9.5 Formulas and Problem Solving

Learning Objectives:
1. Given a formula and values, solve for the unknown.
2. Solve a formula or equation for one of its variables.
3. Solve word problems.
4. Key Vocabulary: formula, perimeter, area, and volume.

A. Using Formulas to Solve Problems

Formula—describes a known relationship among quantities.

Example 1. Substitute the given values into each given formula and solve for the unknown variable, if necessary, round to one decimal place.

1. Distance Formula
   \[ d = rt; \quad t = 9, \quad d = 63 \]

2. Volume of a pyramid
   \[ V = \frac{1}{3} Bh; \quad V = 40, \quad h = 8 \]

B. Solving a Formula for a Variable

Steps for Solving Equations for a Specified Variable(page 666)

1. Multiply both sides of equation to clear fractions if they occur.
2. Use the distributive proper to remove parentheses if they occur.
3. Simplify each side of the equation by combining like terms if needed.
4. Get all terms containing the specified variable on one side and all other terms on the other side by using the addition property of equality.
5. Get the specified variable alone by using the multiplication property of equality.

Example 2. Solve each formula for the specified variable.

1. \[ A = \frac{1}{2} bh \quad \text{for } b. \]
2. \( L = 2d + \pi(a+r) \) for \( a \).

**Example 3.** Solve

1. Convert the record high temperature of 102°F to Celsius. (Use the formula \( F = \frac{9}{5}C + 32 \))

2. You have decided to fence an area of your backyard for your dog. The length of the area is 1 meter less than twice the width. If the perimeter of the area is 70 meters, find the length and width of the rectangular area.