

6-3 Study Guide and Intervention**Elimination Using Addition and Subtraction**

Elimination Using Addition In systems of equations in which the coefficients of the x or y terms are additive inverses, solve the system by adding the equations. Because one of the variables is eliminated, this method is called **elimination**.

Example 1 Use elimination to solve the system of equations.

$$\begin{aligned}x - 3y &= 7 \\ 3x + 3y &= 9\end{aligned}$$

Write the equations in column form and add to eliminate y .

$$\begin{array}{r}x - 3y = 7 \\ (+) 3x + 3y = 9 \\ \hline 4x \qquad = 16\end{array}$$

Solve for x .

$$\begin{aligned}\frac{4x}{4} &= \frac{16}{4} \\ x &= 4\end{aligned}$$

Substitute 4 for x in either equation and solve for y .

$$\begin{aligned}4 - 3y &= 7 \\ 4 - 3y - 4 &= 7 - 4 \\ -3y &= 3 \\ \frac{-3y}{-3} &= \frac{3}{-3} \\ y &= -1\end{aligned}$$

The solution is $(4, -1)$.

Example 2 The sum of two numbers is 70 and their difference is 24. Find the numbers.

Let x represent one number and y represent the other number.

$$\begin{array}{r}x + y = 70 \\ (+) x - y = 24 \\ \hline 2x \qquad = 94 \\ \frac{2x}{2} = \frac{94}{2} \\ x = 47\end{array}$$

Substitute 47 for x in either equation.

$$\begin{aligned}47 + y &= 70 \\ 47 + y - 47 &= 70 - 47 \\ y &= 23\end{aligned}$$

The numbers are 47 and 23.

Exercises

Use elimination to solve each system of equations.

1. $x + y = -4$
 $x - y = 2$

2. $2x - 3y = 14$
 $x + 3y = -11$

3. $3x - y = -9$
 $-3x - 2y = 0$

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

5. $3x + y = 4$
 $2x - y = 6$

6. $-2x + 2y = 9$
 $2x - y = -6$

7. $2x + 2y = -2$
 $3x - 2y = 12$

8. $4x - 2y = -1$
 $-4x + 4y = -2$

9. $x - y = 2$
 $x + y = -3$

10. $2x - 3y = 12$
 $4x + 3y = 24$

11. $-0.2x + y = 0.5$
 $0.2x + 2y = 1.6$

12. $0.1x + 0.3y = 0.9$
 $0.1x - 0.3y = 0.2$

13. Rema is older than Ken. The difference of their ages is 12 and the sum of their ages is 50. Find the age of each.

14. The sum of the digits of a two-digit number is 12. The difference of the digits is 2. Find the number if the units digit is larger than the tens digit.