

Pythagoras Theorem

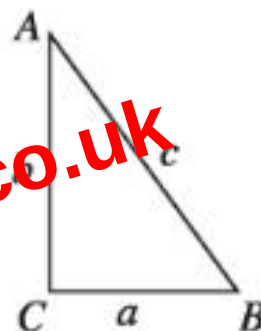
In 6th century B.C. Greek philosopher Pythagoras discovered a special property of right-angled triangle. This property of right-angled triangle is known as Pythagorean property. It is believed that before the birth of Pythagoras, in Egyptian and Greek era, this special property of right-angled triangle was in use. In this chapter, we shall discuss this property of right-angled triangle. We know that the sides of a right-angled triangle have got special names - the side opposite to right angle as hypotenuse and the sides containing the right angle as base and height. In this chapter, relation among these three sides will be discussed.

At the end of this chapter, the students will be able to –

- Verify and prove Pythagoras theorem.
- Verify whether the triangle is right-angled when the lengths of three sides of a triangle are given.
- Use Pythagoras theorem to solve problems.

9.1 Right angled Triangle

In the figure ABC is a right-angled triangle with $\angle ACB$ as a right angle. Therefore, AB is the hypotenuse of the triangle. In the figure we denote the sides by a, b, c .



Activity :

1. Draw a right angle and locate two points on its two sides at 3 cm and 4 cm apart. Join the two points to draw a right-angled triangle. Measure the length of the hypotenuse. Is the length 5 cm?

Observe, $3^2 + 4^2 = 5^2$ i.e. the sum of the squares of two sides is equal to the square of the measurement of the hypotenuse. Therefore, for a right-angled triangle with sides a, b and c , $c^2 = a^2 + b^2$. This is the key point of Pythagoras theorem. This theorem has been proved in various methods. A few simple proofs of this theorem are given below.

9.2 Pythagoras Theorem

In a right-angled triangle the square on the hypotenuse is equal to the sum of the squares on the two other sides.

(Proof with the help of two right angled triangles)