

NAME _____

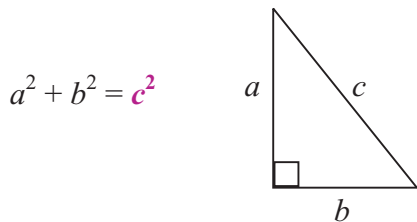
Module 8 Points, Lines, Angles, and Triangles
 Lesson 7 Right Triangles

Lesson Objectives

- Prove and use the Pythagorean Theorem.
- Use special right triangles to solve real-life problems.

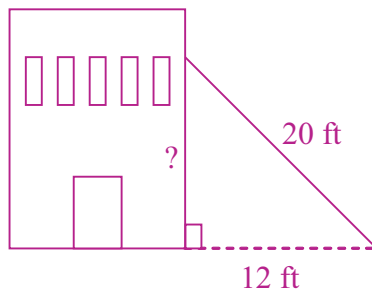
Subtopic 1 The Pythagorean Theorem

In a right triangle, the sum of the squares of the lengths of the **legs** is equal to the square of the length of the **hypotenuse**.



1

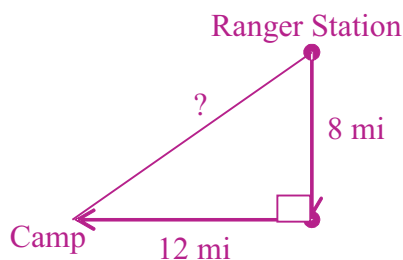
A 20-foot ladder is placed against a building, so its base rests 12 feet from the base of the building. How high up the building does the ladder reach?



$$\begin{aligned} a^2 + b^2 &= c^2 \\ 12^2 + b^2 &= 20^2 \\ 144 + b^2 &= 400 \\ b^2 &= 256 \\ b &= 16 \\ \mathbf{16 \text{ feet}} \end{aligned}$$

2

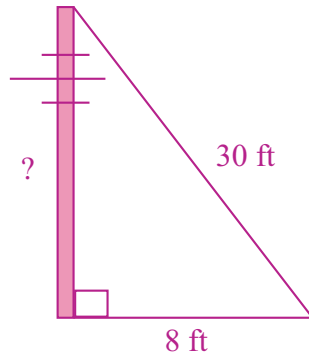
Martha hikes from a ranger station eight miles south, then 12 miles west to a camp. To the nearest hundredth of a mile, what is the direct distance between the ranger station and the camp?



$$\begin{aligned} 8^2 + 12^2 &= c^2 \\ 64 + 144 &= c^2 \\ 208 &= c^2 \\ 14.42 &\approx c \\ \mathbf{\text{About 14.42 miles}} \end{aligned}$$

3

A 30-foot wire runs from the top of a telephone pole to a point on the ground eight feet from the base of the pole. What is the height of the telephone pole to the nearest foot?



$$\begin{aligned}8^2 + b^2 &= 30^2 \\64 + b^2 &= 900 \\b^2 &= 836 \\b &= \sqrt{836} \\b &\approx 29 \text{ feet}\end{aligned}$$

Subtopic 2 Using the Converse of the Pythagorean Theorem

If $a^2 + b^2 = c^2$, then the triangle is a right triangle.

4

The lengths of the sides of a triangle are seven, 24, and 25 inches. Is this a right triangle?

$$\begin{aligned}7^2 + 24^2 &\stackrel{?}{=} 25^2 \\49 + 576 &\stackrel{?}{=} 625 \\625 &= 625\end{aligned}$$

Yes