Activity

Topic
Pythagoras Theorem

Objective
To verify Pythagoras theorem by performing an activity.

Previous Knowledge Required
1. In a right-angled triangle, the square of the hypotenuse is equal to the sumof squares on the other two sides.
2. Concept of a right-angled triangle.
3. Area of square = $(\text{side})^2$
4. Construction of perpendicular lines.

Material Required
Colored papers, pair of scissors, fevicol, geometry box, sketch pens, light colored square sheet.

Procedure
1. Take a coloured paper, draw and cut a right-angled triangle ACB right- angled at C, of sides 3 cm, 4 cm and 5 cm as shown in Fig.(i).

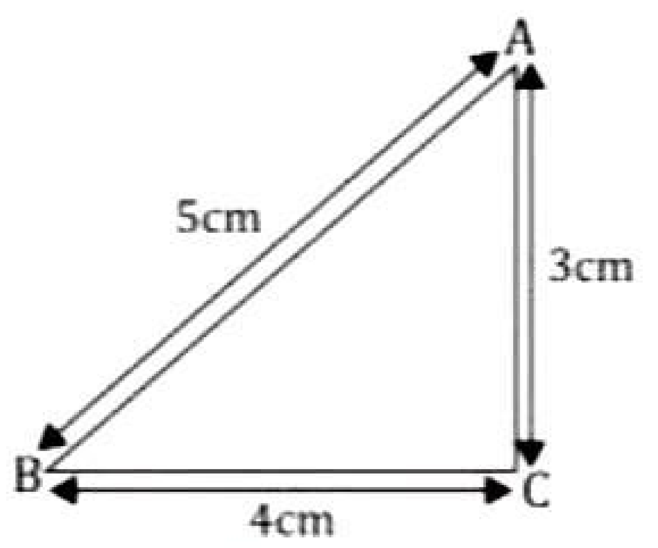


Fig.(i)

2. Paste this triangle on the white sheet of paper.
3. Draw squares on each side of the triangle on side AB, BC and AC and name them accordingly as shown in Fig.(ii).

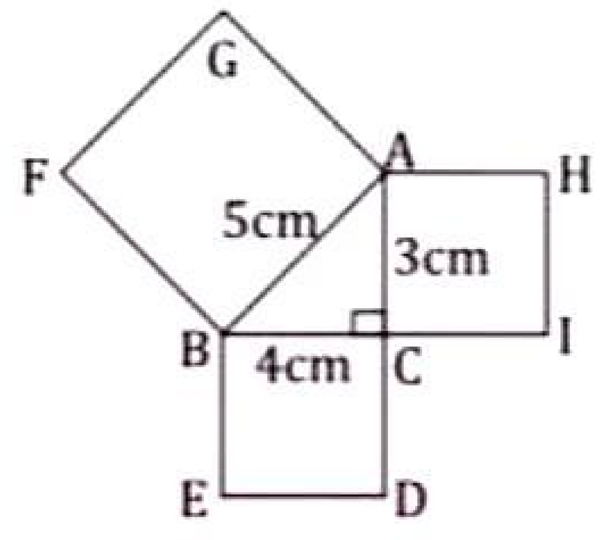


Fig.(ii)

4. Extend the sides FB and GA of the square ABFG which meets ED at Pand CI at Q respectively, as shown in fig. (iii).

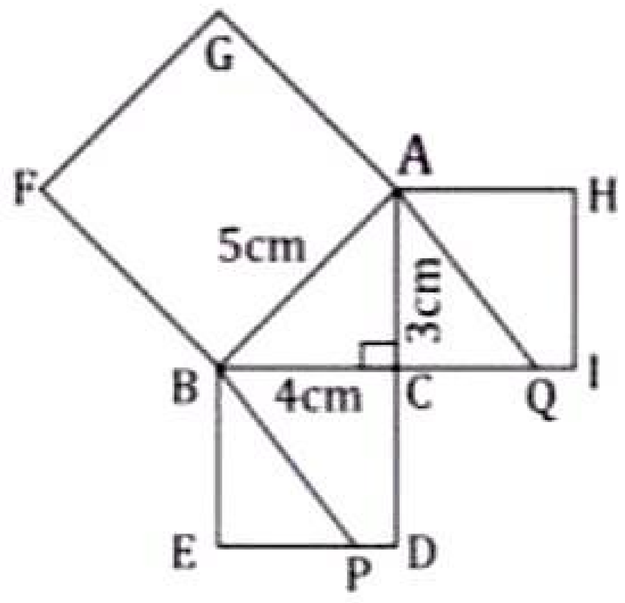


Fig.(iii)

5. Draw perpendicular RP on BP which meets CD at R. Mark the parts 1, 2,3, 4 and 5 of the squares BCDE and ACIH and colour them with five different colours as shown in Fig. (iv).

