Activity

Topic

Areas of Two Similar Triangles

Objective

To verify "The ratio of the areas of two similar triangles is equal to the ratio of the square of their corresponding sides" by performing an activity.

Previous Knowledge Required

1. Concept of parallel lines.
2. Division of a line in a given ratio.

Material Required

Chart paper, construction box, coloured pens, a pair of scissors, fevicol.

Procedure

1. Take a chart paper and cut a ΔABC with $AB = 6cm$, $BC = 6cm$, $CA = 6cm$.
2. Mark 5 points $P_1, P_2, \dots, P_5$ at a distance of 1 cm each on side AB and $Q_1, Q_2 \dots, Q_5$ at a distance of 1 cm each on side AC as shown in Fig (i).
3. Join $P_1Q_1, P_2Q_2, \dots\dots\dots P_5Q_5$ as shown in Fig. (ii).

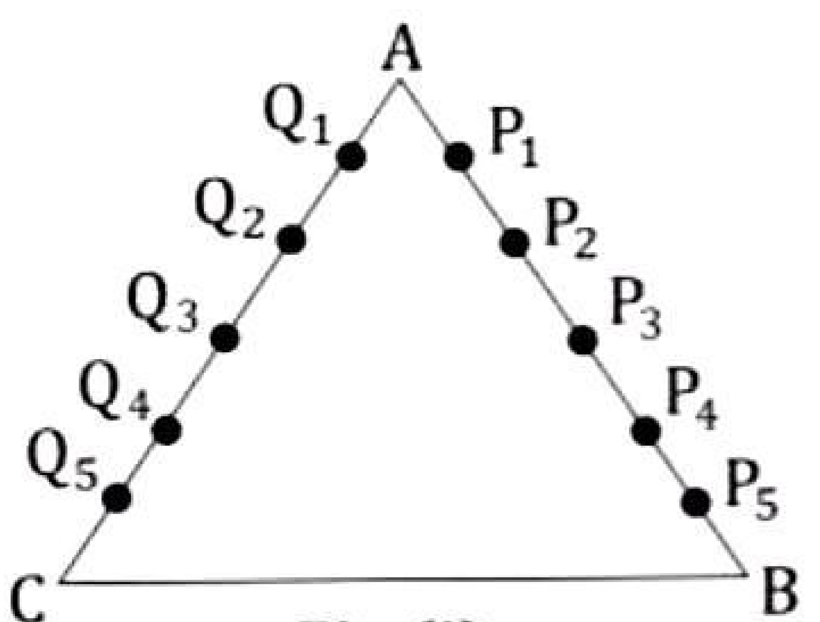


Fig.(i)

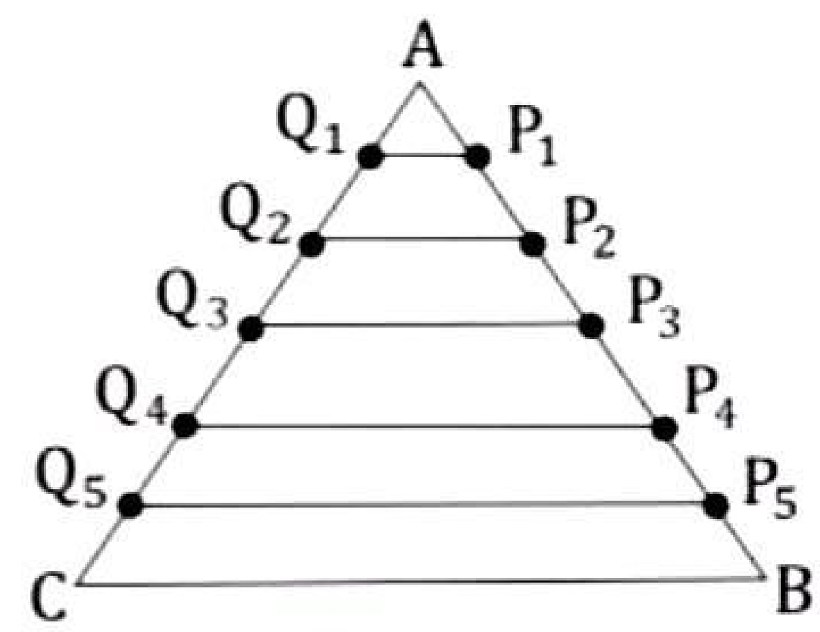


Fig.(ii)

4. Draw lines parallel to AC from $P_1, P_2, \dots P_5$ and draw lines parallel to ABfrom the points $Q_1, Q_2 \dots, Q_5$ as shown in Fig.(iii).

