

# 4-2 Reteaching

## Solving Systems Using Substitution

You can solve a system of equations by substituting an equivalent expression for one variable.

### Problem

Solve and check the following system:

$$x + 2y = 4$$

$$2x - y = 3$$

### Solution

$$x + 2y = 4$$

The first equation is easiest to solve in terms of one variable.

$$x = 4 - 2y$$

Get  $x$  to one side by subtracting  $2y$ .

$$2(4 - 2y) - y = 3$$

Substitute  $4 - 2y$  for  $x$  in the second equation.

$$8 - 4y - y = 3$$

Distribute.

$$8 - 5y = 3$$

Simplify.

$$8 - 8 - 5y = 3 - 8$$

Subtract 8 from both sides.

$$-5y = -5$$

Divide both sides by 25.

$$y = 1$$

You have the solution for  $y$ . Solve for  $x$ .

$$x + 2(1) = 4$$

Substitute in 1 for  $y$  in the first equation.

$$x + 2 - 2 = 4 - 2$$

Subtract 2 from both sides.

$$x = 2$$

The solution is  $(2, 1)$ .

### Check

Substitute your solution into either of the given linear equations.

$$x + 2y = 4$$

$$2 + 2(1) \stackrel{?}{=} 4$$

Substitute  $(2, 1)$  into the first equation.

$$4 = 4 \checkmark$$

You check the second equation.

# 4-2 Reteaching (continued)

## Solving Systems Using Substitution

### Problem

Solve and check the following system:

$$\frac{x}{2} - 3y = 10$$

$$3x + 4y = -6$$

**Solve**

$$\frac{x}{2} - 3y = 10$$

$$\frac{x}{2} = 10 + 3y$$

$$x = 20 + 6y$$

$$3x + 4y = -6$$

$$3(20 + 6y) + 4y = -6$$

$$60 + 22y = -6$$

$$22y = -66, y = -3$$

$$\frac{x}{2} - 3(-3) = 10$$

$$\frac{x}{2} + 9 = 10$$

$$x = 2$$

First, isolate  $x$  in the first equation.

Add  $3y$  to both sides and simplify.

Multiply by  $2$  on both sides.

Substitute  $20 + 6y$  for  $x$  in second equation.

Simplify.

Subtract  $60$  from both sides.

Divide by  $22$  to solve for  $y$ .

Substitute  $23$  in the first equation.

Simplify.

Solve for  $x$ .

The solution is  $(2, -3)$ .

**Check**

$$3(2) + 4(-3) \stackrel{?}{=} 26$$

$$-6 = -6 \checkmark$$

## Solving Systems of Equations by Substitution

**Solve each system by substitution.**

1)  $y = 6x - 11$   
 $-2x - 3y = -7$

2)  $2x - 3y = -1$   
 $y = x - 1$

3)  $y = -3x + 5$   
 $5x - 4y = -3$

4)  $-3x - 3y = 3$   
 $y = -5x - 17$

5)  $y = -2$   
 $4x - 3y = 18$

6)  $y = 5x - 7$   
 $-3x - 2y = -12$

7)  $-4x + y = 6$   
 $-5x - y = 21$

8)  $-7x - 2y = -13$   
 $x - 2y = 11$

9)  $-5x + y = -2$   
 $-3x + 6y = -12$

10)  $-5x + y = -3$   
 $3x - 8y = 24$

$$\begin{aligned} 11) \quad x + 3y &= 1 \\ -3x - 3y &= -15 \end{aligned}$$

$$\begin{aligned} 12) \quad -3x - 8y &= 20 \\ -5x + y &= 19 \end{aligned}$$

$$\begin{aligned} 13) \quad -3x + 3y &= 4 \\ -x + y &= 3 \end{aligned}$$

$$\begin{aligned} 14) \quad -3x + 3y &= 3 \\ -5x + y &= 13 \end{aligned}$$

$$\begin{aligned} 15) \quad 6x + 6y &= -6 \\ 5x + y &= -13 \end{aligned}$$

$$\begin{aligned} 16) \quad 2x + y &= 20 \\ 6x - 5y &= 12 \end{aligned}$$

$$\begin{aligned} 17) \quad -3x - 4y &= 2 \\ 3x + 3y &= -3 \end{aligned}$$

$$\begin{aligned} 18) \quad -2x + 6y &= 6 \\ -7x + 8y &= -5 \end{aligned}$$

$$\begin{aligned} 19) \quad -5x - 8y &= 17 \\ 2x - 7y &= -17 \end{aligned}$$

$$\begin{aligned} 20) \quad -2x - y &= -9 \\ 5x - 2y &= 18 \end{aligned}$$

## Solving Systems of Equations by Substitution

Solve each system by substitution.

1)  $y = 6x - 11$   
 $-2x - 3y = -7$   
(2, 1)

2)  $2x - 3y = -1$   
 $y = x - 1$   
(4, 3)

3)  $y = -3x + 5$   
 $5x - 4y = -3$   
(1, 2)

4)  $-3x - 3y = 3$   
 $y = -5x - 17$   
(-4, 3)

5)  $y = -2$   
 $4x - 3y = 18$   
(3, -2)

6)  $y = 5x - 7$   
 $-3x - 2y = -12$   
(2, 3)

7)  $-4x + y = 6$   
 $-5x - y = 21$   
(-3, -6)

8)  $-7x - 2y = -13$   
 $x - 2y = 11$   
(3, -4)

9)  $-5x + y = -2$   
 $-3x + 6y = -12$   
(0, -2)

10)  $-5x + y = -3$   
 $3x - 8y = 24$   
(0, -3)

11)  $x + 3y = 1$   
 $-3x - 3y = -15$   
(7, -2)

12)  $-3x - 8y = 20$   
 $-5x + y = 19$   
(-4, -1)

13)  $-3x + 3y = 4$   
 $-x + y = 3$   
No solution

14)  $-3x + 3y = 3$   
 $-5x + y = 13$   
(-3, -2)

15)  $6x + 6y = -6$   
 $5x + y = -13$   
(-3, 2)

16)  $2x + y = 20$   
 $6x - 5y = 12$   
(7, 6)

17)  $-3x - 4y = 2$   
 $3x + 3y = -3$   
(-2, 1)

18)  $-2x + 6y = 6$   
 $-7x + 8y = -5$   
(3, 2)

19)  $-5x - 8y = 17$   
 $2x - 7y = -17$   
(-5, 1)

20)  $-2x - y = -9$   
 $5x - 2y = 18$   
(4, 1)