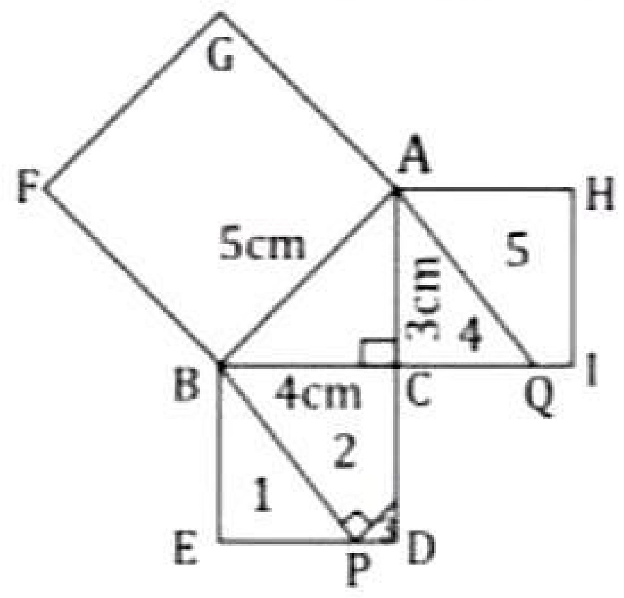


Fig.(iv)

6. Cut the pieces 1, 2, 3, 4 and 5 from the squares BCDE and ACIH andplace the pieces on the square ABFG as shown in Fig.(v).

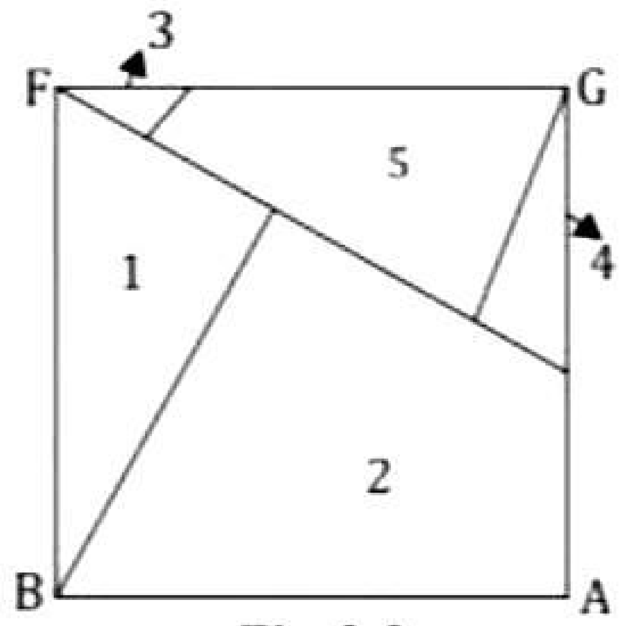


Fig.(v)

Observation

Cut pieces of squares ACIH and BCDH and completely cover the square ABFG.

$\therefore$ Area of square ACIH $= AC^2 = 9\ cm^2$,

Area of square BCDE $= BC^2 = 16\ cm^2$,

Area of square ABFG $= AB^2 = 25\ cm^2$

$\therefore\ AB^2 = BC^2 + AC^2 = 25 = 16 + 9$

Result

Pythagoras theorem is verified.

Learning Outcome

Students will learn practically that in a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Activity Time

1. The area of an equilateral triangle described on the hypotenuse of a right-angled triangle is equal to the sum of the areas of equilateral triangles described on the other two sides.

