Topic

Areas of Sectors formed at the Vertices of a Triangle

Objective

To verify that sum of areas of three sectors of the same radii 'r' formed at the vertices of any triangle is $\frac{1}{2}\pi r^2$ by paper cutting and pasting.

Previous Knowledge Required

1. Concept of different types of triangles.
2. Definition of a sector.
3. Area of circle = πr^2, r → radius.

Materials Required

Glazed paper, sketch pens, fevicol, a pair of scissors, pencil, geometry box.

Procedure

1. Draw three different types of triangles on a glazed paper as shown in fig. (i).
   - **(i)** Equilateral ΔABC
   - **(ii)** Isosceles ΔPQR
   - **(iii)** Scalene ΔXYZ

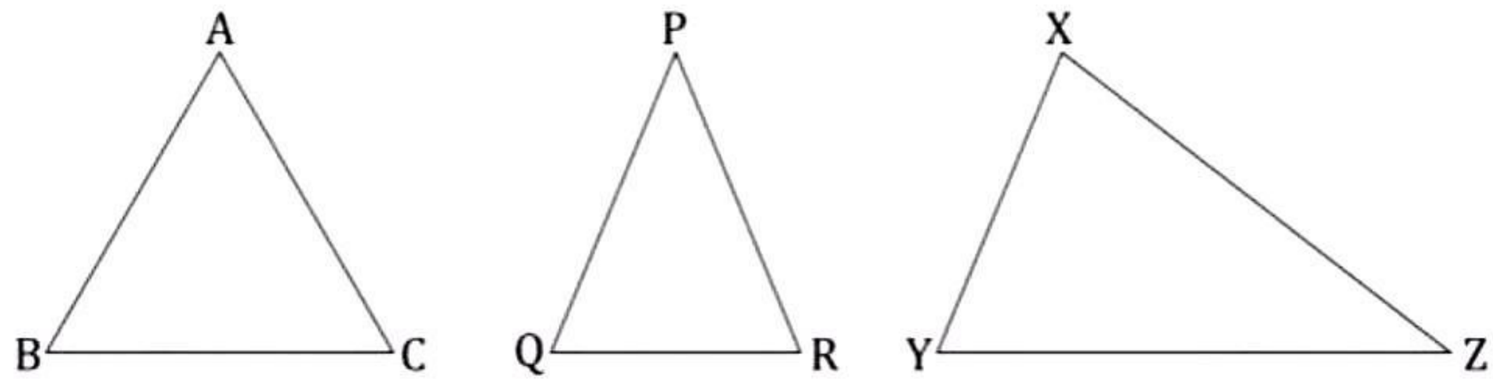

Fig.(i)

2. Cut an equilateral ΔABC as shown in fig.(ii).
3. Taking vertices, A, B and C as centres of ΔABC, draw three sectors of same radii r.

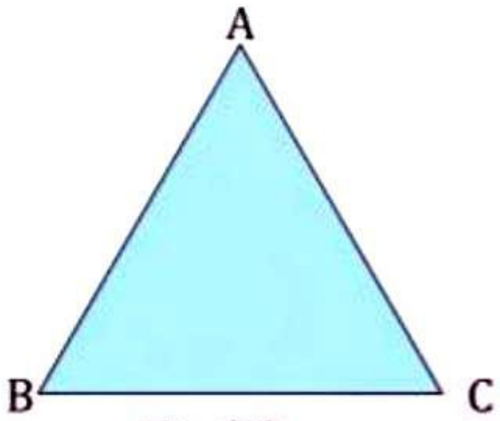

Fig.(ii)

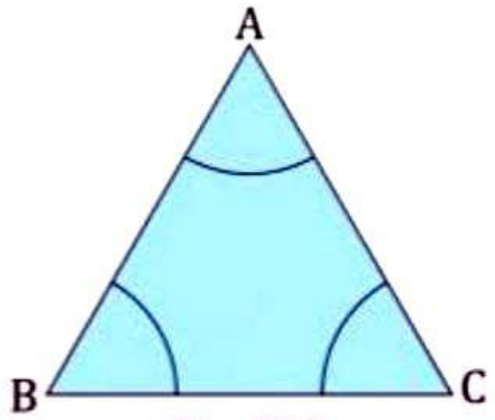

Fig.(iii)