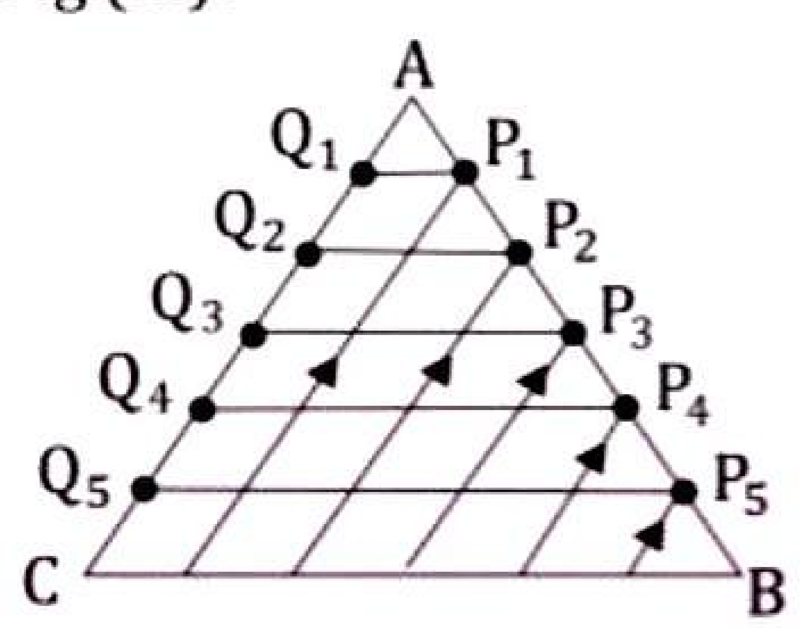
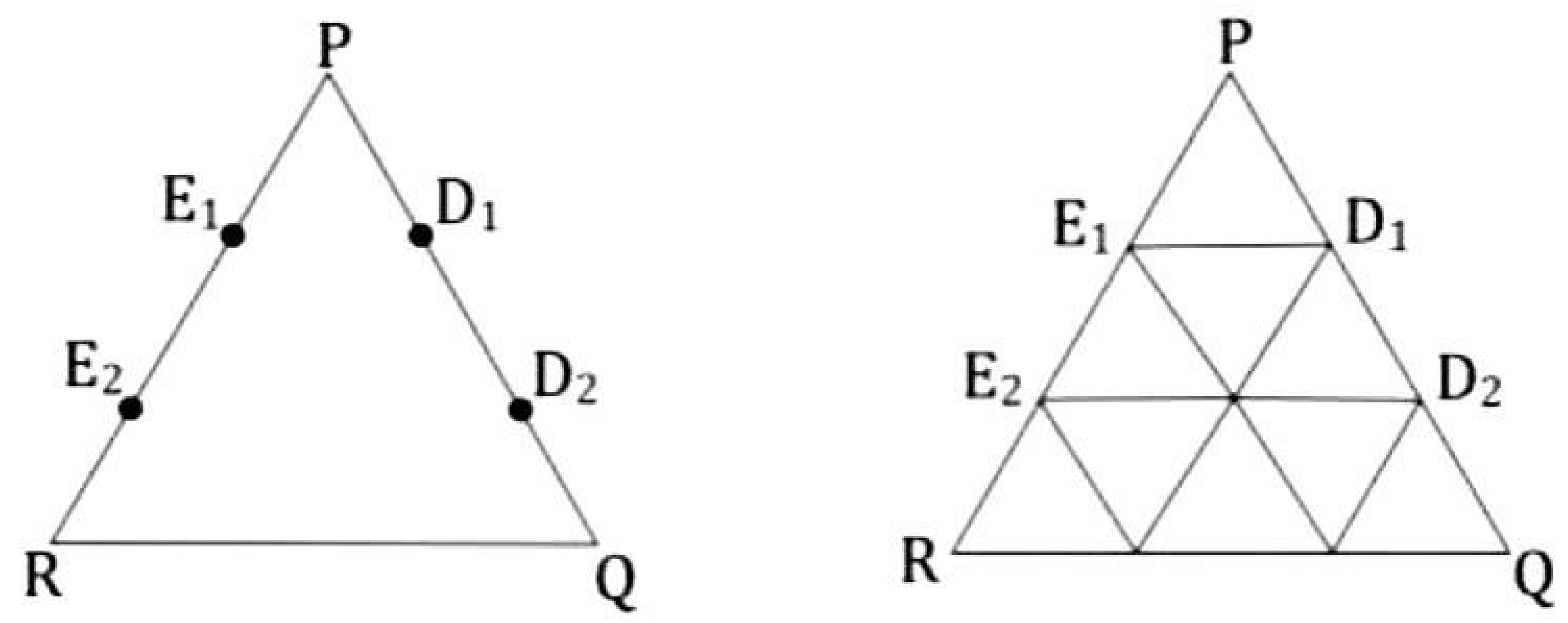


Fig.(iii)

5. Thus ΔABC is divided into 36 smaller triangles, and all are similar to each other and of equal area.
6. Construct a ΔPQR with PQ $= \frac{1}{2}$ of AB, PR $= \frac{1}{2}$ of AC and QR $= \frac{1}{2}$ of BC i.e., 3cm each on another chart paper.
7. Mark D_1, D_2 and E_1, E_2 on sides PQ and PR respectively.
8. Repeat steps 3 and 4.
9. Thus ΔPQR is divided into 9 smaller similar triangles equal in area.



