EXAMPLE 2 Use subtraction to eliminate a variable

Solve the linear system: $4x + 3y = 2$ Equation 1
$5x + 3y = -2$ Equation 2

SUBTRACT EQUATIONS
When the coefficients of one variable are the same, subtract the equations to eliminate the variable.

Solution

STEP 1 **Subtract** the equations to eliminate one variable.

$$\begin{array}{r} 4x + 3y = 2 \\ 5x + 3y = -2 \\ \hline -x \qquad = 4 \end{array}$$

STEP 2 **Solve** for x.

$$x = -4$$

STEP 3 **Substitute** -4 for x in either equation and solve for y.

$4x + 3y = 2$ Write Equation 1.

$4(-4) + 3y = 2$ Substitute -4 for x.

$y = 6$ Solve for y.

▶ The solution is $(-4, 6)$.

EXAMPLE 3 Arrange like terms

Solve the linear system: $8x - 4y = -4$ Equation 1
$4y = 3x + 14$ Equation 2

Solution

STEP 1 **Rewrite** Equation 2 so that the like terms are arranged in columns.

AVOID ERRORS
Make sure that the equal signs are in the same column, just as the like terms are.

$$\begin{array}{l} 8x - 4y = -4 \\ 4y = 3x + 14 \end{array} \quad \rightarrow \quad \begin{array}{r} 8x - 4y = -4 \\ -3x + 4y = 14 \end{array}$$

STEP 2 **Add** the equations.

$$\begin{array}{r} 5x \qquad = 10 \end{array}$$

STEP 3 **Solve** for x.

$$x = 2$$

STEP 4 **Substitute** 2 for x in either equation and solve for y.

$4y = 3x + 14$ Write Equation 2.

$4y = 3(2) + 14$ Substitute 2 for x.

$y = 5$ Solve for y.

▶ The solution is $(2, 5)$.

GUIDED PRACTICE for Examples 1, 2, and 3

Solve the linear system.

1. $4x - 3y = 5$
$-2x + 3y = -7$

2. $-5x - 6y = 8$
$5x + 2y = 4$

3. $6x - 4y = 14$
$-3x + 4y = 1$

4. $7x - 2y = 5$
$7x - 3y = 4$

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

6. $2x + 5y = 12$
$5y = 4x + 6$