4. Cut these three sectors and marked them as 1, 2, 3 and fill different colours as shown in fig. (iv).

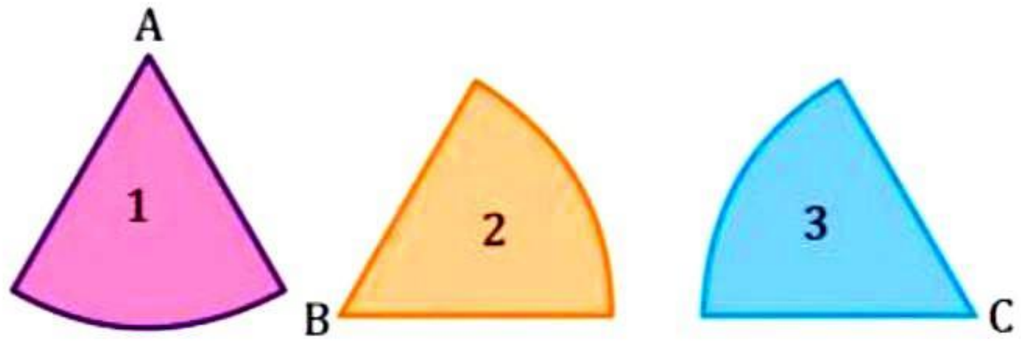

Fig.(iv)

5. Draw a straight line and mark any point 'O' on it. Place three sectors 1, 2, 3 adjacent to each other so that the vertices A, B, C coincide with 'O' without leaving any gap as shown in fig. (v).

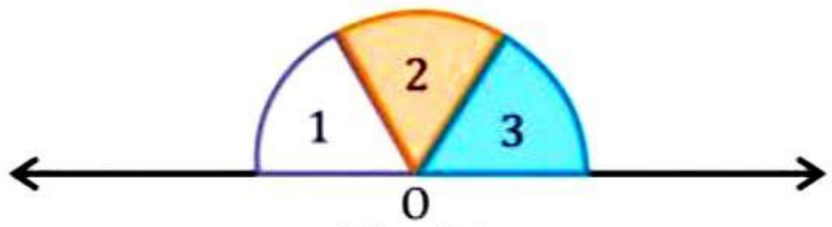

Fig. (v)

6. The same process (steps 1-5) can be taken up with isosceles triangle and scalene triangle fig. (i).

Observation

The shape formed on the straight line is a semi-circle

$\therefore$ Area of circle $= \pi r^2$

$\therefore$ Area of semicircle $= \frac{1}{2}\pi r^2$

Result

It is verified that the sum of areas of three sectors of same radii ' r ' formed at the vertices of any triangle is $\frac{1}{2}\pi r^2$.

Learning Outcome

The students are able to understand the concept of this activity through paper cutting. It is clear to them that a semicircle is always obtained, whatever be the type of a triangle.

VIVA VOCE

Q 1. What is the angle subtended by a circle at Centre?

Ans. 360°

Q 2. What is the sum of angles of four sectors of same radii 'r' formed at the vertices (as Centre) at any quadrilateral?

Ans. 360°

Q 3. If the perimeter of semicircle is 12 cm, find its radius.

Ans. $\frac{7}{3}$ cm

Q 4. What is the area of a semicircle of radius 2 cm?

Ans. 2π

Q 5. **Define a segment of a circle.**

Ans. A chord divides a circle in two parts each of which is called a segment of a circle.

MULTIPLE CHOICE QUESTIONS

Q 1. If the area of a semicircle is 121 cm^2, find its radius.

(a) $\sqrt{77}$ cm (b) $\sqrt{76}$ cm (c) $\sqrt{74}$ cm (d) None of these

Q 2. If the perimeter and the area of a circle are numerically equal, then the radius of the circle is:

(a) π units (b) 2 units (c) 4 units (d) 5 units

Q 3. Area of a sector of angle P (in degree) of a circle with radius R is:

(a) $\frac{P}{180^0} \times 2\pi r$ (b) $\frac{P}{180^0} \times 2\pi r^2$ (c) $\frac{P}{360^\circ} \times 2\pi r$ (d) $\frac{P}{720^0} \times 2\pi r^2$

Q 4. Area of the sector of a circle with radius 4 cm and angle 30° is:

(a) 4.91 cm (b) 14.9 cm (c) 4.19 cm (d) 94.1cm

Q 5. Find the area of a quadrant of circle whose circumference is 22 cm.

(a) $\frac{77}{8}$ cm^2 (b) $\frac{76}{8}$ cm^2 (c) $\frac{77}{2}$ cm^2 (d) $\frac{77}{4}$ cm^2

Answers Key

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