

# 7.2 Solve Linear Systems by Substitution

TEKS

A.8.A, A.8.B,  
A.8.C

**Before**

You solved systems of linear equations by graphing.

**Now**

You will solve systems of linear equations by substitution.

**Why?**

So you can find tubing costs, as in Ex. 32.



## Key Vocabulary

- system of linear equations, p. 427

## KEY CONCEPT

*For Your Notebook*

### Solving a Linear System Using the Substitution Method

- STEP 1** **Solve** one of the equations for one of its variables. When possible, solve for a variable that has a coefficient of 1 or  $-1$ .
- STEP 2** **Substitute** the expression from Step 1 into the other equation and solve for the other variable.
- STEP 3** **Substitute** the value from Step 2 into the revised equation from Step 1 and solve.

## EXAMPLE 1 Use the substitution method

Solve the linear system:  $y = 3x + 2$  Equation 1  
 $x + 2y = 11$  Equation 2

### Solution

**STEP 1** **Solve** for  $y$ . Equation 1 is already solved for  $y$ .

**STEP 2** **Substitute**  $3x + 2$  for  $y$  in Equation 2 and solve for  $x$ .

$$x + 2y = 11 \quad \text{Write Equation 2.}$$

$$x + 2(3x + 2) = 11 \quad \text{Substitute } 3x + 2 \text{ for } y.$$

$$7x + 4 = 11 \quad \text{Simplify.}$$

$$7x = 7 \quad \text{Subtract 4 from each side.}$$

$$x = 1 \quad \text{Divide each side by 7.}$$

**STEP 3** **Substitute** 1 for  $x$  in the original Equation 1 to find the value of  $y$ .

$$y = 3x + 2 = 3(1) + 2 = 3 + 2 = 5$$

► The solution is  $(1, 5)$ .

**CHECK** Substitute 1 for  $x$  and 5 for  $y$  in each of the original equations.

$$y = 3x + 2$$

$$5 \stackrel{?}{=} 3(1) + 2$$

$$5 = 5 \checkmark$$

$$x + 2y = 11$$

$$1 + 2(5) \stackrel{?}{=} 11$$

$$11 = 11 \checkmark$$

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