

## Additional Problem Solving Lesson

### Example 3 Consecutive Numbers

The product of two consecutive even numbers is 5624.  
What are the numbers?

#### Solution

Consecutive even numbers differ by two.  
Let  $x$  represent one even number and  $x + 2$  represent the other.  
Write and solve an equation to find  $x$ .

$$\begin{aligned}x(x + 2) &= 5624 && \text{Expand the left side.} \\x^2 + 2x &= 5624 && \text{Simplify.} \\x^2 + 2x - 5624 &= 0 && \text{Write in the form } ax^2 + bx + c = 0. \\(x - 74)(x + 76) &= 0 && \text{Factor the left side.} \\x - 74 = 0 & \text{ or } && x + 76 = 0 \\x = 74 & \text{ or } && x = -76\end{aligned}$$

Verify that each value of  $x$  solves the problem.

If  $x = 74$ , then the next consecutive even number is 76.

$$74 \times 76 = 5624$$

If  $x = -76$ , then the next consecutive even number is  $-74$ .

$$(-76) \times (-74) = 5624$$

The numbers are 74 and 76 or  $-76$  and  $-74$ .

### Example 4 Right Triangle

One leg of a right triangle is 1 cm longer than the other leg. The length of the hypotenuse is 9 cm greater than that of the shorter leg. Find the lengths of the three sides.

#### Solution

Let  $x$  represent the length of the shorter leg. The length of the longer leg is  $x + 1$  and the length of the hypotenuse is  $x + 9$ .

Use the Pythagorean theorem.

$$\begin{aligned}x^2 + (x + 1)^2 &= (x + 9)^2 \\x^2 + x^2 + 2x + 1 &= x^2 + 18x + 81 \\2x^2 + 2x + 1 &= x^2 + 18x + 81 \\x^2 - 16x - 80 &= 0 \\(x - 20)(x + 4) &= 0 \\x - 20 = 0 & \text{ or } && x + 4 = 0 \\x = 20 & \text{ or } && x = -4\end{aligned}$$

Since the length cannot be negative, reject the root  $x = -4$ .

