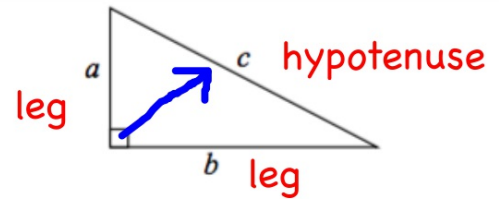


Pythagorean Theorem

$$a^2 + b^2 = c^2$$

$$\text{leg}^2 + \text{leg}^2 = \text{hyp}^2$$

A **Pythagorean triple** is a set of nonzero whole numbers a , b , and c that satisfy the equation $a^2 + b^2 = c^2$.

**Example 1:**

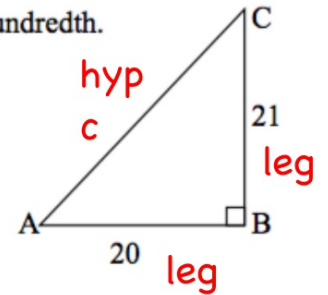
Find the length of the hypotenuse of $\triangle ABC$. Round to the nearest hundredth.

$$20^2 + 21^2 = c^2$$

$$400 + 441 = c^2$$

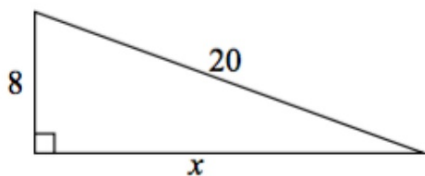
$$\sqrt{841} = \sqrt{c^2}$$

$$c = 29$$



Example 2:

Find the value of x . Round to the nearest hundredth.



$$\begin{aligned}
 8^2 + x^2 &= 20^2 \\
 64 + x^2 &= 400 \\
 -64 \quad & -64 \\
 \hline
 \sqrt{x^2} &= \sqrt{336}
 \end{aligned}$$

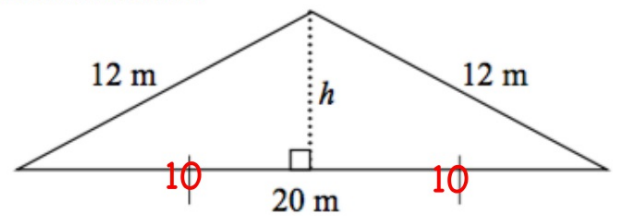
$$x = 18.33$$

Example 3:

Find the area of the triangle. Round to the nearest hundredth.

$$A = (1/2) b \cdot h$$

$$\begin{aligned}
 10^2 + h^2 &= 12^2 \\
 100 + h^2 &= 144 \\
 -100 \quad & -100 \\
 \sqrt{h^2} &= \sqrt{44} \quad h=6.63
 \end{aligned}$$



$$\begin{aligned}
 A &= (1/2)(6.63)(20) = \\
 & \underline{66.33 \text{ m}^2}
 \end{aligned}$$

Converse of Pythagorean Theorem: If $a^2 + b^2 = c^2$, then the triangle is a right triangle.

Theorem: If $a^2 + b^2 > c^2$, then the triangle is an acute triangle.

Theorem: If $a^2 + b^2 < c^2$, then the triangle is an obtuse triangle.

c must be longest side!

Example 4:

The lengths a triangle's sides are given. Classify each triangle as acute, obtuse, or right.

a. 6, 11, 14

b. 84, 85, 13

c. 12, 13, 15

$$6^2 + 11^2 \quad ? \quad 14^2$$

$$157 \quad < \quad 196$$

$$13^2 + 84^2 \quad ? \quad 85^2$$

$$7225 = 7225$$

$$12^2 + 13^2 \quad ? \quad 15^2$$

$$313 \quad > \quad 225$$

obtuse!

right

acute

Questions

7.1 Practice – Round all answers to the nearest tenth, if necessary.

1. A painter leans a 15-ft ladder against a house. The base of the ladder is 5 ft from the house. How high on the house does the ladder reach?

14.1 ft

2. The size of a computer monitor is the length of its diagonal. You want to buy a 19-in monitor that has a height of 11 in. What is the width of the monitor?

15.5 ft

3. You are designing dinnerware. You want to make a square plate that fits a 20 cm chopstick along the diagonal. Find the length of the sides of the square.

14.1 cm

4. Is a triangle with the following side lengths acute, obtuse, or right?

a) 7, 8, 9

acute

b) 20, 28, 19

obtuse

c) 33, 65, 56

right

Summary: