

Substitute 4 for  $x$ .  
Solve for  $y$ .

Check  $x = 4$  and  $y = 2$  in each original equation.

$$\begin{aligned} 2x - 2y &= 4 \\ 2(4) - 2(2) &\stackrel{?}{=} 4 \\ 4 &= 4 \quad \checkmark \end{aligned}$$

$$\begin{aligned} x + y &= 6 \\ 4 + 2 &\stackrel{?}{=} 6 \\ 6 &= 6 \quad \checkmark \end{aligned}$$

The solution is  $(4, 2)$ .

**Example 2**

**EXERCISE** Pedro and Kerri typically exercise for a total of 11 hours each week. Kerri exercises 1 hour less than twice the number of hours Pedro exercises each week. How many hours does each person spend exercising in a typical week?

**Solution**

Define each of the variables. Write and solve a representative system of equations.

Let  $p$  = number of hours Pedro exercises

Let  $k$  = number of hours Kerri exercises

The two exercise for a total of 11 hours each week.

$$p + k = 11$$

Kerri exercises 1 hour less than twice the number of hours Pedro exercises each week.

$$k = 2p - 1$$

$$\begin{aligned} p + k &= 11 \\ p + 2p - 1 &= 11 \\ 3p - 1 &= 11 \\ 3p &= 12 \\ p &= 4 \end{aligned}$$

$$\begin{aligned} p + k &= 11 \\ 4 + k &= 11 \\ k &= 11 - 4 \\ k &= 7 \end{aligned}$$

Pedro exercises for 4 hours each week, and Kerri exercises for 7 hours each week.

**Check**

$$\begin{aligned} p + k &= 11 \\ 4 + 7 &\stackrel{?}{=} 11 \\ 11 &= 11 \checkmark \end{aligned}$$

$$\begin{aligned} k &= 2p - 1 \\ 7 &\stackrel{?}{=} 2(4) - 1 \\ 7 &= 7 \checkmark \end{aligned}$$

**Example 3**

Solve the system of equations.

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

**Solution**

$$\begin{aligned}x - 3y &= -2 && \text{Solve for } x. \\ x &= 3y - 2\end{aligned}$$

$$\begin{aligned}-2x + 6y &= 5 \\ -2(3y - 2) + 6y &= 5 && \text{Substitute } 3y - 2 \text{ for } x. \\ -6y + 4 + 6y &= 5 \\ 4 &\neq 5\end{aligned}$$

Since  $4 \neq 5$ , the lines are parallel. There is no solution.