

Today is the first of several days where we will focus on the Pythagorean Theorem.

You will need your clickers, notebook, and pencil.

There are only three clicker questions today.

1-4

The Pythagorean Theorem

What You'll Learn

To use the Pythagorean Theorem to find the length of the hypotenuse of a right angle

■ **New Vocabulary** legs, hypotenuse, Pythagorean Theorem

Why Learn This?

The Pythagorean Theorem describes the special relationship among the sides of a right triangle. You can use the theorem to find the side lengths of right triangles in structures such as bridges.

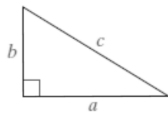


In a right triangle, the two shortest sides are **legs**. The longest side, which is opposite the right angle, is the **hypotenuse**. The **Pythagorean Theorem** is an equation that shows the relationship between the legs and the hypotenuse.

KEY CONCEPTS The Pythagorean Theorem

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

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



You can use the Pythagorean Theorem to find the length of the hypotenuse of a right triangle if you know the lengths of the two legs.

EXAMPLES Finding the Hypotenuse

- 1 Find the length of the hypotenuse of the triangle.

$$a^2 + b^2 = c^2 \quad \leftarrow \text{Use the Pythagorean Theorem.}$$

$$5^2 + 12^2 = c^2 \quad \leftarrow \text{Substitute 5 for } a \text{ and 12 for } b.$$

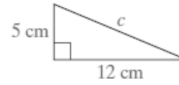
$$25 + 144 = c^2 \quad \leftarrow \text{Simplify.}$$

$$169 = c^2 \quad \leftarrow \text{Add.}$$

$$\sqrt{169} = \sqrt{c^2} \quad \leftarrow \text{Find the positive square root of each side.}$$

$$13 = c \quad \leftarrow \text{Simplify.}$$

The length of the hypotenuse is 13 cm.



Examples

- 1 **Finding the Hypotenuse** Find the length of the hypotenuse of a right triangle with legs of 6 ft and 8 ft.

$$a^2 + b^2 = c^2 \quad \leftarrow \text{Use the Pythagorean Theorem.}$$

$$6^2 + 8^2 = c^2 \quad \leftarrow \text{Substitute 6 for } a \text{ and 8 for } b$$

$$36 + 64 = c^2 \quad \leftarrow \text{Simplify.}$$

$$100 = c^2 \quad \leftarrow \text{Add.}$$

$$\sqrt{100} = \sqrt{c^2} \quad \leftarrow \text{Find the positive square root of each side.}$$

$$10 = c \quad \leftarrow \text{Simplify.}$$

The length of the hypotenuse is 10 ft.

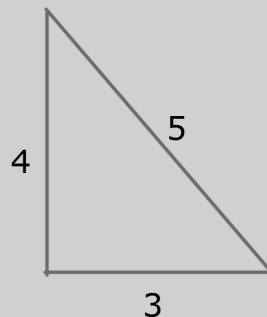


Look at the right triangle. Which measurement identifies the hypotenuse?

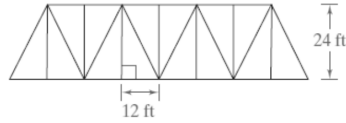
(A) 3

(B) 4

(C) 5



- 2 **Multiple Choice** An architect drew the sketch of a bridge shown below. The bridge has 12-ft-long horizontal members and 24-ft-long vertical members. What is the length in feet of each diagonal member? Round to the nearest foot.



- (A) 720 ft (B) 27 ft (C) 21 ft (D) 12 ft

Test Prep Tip

Draw and label a picture of a right triangle like the one below to match the problem situation.



Each diagonal member is the hypotenuse of a right triangle.

$$a^2 + b^2 = c^2 \quad \leftarrow \text{Use the Pythagorean Theorem.}$$

$$12^2 + 24^2 = c^2 \quad \leftarrow \text{Substitute 12 for } a \text{ and 24 for } b.$$

$$144 + 576 = c^2 \quad \leftarrow \text{Simplify.}$$

$$720 = c^2 \quad \leftarrow \text{Add.}$$

$$\sqrt{720} = \sqrt{c^2} \quad \leftarrow \text{Find the positive square root of each side.}$$

$$\sqrt{720} \approx 26.83281573 \quad \leftarrow \text{Use a calculator.}$$

$$27 \approx c \quad \leftarrow \text{Simplify.}$$

The length of each diagonal member is about 27 ft. The answer is B.

- 2 **Multiple Choice** The bottom of a ladder is 10 ft from the side of a building. The top of the ladder is 24 ft from the ground. How long is the ladder.

- A. 22 ft B. 26 ft C. 30 ft D. 34 ft

\leftarrow Use the Pythagorean Theorem.

$$\square^2 + 24^2 = \square^2 \quad \leftarrow \text{Substitute}$$

$$100 + \square = c^2 \quad \leftarrow \text{Simplify.}$$

$$\square = c^2 \quad \leftarrow \text{Add.}$$

$$\sqrt{\square} = \sqrt{c^2} \quad \leftarrow \text{Find the positive square root of each side.}$$

$$\square = c \quad \leftarrow \text{Simplify.}$$

The ladder is ft long. The correct answer is choice .



What is the length of the hypotenuse of a right triangle whose legs are 6 feet and 8 feet? _____ feet

Text in your response.



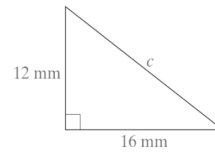
Find the hypotenuse of a right triangle whose legs measure 12 feet and 9 feet. _____ feet

Text in your response.

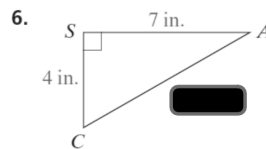
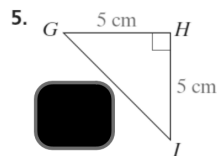
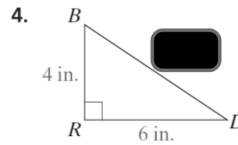
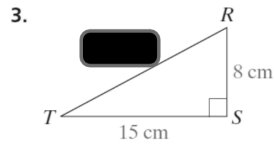
Check Your Understanding

- Vocabulary** The side lengths of a right triangle are 5, 12, and 13. How do you know that the length of the hypotenuse is 13? Explain.
- Fill in the blanks for each step to find the missing hypotenuse length of the triangle below.

- $12^2 + \blacksquare^2 = c^2$
- $\blacksquare + 256 = c^2$
- $\blacksquare = c^2$
- $\blacksquare = c$



A Find the length of the hypotenuse of each triangle. For Exercises 7–12, a and b represent the lengths of the two legs. If necessary, round to the nearest tenth.



Powerdown your clickers and put them away.

You have google form assignment. Your form may not be like your neighbor's form, but everyone has 4 questions to answer. You may use the computer calculator to assist you.