

# Study Guide and Intervention

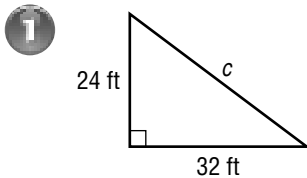
7MG3.3, 7MR3.2

## The Pythagorean Theorem

The **Pythagorean Theorem** describes the relationship between the lengths of the legs of any right triangle. In a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs. You can use the Pythagorean Theorem to find the length of a side of a right triangle if the lengths of the other two legs are known.

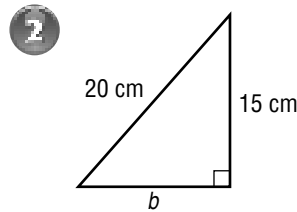
### Examples

Find the missing measure for each right triangle. Round to the nearest tenth if necessary.



$$\begin{aligned} c^2 &= a^2 + b^2 \\ c^2 &= 24^2 + 32^2 \\ c^2 &= 576 + 1,024 \\ c^2 &= 1,600 \\ c &= \pm \sqrt{1,600} \\ c &= 40 \text{ or } -40 \end{aligned}$$

Length must be positive, so the length of the hypotenuse is 40 feet.

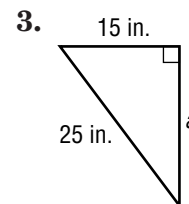
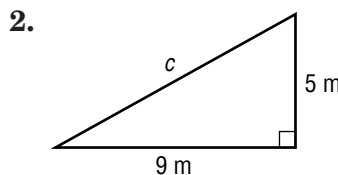
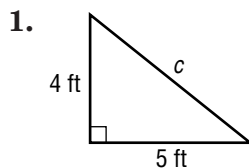


$$\begin{aligned} c^2 &= a^2 + b^2 \\ 20^2 &= 15^2 + b^2 \\ 400 &= 225 + b^2 \\ 400 - 225 &= 225 + b^2 - 225 \\ 175 &= b^2 \\ \sqrt{175} &= \sqrt{b^2} \\ 13.2 &\approx b \end{aligned}$$

The length of the other leg is about 13.2 centimeters.

### Exercises

Write an equation you could use to find the length of the missing side of each right triangle. Then find the missing length. Round to the nearest tenth if necessary.



4.  $a = 7$  km,  $b = 12$  km

5.  $a = 10$  yd,  $c = 25$  yd

6.  $b = 14$  ft,  $c = 20$  ft

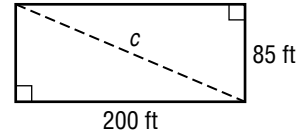
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## Using the Pythagorean Theorem

7MG3.3

You can use the Pythagorean Theorem to help you solve problems.

**Example 1** A professional ice hockey rink is 200 feet long and 85 feet wide. What is the length of the diagonal of the rink?



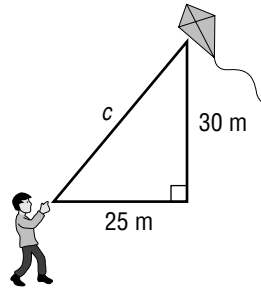
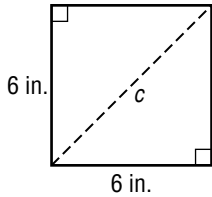
$c^2 = a^2 + b^2$	The Pythagorean Theorem
$c^2 = 200^2 + 85^2$	Replace $a$ with 200 and $b$ with 85.
$c^2 = 40,000 + 7,225$	Evaluate $200^2$ and $85^2$ .
$c^2 = 47,225$	Simplify.
$\sqrt{c^2} = \sqrt{47,225}$	Take the square root of each side.
$c \approx 217.3$	Simplify.

The length of the diagonal of an ice hockey rink is about 217.3 feet.

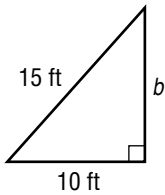
### Exercises

Write an equation that can be used to answer the question. Then solve. Round to the nearest tenth if necessary.

- What is the length of the diagonal?
- How long is the kite string?



- How high is the ramp?



- How tall is the tree?

