ACTIVITY

Angle In A Semicircle, Major Segment, Minor Segment

Objective

To verify that angle in a semicircle is a right angle, angle in a major segment is acute, angle in a minor segment is obtuse by paper folding.

Material Required

White sheet, glazed papers, compass, pencil, tracing paper

Theory

1. Concept of a semicircle, major segment and minor segments
2. Concept of right angle, acute angle and obtuse angle.

Procedure

Case I.

1. Draw a circle of any radius with centre O on a glazed paper. Cut it and paste it on white paper.
2. Fold the circle along the line passing through the centre O to get a diameter AB.
3. Take any point P on the circumference of the circle.
4. Join AP and BP by paper folding to get $\angle APB$.
5. Make two replicas of $\angle APB$ with the help of tracing paper such that $\angle A_1P_1B_1$ and $\angle A_2P_2B_2$.

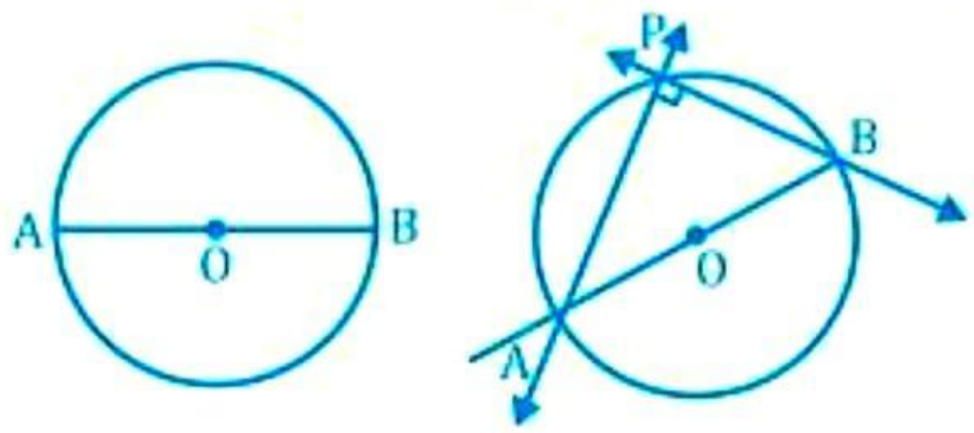


fig. (i)

6. Place two $\Delta A_1P_1B_1$ and $\Delta A_2P_2B_2$ such that $\angle P_1$ and $\angle P_2$ coincide each other fig. (ii).

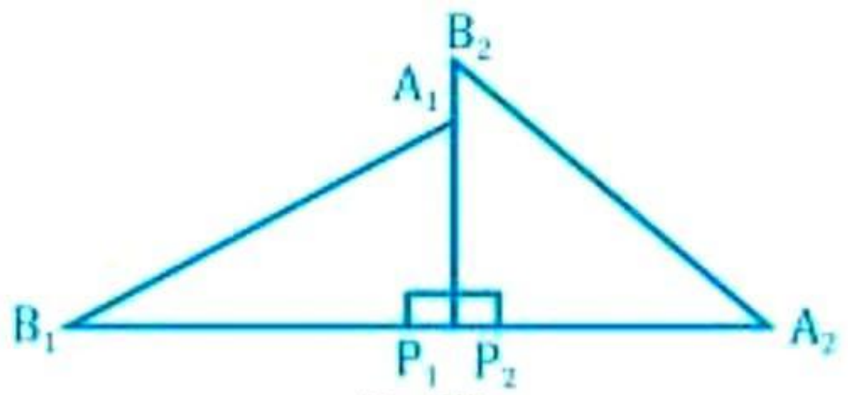


fig. (ii)

We notice $\angle A_1P_1B_1$ and $\angle A_2P_2B_2$ form a linear pair.

$\therefore \angle A_1P_1B_1 + \angle A_2P_2B_2 = 180^\circ$ (Linear pair).

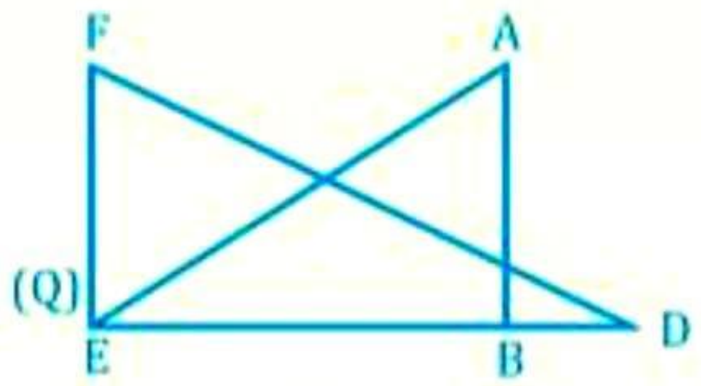
$2\angle APB = 180^\circ$ ($\angle A_1P_1B_1$ and $\angle A_2P_2B_2$ are replicas of $\angle APB$)

