

THE PYTHAGOREAN THEOREM

What Is the Pythagorean Theorem?

The **Pythagorean Theorem** is a theorem that states the sum of the squares of the legs of a right triangle equals the square of the length of the hypotenuse.

- In mathematical terms, this is represented by a² + b² = c², where a and b are the length of the legs and c is the length of the hypotenuse of a right triangle.
- A Pythagorean triple is a set of numbers that always satisfy the equation, a² + b² = c².





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How to use the Pythagorean Theorem

In order to use the **Pythagorean Theorem**, **powers and roots** should be looked at first.

For example, what is 7² and the square root of 225?

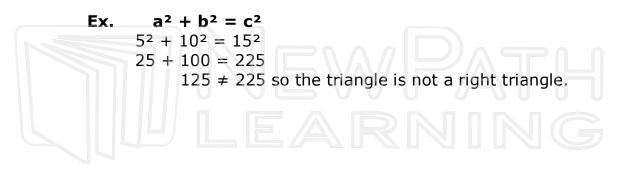
Ex. $7^2 = 7 \cdot 7 = 49$

The square root of 225 = $\sqrt{225}$ = 15 because 15 · 15 = 225.

The **Pythagorean Theorem** can only be used if a triangle is a **right triangle**. This would have to be stated in order to use the **Pythagorean Theorem**. If a triangle is a right triangle and the sides are given, the hypotenuse can be found as follows:



• For example if a triangle has legs that are 5 cm and 10 cm and a hypotenuse of 15, is the triangle a right triangle?



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Objects in every day life can be used with the **Pythagorean Theorem** also.

- For example, if an 18 ft ladder leans against a house and rests on the house16 ft above the ground, how far away is the ladder from the house given that the house and the ground make a right angle? Ex. $a^2 + b^2 = c^2$ $a^2 + 16^2 = 18^2$ $a^2 + 256 = 324$ = 68 a^2 $=\sqrt{68} \approx 8.25 \approx 8.3$ ft. а The ladder is approximately 8.3 ft away from the house. T۲ 1. \ 2. V PREVIEW at is 3. A Please Sign In or Sign Up to download the printable version of this worksheet 4. A right triangle has a hypotenuse of 26 ft and a leg that is 24 ft. What is the length of the **missing leg**? 5. A triangle has sides of 5 cm and 8 cm. The hypotenuse is 13. Is the triangle a right triangle?
 - 6. A square is cut into two triangles by a diagonal. If a side of the square measures 10 m, what is the length of the **diagonal**?