

# 7.4

## Solve Linear Systems by Multiplying First

**Goal** • Solve linear systems by multiplying first.

### Your Notes

#### Example 1 Multiply one equation, then add

Solve the linear system:  $3x - 3y = 21$  Equation 1  
 $8x + 6y = -14$  Equation 2

#### Solution

1. Multiply Equation 1 by \_\_\_ so that the coefficients of  $y$  are \_\_\_\_\_.

$$\begin{array}{r} 3x - 3y = 21 \\ 8x + 6y = -14 \end{array} \quad \times \_ \rightarrow \quad \begin{array}{r} \underline{\hspace{2cm}} \\ 8x + 6y = -14 \end{array}$$

2. Add the equations.  $\underline{\hspace{2cm}} = \underline{\hspace{2cm}}$   
 3. Solve for  $x$ .  $x = \underline{\hspace{2cm}}$

4. Substitute \_\_\_ for  $x$  in either of the original equations and \_\_\_\_\_.

$$\begin{array}{ll} 3x - 3y = 21 & \text{Write Equation 1.} \\ 3(\underline{\hspace{1cm}}) - 3y = 21 & \text{Substitute } \underline{\hspace{1cm}} \text{ for } x. \\ y = \underline{\hspace{1cm}} & \text{Solve for } y. \end{array}$$

The solution is ( $\underline{\hspace{1cm}}$ ,  $\underline{\hspace{1cm}}$ ).

**CHECK** Substitute  $\underline{\hspace{1cm}}$  for  $x$  and  $\underline{\hspace{1cm}}$  for  $y$  in the original equations.

Equation 1	Equation 2
$3x - 3y = 21$	$8x + 6y = -14$
$3(\underline{\hspace{1cm}}) - 3(\underline{\hspace{1cm}}) \stackrel{?}{=} 21$	$8(\underline{\hspace{1cm}}) + 6(\underline{\hspace{1cm}}) \stackrel{?}{=} -14$
$\underline{\hspace{1cm}} = 21 \checkmark$	$\underline{\hspace{1cm}} = -14 \checkmark$

## Your Notes

### Example 2 Multiply both equations, then subtract

Solve the linear system:  $3y = -2x + 17$  Equation 1

$3x + 5y = 27$  Equation 2

#### Solution

1. Arrange the equations so that like terms are in columns.

$2x + 3y = 17$  Rewrite Equation 1.

$3x + 5y = 27$  Write Equation 2.

2. Multiply Equation 1 by \_\_\_ and Equation 2 by \_\_\_ so that the coefficient of  $x$  in each equation is the \_\_\_\_\_ of 2 and 3, or \_\_\_.

$2x + 3y = 17$   $\times$  \_\_\_  $\rightarrow$  \_\_\_  $x$  + \_\_\_  $y$  = \_\_\_

$3x + 5y = 27$   $\times$  \_\_\_  $\rightarrow$  \_\_\_  $x$  + \_\_\_  $y$  = \_\_\_

3. \_\_\_\_\_ the equations. \_\_\_\_\_ = \_\_\_\_\_

4. Solve for  $y$ .  $y$  = \_\_\_\_\_

5. Substitute \_\_\_\_\_ for  $y$  in either of the original equations and solve for  $x$ .

$3x + 5y = 27$  Write Equation 2.

$3x + 5(\text{---}) = 27$  Substitute \_\_\_\_\_ for  $y$ .

$x = \text{---}$  Solve for  $x$ .

The solution is (\_\_\_\_, \_\_\_\_).

#### ✔ Checkpoint Solve the linear system using elimination.

1.  $7x + 2y = 26$

$10x - 5y = -10$

2.  $5y = 9x - 8$

$-20x + 10y = -10$

### Homework