NAME _____ DATE _____

8-7 The Pythagorean Theorem (Pages 366–371)

You can use the **Pythagorean Theorem** to find the length of any side of a right triangle if the lengths of the other two sides are known. You can use the **converse** of this theorem to test whether a triangle is a right triangle.

Pythagorean Theorem	If a and b are the lengths of the legs of a right triangle and c is the length of the hypotenuse, then $c^2 = a^2 + b^2$.
Converse of the Pythagorean Theorem	If c is the measure of the longest side of a triangle and $c^2 = a^2 + b^2$, then the triangle is a right triangle.

EXAMPLES

A Find the length of leg b of a right triangle if the length of leg a is 24 and the length of the hypotenuse is 30.

$c^2 = a^2 + b^2$ *Pythagorean Theorem*
$30^2 = 24^2 + b^2$ *Substitute.*
$900 = 576 + b^2$
$324 = b^2$
$\sqrt{324} = b$
$18 = b$

The length of leg b is 18 units.

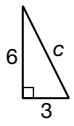
B The lengths of the sides of a triangle are 14 m, 12 m, and 10 m. Is the triangle a right triangle?

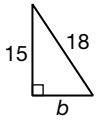
$c^2 = a^2 + b^2$ *Pythagorean Theorem*
$14^2 \stackrel{?}{=} 12^2 + 10^2$ *Substitute.*
$196 \stackrel{?}{=} 144 + 100$
$196 \neq 244$

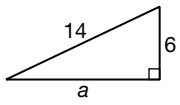
The triangle is not a right triangle.

PRACTICE

If c is the measure of the hypotenuse and a and b are the measures of the legs, find each missing measure. Round to the nearest tenth if necessary.

1. 

2. 

3. 

4. $a = 12, b = 32, c =$?

5. $a = 7, b = 10, c =$?

6. $a = 16, c = 52, b =$?

7. $a = 2, b = 4, c =$?

The lengths of three sides of a triangle are given. Determine whether each triangle is a right triangle.

8. 10 cm, 24 cm, 26 cm

9. 12 in., 14 in., 19 in.

10. Art Jessica is making a collage of rectangles for her art project. The largest rectangle is 12 inches long and 8 inches wide. What is the length of a diagonal of the rectangle? Round to the nearest tenth.

11. **Standardized Test Practice** Jamal and Gloria start hiking from the same point. After Bill hikes 7 miles due east and Jamal hikes 4 miles due north, how far apart are the two hikers?

A 5.3 mi **B** 5.4 mi **C** 8.1 mi **D** 9.3 mi

Answers: **1.** $c = 6.7$ **2.** $b = 9.9$ **3.** $a = 12.6$ **4.** $c = 34.2$ **5.** $c = 12.2$ **6.** $b = 49.5$ **7.** $c = 4.5$ **8.** yes **9.** no **10.** 14.4 in. **11.** C