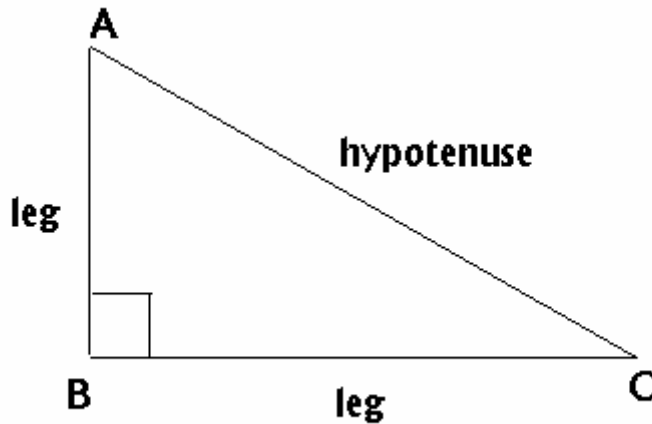


In $\triangle ABC$, if the right angle is at B, then AC is the hypotenuse. AB and BC are the legs of $\triangle ABC$.



The parts of right triangle shown through smart class.

DISCOVERY OF PYTHAGORAS THEOREM

Pythagoras the famous Greek Philosopher gave the wonderful relation between the lengths of the side of a right triangle and for this reason, the theorem bears this name. But, facts available have much scope for doubt on this account. Of course, the theorem and its proof was given by Euclid, in his book The Elements.

An Indian Mathematician, Baudhayan, stated the theorem in its most general form and illustrated it by a number of numerical examples but he gave no proof.

Discovery taken from INTERNET AND PICTURES OF THE DISCOVERERS DOWNLOADED AND SHOWN IN THE CLASS.

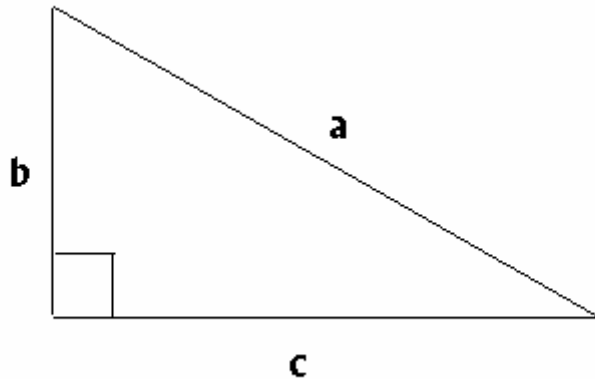
STATEMENT OF PYTHAGORAS THEOREM

In a Right Angled Triangle, the square of the hypotenuse is equal to the sum of the squares of its legs.

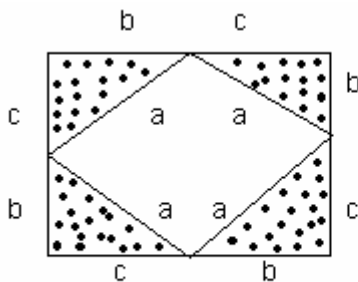
ACTIVITIES SHOWN & EXPLAINED THROUGH SMART CLASS STUDENTS PERFORM THESE ACTIVITIES IN MATHS LAB THROUGH GEOMETRIC SKETCH PAD

ACTIVITY –1

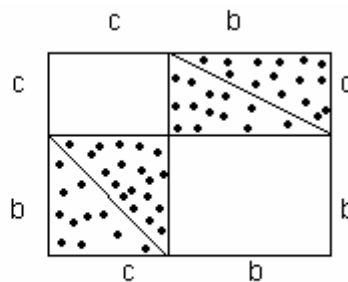
Make eight identical copies of right angled triangle of any size . For e.g. – a right angled triangle whose hypotenuse is 'a' units and the legs are of lengths 'b' units and 'c' units.



Draw two identical squares on a sheet with sides of length b+c. Place four triangles in one square and the remaining four triangles in the other square.



Square A



Square B

The squares are identical the eight triangles inserted are also identical. Hence the uncovered area of square A = Uncovered area of square B

i.e. Area of inner square of square A = The total areas of two uncovered squares in square B.

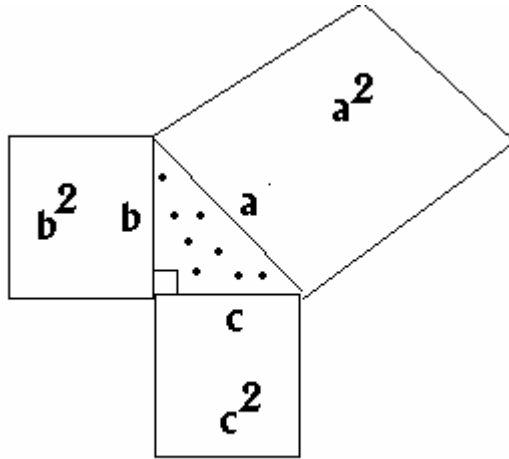
$$a^2 = b^2 + c^2$$

This is Pythagoras Property

ACTIVITY – 2

Pythagoras property is a very useful tool in mathematics. It means that for any right triangle the area of the square on the hypotenuse is equal to the sum of the areas of the squares on the legs.