In ΔACD, $AC = DC = DA = 5cm$,

$$ar(\Delta ACD) = \frac{\sqrt{3}}{4}(5)^2$$

In ΔABE, $AB = BE = EA = 3cm$

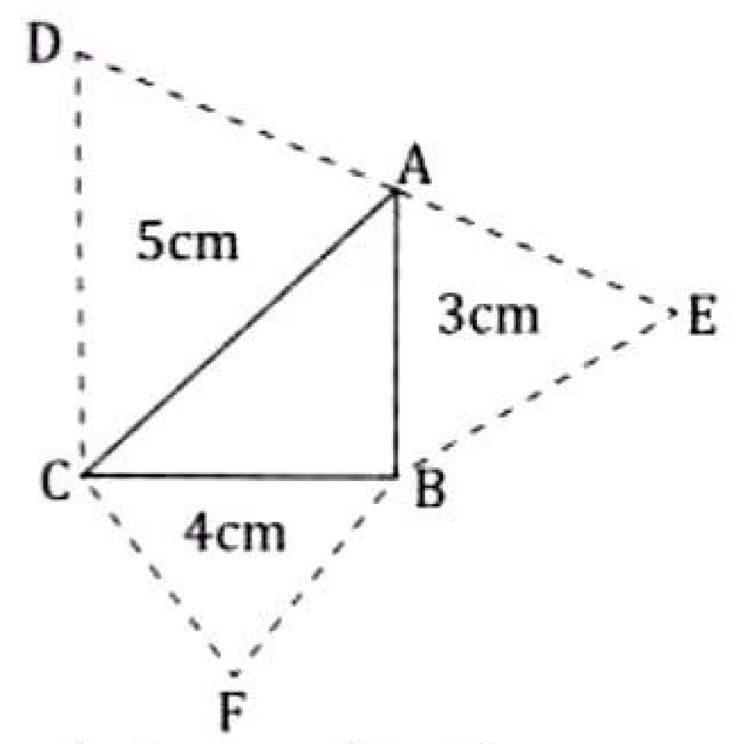
$$ar(\Delta ABE) = \frac{\sqrt{3}}{4}(3)^2$$

In ΔBCF, $BC = CF = FB = 4cm$,

$$ar(\Delta BCF) = \frac{\sqrt{3}}{4}(4)^2$$

Now, $ar(\Delta ABE) + ar(\Delta BCF) = \frac{\sqrt{3}}{4}(3)^2 + \frac{\sqrt{3}}{4}(4)^2 = \frac{\sqrt{3}}{4}[9 + 16]$

$$= \frac{\sqrt{3}}{4}(5)^2$$



$\therefore$ $ar(\Delta ABE) + ar(\Delta BCF) = ar(\Delta ACD)$ verified.

2. The area of a semi-circle described on the hypotenuse of a right-angled triangle is equal to the sum of the areas of semicircles described on the other two sides of the right-angled triangle.

VIVA VOCE

Q 1. What is the name given to the longest side of a right-angled triangle?

Ans. Hypotenuse

Q 2. Name three sides of a right-angled triangle.

Ans. Base, perpendicular, hypotenuse

Q 3. Is the Pythagoras theorem applicable for an equilateral triangle?

Ans. No

Q 4. What is the name of the triplet forming the sides of a right-angled triangle?

Ans. Pythagorean triplet

Q 5. Write the converse of the Pythagoras theorem.

Ans. In a triangle, if a square of the longest side is equal to the sum of the squares of the other two sides, then the angle opposite to the longest side is a right angle.

MULTIPLE CHOICE QUESTIONS

Q 1. Find all angles of an isosceles right-angled triangle.

(a) 30°, 60°, 90° (b) 20°, 70°, 90° (c) 45°, 45°, 90° (d) None of these

Q 2. In right ΔABC, $AB = 3cm$, $BC = 4$ cm and $\angle B = 90°$, then AC is:

(a) 7 cm (b) 5 cm (c) 2 cm (d) 3 cm

Q 3. The hypotenuse of a right triangle is 17 cm long. If one of the remaining two sides is of length 8 cm. Then the length of another side:

(a) 8 cm (b) 15 cm (c) 12 cm (d) 24 cm

Q 4. The sides of certain triangles are given below. Determine which of them are right triangles?

(a) 7 cm, 24 cm, 25 cm (b) 5 cm, 8 cm, 11 cm

(c) 5 cm, 20 cm, 25 cm (d) None of these

Q 5. ABC is an isosceles triangle, right angled at C. Tick the correct relation.

(a) $2AB = AC^2$ (b) $BC = 2AB^2$ (c) $2AB^2 = AC^2 + BC^2$ (d) None of these

Answer Key

1.(c)	2.(b)	3.(b)	4.(a)	5.(d)