NAME _____ DATE _____ PERIOD _____

3-2 Study Guide and Intervention

Solving Systems of Equations Algebraically

Substitution To solve a system of linear equations by **substitution**, first solve for one variable in terms of the other in one of the equations. Then substitute this expression into the other equation and simplify.

Example **Use substitution to solve the system of equations.** $2x - y = 9$, $x + 3y = -6$

Solve the first equation for y in terms of x.

$2x - y = 9$	First equation
$-y = -2x + 9$	Subtract $2x$ from both sides.
$y = 2x - 9$	Multiply both sides by -1.

Substitute the expression $2x - 9$ for y into the second equation and solve for x.

$x + 3y = -6$	Second equation
$x + 3(2x - 9) = -6$	Substitute $2x - 9$ for y.
$x + 6x - 27 = -6$	Distributive Property
$7x - 27 = -6$	Simplify.
$7x = 21$	Add 27 to each side.
$x = 3$	Divide each side by 7.

Now, substitute the value 3 for x in either original equation and solve for y.

$2x - y = 9$	First equation
$2(3) - y = 9$	Replace x with 3.
$6 - y = 9$	Simplify.
$-y = 3$	Subtract 6 from each side.
$y = -3$	Multiply each side by -1.

The solution of the system is $(3, -3)$.

Exercises

Solve each system of equations by using substitution.

1. $3x + y = 7$
$4x + 2y = 16$

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

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

4. $2x - y = 7$
$6x - 3y = 14$

5. $4x - 3y = 4$
$2x + y = -8$

6. $5x + y = 6$
$3 - x = 0$

7. $x + 8y = -2$
$x - 3y = 20$

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

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

10. $x - 4y = 4$
$2x + 12y = 13$

11. $x + 3y = 2$
$4x + 12y = 8$

12. $2x + 2y = 4$
$x - 2y = 0$