Observation

Area of ΔABC = area of 36 smaller Δ's

Area of ΔPQR = area of 9 smaller Δ's

$$\frac{PQ}{AB} = \frac{3}{6} = \frac{1}{2} = \frac{PR}{AC}$$

$$\frac{\text{Area of } \Delta PQR}{\text{Area of } \Delta ABC} = \frac{PQ^2}{AB^2}$$

$$\frac{9 \text{ smaller } \Delta' s}{36 \text{ smaller } \Delta' s} = \frac{1}{4} = \left(\frac{1}{2}\right)^2 \text{ (because } \triangle ABC \sim \triangle PQR)$$

Result

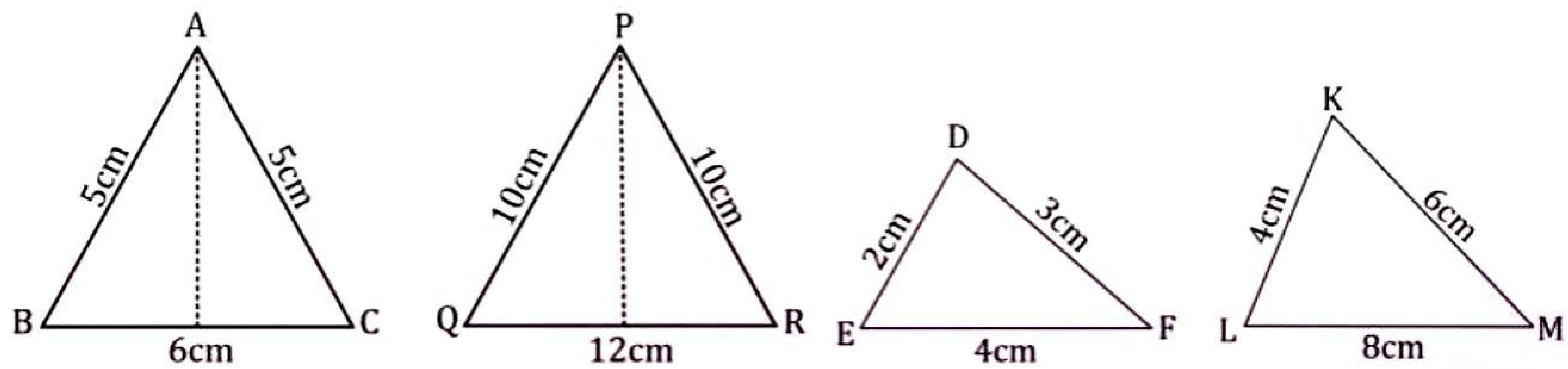
Thus, it is verified that the ratio of the areas of two similar triangles is equal to the ratio of the square of their corresponding sides.

Learning Outcome

The concept of the area theorem is clear to the students through this activity.

Activity Time

Take isosceles similar triangles and scalene similar triangles and try to verify this activity. Here isosceles triangles, ΔABC ~ ΔPQR. Scalene triangle ΔDEF ~ ΔKLM



VIVA VOCE

Q 1. What are the criteria for two triangles to be similar?

Ans. Two triangles are said to be similar if their corresponding angles are equal.

Q 2. $\Delta ABC \sim \Delta DEF$ and their areas are respectively 64 cm^2 and 121 cm^2. If EF = 15.4 cm, then find BC.

Ans. 11.2 cm

Q 3. Is it true, if the areas of two similar triangles are equal, then they are congruent?

Ans. Yes

Q 4. Are a square and a rhombus of side 3 cm similar?

Ans. No

Q 5. What is the ratio of the area of an equilateral triangle described on one side of a square to the area of an equilateral triangle described on one of its diagonals?

Ans. 1:2

MULTIPLE CHOICE QUESTIONS

Q 1. ABC and BDE are two equilateral triangles, such that D is the mid-point of BC. Then the ratio of the areas of ΔABC and ΔBDE is:

(a) 4:1 (b) 1:4 (c) 1:2 (d) 2:1

Q 2. If in two similar triangles PQR and LMN, if QR = 15 cm and MN = 10 cm, then the ratio of the areas of triangles is:

(a) 3:2 (b) 9:4 (c) 5:4 (d) 7:4

Q 3. The sides of two similar triangles are in the ratio 4: 9. Areas of these triangles are in the ratio:

(a) 2:3 (b) 4:9 (c) 81:16 (d) 16:81

Q 4. Two isosceles triangles have equal vertical angles, and their areas are in the ratio 16: 25. Then the ratio of their corresponding heights is:

(a) 16:25 (b) 256:625 (c) 4:5 (d) None of these

Answer Key

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