Draw a right triangle on a square sheet construct squares on its sides and compute the area of these squares & hence we can verify the theorem practically



Thus, $a^2 = b^2 + c^2$ This is a Pythagoras Property.

CONVERSE OF PYTHAGORAS PROPERTY

If in a triangle the square of the longest side is equal to the sum of the squares its other two sides then the triangle is a right triangle.

EXAMPLES SHOWN THROUGH SMART CLASS

PYTHAGOREAN TRIPLET

Three positive integers a , b and c in this order are called Pythagorean triplet if $c^2 = a^2 + b^2$. Once a Pythagorean triplet is obtained, it may be divided or multiplied by the same constant to get another triplet.

EXAMPLES THROUGH SMART CLASS

APPLICATIONS OF PYTHAGORAS THEOREM

Pythagoras theorem is a very useful tool in mathematics, which helps us in solving various problems in our day to day life.

EXAMPLE-1

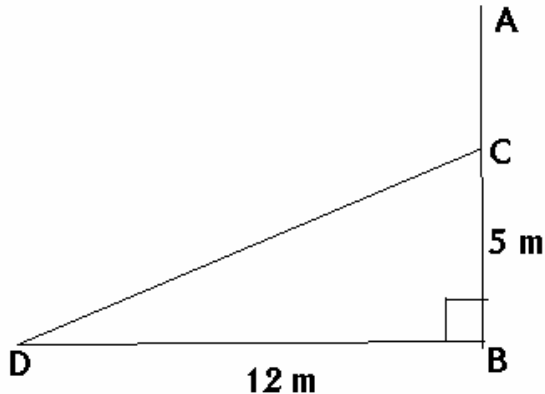
A tree broke at a point but did not separate. Its top touched the ground at a distance of 12 m from its base. If the point where it broke be at a height of 5 m from the ground, what was the total height of the tree before it broke ?

Through the Smart Class the problem is actually visualized i.e. the broken part of the tree falling down at some distance from the base of the tree & how a right triangle is formed & hence Pythagoras theorem can be applied to solve the problem.

SOLUTION

Let ACB represents the tree before it broke at the point C and let the top A touch the ground at D after it broke.

Then $\triangle DBC$ is right angled at B and $DB = 12\text{m}$ & $BC = 5\text{m}$



Therefore by Pythagoras theorem,

$$\begin{aligned} DC^2 &= DB^2 + BC^2 \\ &= 12^2 + 5^2 \text{ m}^2 \\ &= 144 + 25 \text{ m}^2 \\ &= 169 \text{ m}^2 \\ &= 13^2 \text{ m}^2 \end{aligned}$$

$$DC = 13 \text{ m}$$

$$\text{Now, } DC = AC = 13 \text{ m}$$

$$\begin{aligned} AB &= AC + BC \\ &= (13 + 5)\text{m} = 18 \text{ m} \end{aligned}$$

Hence, the height of the tree before it broke was 18 m.

EXAMPLE – 2

A 15 m long ladder reached a window 12 m high from the ground on placing it against a wall at a distance 'a'. Find the distance of the foot of the ladder from the wall.

Again through the smart class the problem is actually visualized, i.e, how the ladder is placed at some angle against the wall & the wall being perpendicular to the ground, a right triangle is formed & hence Pythagoras theorem can be applied to solve the problem.

SOLUTION

Let A represents the window on the wall AB & let the ladder reaches the window from point C. Thus $\triangle ABC$ is right angled at B and $AC = 15$ m & $AB = 12$ m.

\therefore By Pythagoras theorem

$$AC^2 = AB^2 + BC^2$$

$$15^2 = 12^2 + a^2$$

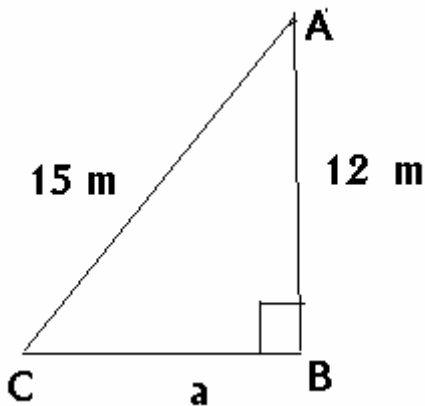
$$225 - 144 = a^2$$

$$81 = a^2$$

$$a^2 = 9^2$$

$$a = 9 \text{ m}$$

Hence the distance of the foot of the ladder from the wall is 9m.



STUDENTS FEED BACK

Students learnt the concepts of the topic through multifarious activities and hence were able to solve the problems of exploratory nature, . Thus the fear of the topic was removed from the minds of the learners as their learning was not based on rote memorization of formulae and theorem but on acquisition and mastery of basic concept by actually visualizing and verifying the concept. Even the application based problems which they found very mechanical were now very interesting, joyful and meaningful to them.