

# 7-5 Solving Equations with Variables on Each Side

(Pages 346–350)

Some equations have the variable on each side of the equals sign. Use the properties of equality to eliminate the variable from one side. Then solve the equation. You may find that some equations have *no solution*. The solution set is the **null** or **empty set**. It is shown by the symbol  $\{\}$  or  $\emptyset$ .

## EXAMPLES

Solve each equation.

**A**  $12 + 3a = 7a$

$$12 + 3a - 3a = 7a - 3a \quad \text{Subtract } 3a \text{ from each side.}$$

$$\frac{12}{4} = \frac{4a}{4} \quad \text{Divide each side by 4.}$$

$$3 = a \quad \text{The solution is 3.}$$

**B**  $4b - 7 = 13 + 4b$

$$4b - 4b - 7 = 13 + 4b - 4b \quad \text{Subtract } 4b \text{ from each side.}$$

$$-7 = 13$$

This sentence is never true, so there is no solution for this equation. The solution set is  $\emptyset$ .

## Try These Together

Solve each equation.

1.  $5t = 3 + t$

2.  $6g - 4 = g + 1$

3.  $c = 4c + 8$

HINT: Eliminate the variable from one side of the equation then solve.

## PRACTICE

Solve each equation.

4.  $9h - 3 = h$

5.  $-16d + 4 = d$

6.  $7m = 18m - 2$

7.  $6 + 3(1 + 3a) = 2a$

8.  $n + 8 = -5 + 4n$

9.  $4 - 2(2 + 4x) = x - 3$

10.  $8p - 2p + 3 = 10p - 6$

11.  $15 + 5(w - 2) = 7w + 4$

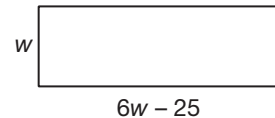
12.  $12r + 34 = -6r - (-9)$

13.  $6k + 3(k + 2) = 5k + 12$

14.  $2s - 4.2 = -8s + 8$

15.  $7x + \frac{1}{-8} = x - \frac{3}{4}$

16. **Geometry** Find the dimensions of the rectangle if the perimeter is 118 feet.



17. **Algebra** Eight times a number plus two is five times the number decreased by three. What is the number?



18. **Standardized Test Practice** Solve the equation  $4k + 2(k + 1) = 3k + 4$ .

**A**  $\frac{2}{3}$

**B** 2

**C** 4

**D** 6

Answers: 1.  $\frac{4}{3}$  2. 1 3.  $-2\frac{3}{2}$  4.  $\frac{8}{3}$  5.  $\frac{17}{4}$  6.  $\frac{11}{2}$  7.  $-1\frac{7}{2}$  8.  $4\frac{3}{4}$  9.  $\frac{3}{1}$  10.  $2\frac{1}{4}$  11.  $\frac{2}{1}$  12.  $-1\frac{18}{7}$  13.  $1\frac{1}{2}$  14. 1.22 15.  $-\frac{48}{5}$  16. width: 12 ft; length: 47 ft 17.  $-1\frac{3}{2}$  18. A