

### Lesson 3-8

#### Example 1 Solve an Equation for a Specific Variable

Solve  $\frac{3m-n}{2} = k$  for  $m$ .

$$\frac{3m-n}{2} = k \quad \text{Original equation}$$

$$2\left(\frac{3m-n}{2}\right) = 2(k) \quad \text{Multiply each side by 2.}$$

$$\begin{aligned} 3m-n &= 2k && \text{Simplify.} \\ 3m-n+n &= 2k+n && \text{Add } n \text{ to each side.} \\ 3m &= 2k+n && \text{Simplify.} \end{aligned}$$

$$\frac{3m}{3} = \frac{2k+n}{3} \quad \text{Divide each side by 3.}$$

$$m = \frac{2k+n}{3} \quad \text{Simplify.}$$

The value of  $m$  is  $\frac{2k+n}{3}$ .

#### Example 2 Solve an Equation for a Specific Variable

Solve  $6-ay = 4(a-b)$  for  $a$ .

$$6-ay = 4(a-b) \quad \text{Original equation}$$

$$6-ay = 4a-4b \quad \text{Distributive Property}$$

$$6-ay+ay = 4a-4b+ay \quad \text{Add } ay \text{ to each side.}$$

$$6 = 4a-4b+ay \quad \text{Simplify.}$$

$$6+4b = 4a-4b+ay+4b \quad \text{Add } 4b \text{ to each side.}$$

$$6+4b = 4a+ay \quad \text{Simplify.}$$

$$6+4b = a(4+y) \quad \text{Use the Distributive Property.}$$

$$\frac{6+4b}{4+y} = \frac{a(4+y)}{4+y} \quad \text{Divide each side by } 4+y.$$

$$\frac{6+4b}{4+y} = a \quad \text{Simplify.}$$

The value of  $a$  is  $\frac{6+4b}{4+y}$ . Since division by 0 is undefined,  $4+y \neq 0$  or  $y \neq -4$ .

**Example 3 Use a Formula to Solve Problems**

The perimeter of a square field is given by the equation  $P = 2l + 2w$ , where  $P$  represents the perimeter,  $l$  represents the length of the field, and  $w$  represents the width of the field.

a. Solve the formula for  $l$ .

$$P = 2l + 2w \quad \text{Formula for perimeter}$$

$$P - 2w = 2l + 2w - 2w \quad \text{Subtract } 2w \text{ from each side.}$$

$$P - 2w = 2l \quad \text{Simplify.}$$

$$\frac{P - 2w}{2} = \frac{2l}{2} \quad \text{Divide each side by 2.}$$

$$\frac{P - 2w}{2} = l \quad \text{Simplify.}$$

b. Find the length of a field that is 50 yards wide and has a perimeter of 220 yards.

$$\frac{P - 2w}{2} = l \quad \text{Formula for length}$$

$$\frac{220 - 2(50)}{2} = l \quad P = 220, \text{ and } w = 50$$

$$\frac{220 - 100}{2} = l \quad \text{Multiply.}$$

$$\frac{120}{2} = l \quad \text{Subtract.}$$

$$60 = l \quad \text{Simplify.}$$

The length of a field that has a perimeter of 220 yards and a width of 50 yards has a length of 60 yards.

**Example 4 Use Dimensional Analysis**

The formula  $C = 2\pi r$  represents the circumference  $C$  of a circle with a radius  $r$ .

a. Solve the formula for  $r$ .

$$C = 2\pi r \quad \text{Original formula}$$

$$\frac{C}{2\pi} = \frac{2\pi r}{2\pi} \quad \text{Divide each side by } 2\pi .$$

$$\frac{C}{2\pi} = r \quad \text{Simplify.}$$

b. A round deck has a circumference of  $40\pi$  feet. What is the radius in meters?

$$\frac{C}{2\pi} = r \quad \text{Formula for } r$$

$$\frac{40\pi \text{ft}}{2\pi} = r \quad C = 40\pi \text{ ft}$$

$$20 \text{ ft} = r \quad \text{Simplify.}$$

$$\frac{20 \text{ ft}}{1} \cdot \frac{1 \text{ yd}}{3 \text{ ft}} \cdot \frac{0.9144 \text{ m}}{1 \text{ yd}} = r \quad \text{Convert feet to yards. The conversion factor is 1 yard} = 3 \text{ feet.}$$

$$\frac{18.288 \text{ m}}{3} = r \quad \text{Multiply.}$$

$$6.096 \text{ m} = r \quad \text{Simplify.}$$

The deck has a radius of 6.096 meters.