GUIDED PRACTICE for Example 3

4. **WHAT IF?** In Example 3, suppose the school spends a total of \$3715 on T-shirts and sells all of them for \$6160. How many of each type of T-shirt are sold?

CHOOSING A METHOD In general, the substitution method is convenient when one of the variables in a system of equations has a coefficient of 1 or −1, as in Example 1. If neither variable in a system has a coefficient of 1 or −1, it is usually easier to use the elimination method, as in Examples 2 and 3.

EXAMPLE 4 Solve linear systems with many or no solutions

Solve the linear system.

a. $x - 2y = 4$
$3x - 6y = 8$

b. $4x - 10y = 8$
$-14x + 35y = -28$

Solution

a. Because the coefficient of x in the first equation is 1, use the substitution method.

Solve the first equation for x.

$x - 2y = 4$ — Write first equation.

$x = 2y + 4$ — Solve for x.

Substitute the expression for x into the second equation.

$3x - 6y = 8$ — Write second equation.

$3(2y + 4) - 6y = 8$ — Substitute $2y + 4$ for x.

$12 = 8$ — Simplify.

▶ Because the statement $12 = 8$ is never true, there is *no solution*.

b. Because no coefficient is 1 or −1, use the elimination method.

Multiply the first equation by **7** and the second equation by **2**.

$4x - 10y = 8$ → × 7 → $28x - 70y = 56$

$-14x + 35y = -28$ → × 2 → $-28x + 70y = -56$

Add the revised equations. $0 = 0$

▶ Because the equation $0 = 0$ is always true, there are *infinitely many solutions*.

AVOID ERRORS
When multiplying an equation by a constant, make sure you multiply each term of the equation by the constant.

GUIDED PRACTICE for Example 4

Solve the linear system using any algebraic method.

5. $12x - 3y = -9$
$-4x + y = 3$

6. $6x + 15y = -12$
$-2x - 5y = 9$

7. $5x + 3y = 20$
$-x - \frac{3}{5}y = -4$

8. $12x - 2y = 21$
$3x + 12y = -4$

9. $8x + 9y = 15$
$5x - 2y = 17$

10. $5x + 5y = 5$
$5x + 3y = 4.2$