Section Overview

Professional Development

Solving Systems of Linear Equations — Lesson 6-1, 6-2, 6-3

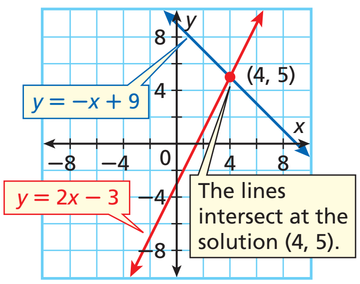
Why? Systems of linear equations are used to represent situations and solve problems involving consumer economics, finance, and geometry.

A system of linear equations is a set of two or more linear equations containing two or more variables.

$$\begin{cases} y = -x + 9 \\ y = 2x - 3 \end{cases}$$

Solving by Graphing

$$\begin{cases} y = -x + 9 \\ y = 2x - 3 \end{cases}$$



Solving by Substitution

$$\begin{cases} y = -x + 9 \\ y = 2x - 3 \end{cases}$$

$$\begin{aligned} 2x - 3 &= -x + 9 \\ +x \quad &\quad +x \\ 3x - 3 &= 9 \\ +3 \quad &\quad +3 \\ 3x &= 12 \\ \frac{3x}{3} &= \frac{12}{3} \\ x &= 4 \end{aligned}$$

Substitute $2x - 3$ for y in the first equation, and solve for x.

$$\begin{aligned} y &= -x + 9 \\ y &= -(4) + 9 \\ y &= 5 \end{aligned}$$

Substitute 4 for x in one of the original equations.

The solution is $(4, 5)$.

Solving by Elimination

$$\begin{cases} y + x = 9 \\ y - 2x = -3 \end{cases}$$

$$\begin{aligned} y + x &= 9 \\ -(y - 2x &= -3) \\ 0y + 3x &= 12 \\ \frac{3x}{3} &= \frac{12}{3} \\ x &= 4 \end{aligned}$$

Subtract the equations to eliminate the y terms, and solve for x.

$$\begin{aligned} x + y &= 9 \\ 4 + y &= 9 \\ -4 \quad &\quad -4 \\ y &= 5 \end{aligned}$$

Substitute 4 for x in one of the original equations.

The solution is $(4, 5)$.

Check the solution by substituting for x and y in both equations.

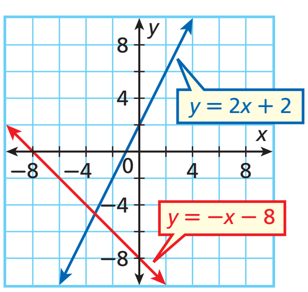
y	$= -x + 9$
5	$-(4) + 9$
5	$-4 + 9$
5	5 ✔

y	$= 2x - 3$
5	$2(4) - 3$
5	$8 - 3$
5	5 ✔

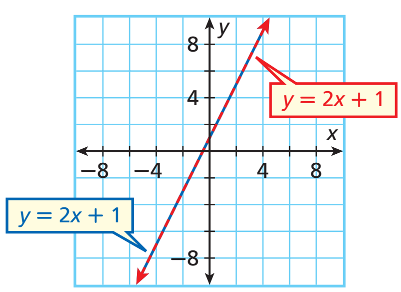
The ordered pair $(4, 5)$ is the solution because it makes both equations true.

Solving Special Systems — Lesson 6-4

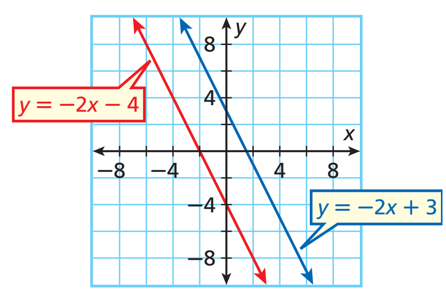
Why? Special systems of linear equations can represent real-world business situations in which there are no solutions or infinitely many solutions.



- intersecting lines
- one solution
- consistent and independent



- coinciding lines
- infinitely many solutions
- consistent and dependent



- parallel lines
- no solutions
- inconsistent