CONVERSE OF THE PYTHAGOREAN THEOREM Recall that when you reverse the hypothesis and conclusion of an if-then statement, the new statement is called the converse. Although not all converses of true statements are true, the converse of the Pythagorean theorem is true.

KEY CONCEPT   *For Your Notebook*

Converse of the Pythagorean Theorem

If a triangle has side lengths a, b, and c such that $a^2 + b^2 = c^2$, then the triangle is a right triangle.

EXAMPLE 4 **Determine right triangles**

Tell whether the triangle with the given side lengths is a right triangle.

a. 8, 15, 17

$$8^2 + 15^2 \overset{?}{=} 17^2$$

$$64 + 225 \overset{?}{=} 289$$

$$289 = 289 \checkmark$$

▶ The triangle is a right triangle.

b. 5, 8, 9

$$5^2 + 8^2 \overset{?}{=} 9^2$$

$$25 + 64 \overset{?}{=} 81$$

$$89 = 81 ✗$$

▶ The triangle is *not* a right triangle.

EXAMPLE 5 **Use the converse of the Pythagorean theorem**

CONSTRUCTION A construction worker is making sure one corner of the foundation of a house is a right angle. To do this, the worker makes a mark 8 feet from the corner along one wall and another mark 6 feet from the same corner along the other wall. The worker then measures the distance between the two marks and finds the distance to be 10 feet. Is the corner a right angle?

Solution

$$8^2 + 6^2 \overset{?}{=} 10^2 \qquad \text{Check to see if } a^2 + b^2 = c^2 \text{ when } a = 8, b = 6, \text{ and } c = 10.$$

$$64 + 36 \overset{?}{=} 100 \qquad \text{Simplify.}$$

$$100 = 100 \checkmark \qquad \text{Add.}$$

▶ Because the sides that the construction worker measured form a right triangle, the corner of the foundation is a right angle.

✓ **GUIDED PRACTICE** **for Examples 4 and 5**

Tell whether the triangle with the given side lengths is a right triangle.

4. 7, 11, 13   **5.** 15, 36, 39   **6.** 15, 112, 113

7. WINDOW DESIGN A window has the shape of a triangle with side lengths of 120 centimeters, 120 centimeters, and 180 centimeters. Is the window a right triangle? *Explain*.