Right Angle Triangle and Pythagoras theorem

A right triangle has a right angle. An important theorem called Pythagoras Theorem relating to a right triangle is states as follows:

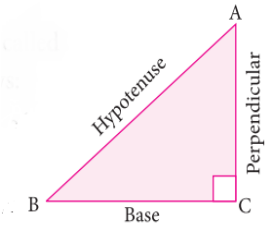
In a right triangle, the square of the hypotenuse equals the sum of the squares of its remaining two sides.

In a right triangle ABC right-angled at C i.e., AB is the hypotenuse and AC and BC are the other two sides of the triangle, we have

$$(AB)^2 = (BC)^2 + (CA)^2$$

i.e., $(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Perpendicular})^2$

i.e., $c^2 = a^2 + b^2$, where a = BC, b = CA and c = AB



Let us understand with an example:

Example: A ladder is placed in such a way that its foot is at a distance of 5m from a wall and its top reaches a window 12 m above the ground. Determine the length of the ladder.

Solution: Let AB be the ladder and B be the window.

Thus, BC = 5m and AC = 12m.

Since ABC is a right triangle, right-angled at C

$AB^2 = AC^2 + BC^2$ (Pythagoras theorem)

i.e., $AB^2 = 5^2 + (12)^2 = 25 + 144 = 169$

or $AB \times AB = 13 \times 13$ or AB = 13cm

Hence, the length of the ladder is 13 m.