

13-1

NAME _____ DATE _____

The Pythagorean Theorem (Pages 713–718)

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. A corollary to this theorem can be used to determine whether a triangle is a right triangle.

Pythagorean Theorem	If a and b are the measures of the legs of a right triangle and c is the measure of the hypotenuse, then $c^2 = a^2 + b^2$.
Corollary to the Pythagorean Theorem	If c is the measure of the longest side of a triangle and $c^2 \neq a^2 + b^2$, then the triangle is not 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.

$$\begin{aligned} c^2 &= a^2 + b^2 && \text{Pythagorean theorem} \\ 30^2 &= 24^2 + b^2 && \text{Substitute.} \\ 900 &= 576 + b^2 \\ 324 &= b^2 \\ \sqrt{324} &= b \\ 18 &= b \end{aligned}$$

The length of leg b is 18 units.

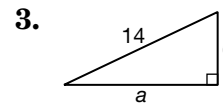
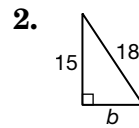
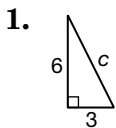
- B** The lengths of the sides of a triangle are 14 m, 12 m, and 10 m. Is the triangle a right triangle?

$$\begin{aligned} c^2 &= a^2 + b^2 && \text{Pythagorean theorem} \\ 14^2 &\stackrel{?}{=} 12^2 + 10^2 && \text{Substitute.} \\ 196 &\stackrel{?}{=} 144 + 100 \\ 196 &\neq 244 \end{aligned}$$

The triangle is not a right triangle.

PRACTICE

Find the length of each missing side. Round to the nearest hundredth.



If c is the measure of the hypotenuse of a right triangle, find each missing measure. Round answers to the nearest hundredth.

4. $a = 12, b = 32, c = \underline{\quad ? \quad}$

5. $a = 7, b = 10, c = \underline{\quad ? \quad}$

6. $a = 16, c = 52, b = \underline{\quad ? \quad}$

7. $a = 2, b = 4, c = \underline{\quad ? \quad}$

8. $b = 18, c = \sqrt{740}, a = \underline{\quad ? \quad}$

9. $a = 5, b = \sqrt{10}, c = \underline{\quad ? \quad}$

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?



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 5.29 mi

B 5.40 mi

C 8.06 mi

D 9.25 mi

Answers: 1. $c = 6.71$ 2. $b = 9.95$ 3. $a = 12.65$ 4. $c = 34.18$ 5. $c = 12.21$ 6. $b = 49.48$ 7. $c = 4.47$ 8. $a = 20.40$ 9. $c = 5.92$ 10. about 14.42 in. 11. C