7.3 Solve Linear Systems by Adding or Subtracting

TEKS A.8.A, A.8.B

Before You solved linear systems by graphing and using substitution.

Now You will solve linear systems using elimination.

Why? So you can solve a problem about arranging flowers, as in Ex. 42.

Key Vocabulary
- **system of linear equations,** *p. 427*

When solving a linear system, you can sometimes add or subtract the equations to obtain a new equation in one variable. This method is called *elimination*.

KEY CONCEPT *For Your Notebook*

Solving a Linear System Using the Elimination Method

STEP 1 **Add or subtract** the equations to eliminate one variable.

STEP 2 **Solve** the resulting equation for the other variable.

STEP 3 **Substitute** in either original equation to find the value of the eliminated variable.

EXAMPLE 1 Use addition to eliminate a variable

Solve the linear system:

$$2x + 3y = 11 \quad \text{Equation 1}$$
$$-2x + 5y = 13 \quad \text{Equation 2}$$

Solution

ADD EQUATIONS
When the coefficients of one variable are opposites, add the equations to eliminate the variable.

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

$$\begin{array}{r} 2x + 3y = 11 \\ -2x + 5y = 13 \\ \hline 8y = 24 \end{array}$$

STEP 2 **Solve** for y.

$$y = 3$$

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

$2x + 3y = 11$ Write Equation 1.

$2x + 3(3) = 11$ Substitute 3 for y.

$x = 1$ Solve for x.

▶ The solution is (1, 3).

CHECK Substitute 1 for x and 3 for y in each of the original equations.

$$2x + 3y = 11 \qquad -2x + 5y = 13$$
$$2(1) + 3(3) \stackrel{?}{=} 11 \qquad -2(1) + 5(3) \stackrel{?}{=} 13$$
$$11 = 11 \checkmark \qquad 13 = 13 \checkmark$$