NAME _____ DATE_____ PERIOD _____

Study Guide and Intervention

Alg1 9.0

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 addition to solve the system of equations.**

$x - 3y = 7$

$3x + 3y = 9$

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

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

Solve for x.

$$\frac{4x}{4} = \frac{16}{4}$$

$$x = 4$$

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.

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

$$\frac{2x}{2} = \frac{94}{2}$$

$$x = 47$$

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. $2m - 3n = 14$, $m + 3n = -11$

3. $3a - b = -9$, $-3a - 2b = 0$

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

5. $3c + d = 4$, $2c - d = 6$

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.

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Study Guide and Intervention *(continued)*

Elimination Using Addition and Subtraction

Elimination Using Subtraction In systems of equations where the coefficients of the x or y terms are the same, solve the system by subtracting the equations.

Example **Use subtraction to solve the system of equations.**

$2x - 3y = 11$
$5x - 3y = 14$

$2x - 3y = 11$ $(-)\ 5x - 3y = 14$	Write the equations in column form and subtract.
$-3x = -3$	Subtract the two equations. y is eliminated.
$\frac{-3x}{-3} = \frac{-3}{-3}$	Divide each side by -3.
$x = 1$	Simplify.
$2(1) - 3y = 11$	Substitute 1 for x in either equation.
$2 - 3y = 11$	Simplify.
$2 - 3y - 2 = 11 - 2$	Subtract 2 from each side.
$-3y = 9$	Simplify.
$\frac{-3y}{-3} = \frac{9}{-3}$	Divide each side by -3.
$y = -3$	Simplify.

The solution is $(1, -3)$.

Exercises

Use elimination to solve each system of equations.

1. $6x + 5y = 4$
$6x - 7y = -20$

2. $3m - 4n = -14$
$3m + 2n = -2$

3. $3a + b = 1$
$a + b = 3$

4. $-3x - 4y = -23$
$-3x + y = 2$

5. $c - 3d = 11$
$2c - 3d = 16$

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

7. $2a - 3b = -13$
$2a + 2b = 7$

8. $4x + 2y = 6$
$4x + 4y = 10$

9. $5s - t = 6$
$5s + 2t = 3$

10. $6x - 3y = 12$
$4x - 3y = 24$

11. $x + 2y = 3.5$
$x - 3y = -9$

12. $0.2x + y = 0.7$
$0.2x + 2y = 1.2$

13. The sum of two numbers is 70. One number is ten more than twice the other number. Find the numbers.

14. GEOMETRY Two angles are supplementary. The measure of one angle is 10° more than three times the other. Find the measure of each angle.