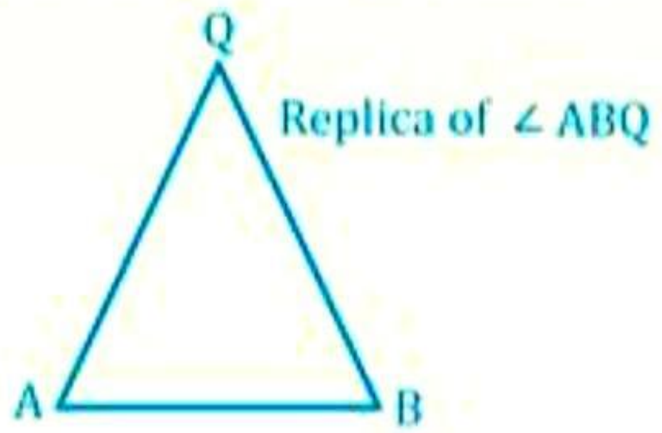
$\therefore \angle APB = 90^\circ$

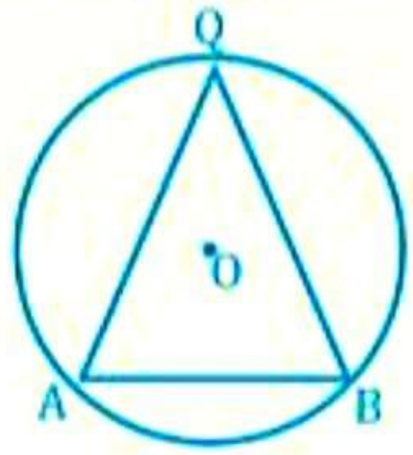
Case II.

For Major Segment:

1. Cut a circle of any radius using glazed paper with centre O and paste it on white paper.
2. Make a chord AB by paper folding.
3. Take a point Q on the major segment. Join QA and QB by paper folding.
4. Draw and cut replica of $\angle AQB$.
5. Place the replica of $\angle AQB$ on the newly drawn, right-angled ΔDEF such that side BQ falls on DE.







$\therefore \angle AQB < \angle DEF = 90^\circ$

$\therefore \angle AQB$ is acute.

Case III.

For Minor Segment:

1. Cut a circle of any radius using glazed paper with centre O. Paste it on white paper.
2. Make a chord AB by paper folding.
3. Take any point M on the minor segment. Join MA and MB by paper folding to get $\angle AMB$.
4. Draw and cut replica of $\angle AMB$ with the help of tracing paper.
5. Place the replica of $\angle AMB$ on the base of the newly drawn right angled triangle ΔDEF, such that base MB coincides with EF and point M coincides with E.

Here, $\angle AMB > \angle DEF = 90^\circ \therefore \angle AMB$ is an obtuse angle.

Observation

We observe that,

In Case I, AOB is diameter and $\angle APB$ is 90°.

In Case II, AQB is a major segment and $\angle AQB$ is an acute angle.

In Case III, AMB is a minor segment and $\angle AMB$ is an obtuse angle.

Result

By paper folding method, we verified that angle in a semicircle is a right angle. In any circle, the angle in the minor segment is an obtuse angle, angle in the major segment is an acute angle.

Learning Outcome

In any circle, any angle in a minor segment is always obtuse, any angle in a major segment is always acute, angle in a semicircle is always a right angle.

Activity Time

Divide the circle into two parts:

1. Along the diameter and measure different angles formed on the diameter by the paper folding method.
2. Along any chord (other than diameter) and measure the different angles formed by paper folding on two different segments.

Viva Voce

Q1. The line is drawn through the centre of a circle to bisect a chord is perpendicular to the chord". Is this statement true?

Ans: Yes

Q2. How many longest chords are there in a circle?

Ans: There are infinite longest chords in a circle passing through the centre and each of them is equal to the diameter of the circle.

Q3. What do you mean by the minor segment of a circle?

Ans: A chord divides a circle into two parts and the smaller part is called the minor segment.

Q4. How will you define the major segment of a circle?

Ans: A chord divides a circle into two parts and the larger part is called the major segment.

Q5. Do equal chords of a circle subtend different angles at the centre?

Ans: No, because equal chords subtended equal angles at the centre.

Q6. The angle subtended by an arc at the circle in the minor segment is an obtuse angle. What is the value of angle subtended by it in the major segment?

Ans: Acute angle

Q7. If a chord AB subtended an angle 80° at the centre, then what will be the measure of angles subtended by same chord in the same segment of the circle at points P and Q?

Ans: Chord AB subtended an angle of 40° at both points.

Q8. How will you relate the angles in the same segment of a circle?

Ans: Angles will be equal.

Multiple Choice Questions

Q 1. If the circumference of a circle is 22 cm, find the area of the semicircle.

(a) 38.5 cm^2 (b) 19.25 cm^2 (c) 44 cm^2 (d) 77 cm^2

Q 2. The angle subtended by the diameter of a semicircle is:

(a) 45° (b) 180° (c) 90° (d) 60°

Q 3. The area of a sector of a circle is $\frac{1}{6}$ to the area of the circle. Find the degree measure of its minor arc.

(a) 90° (b) 60° (c) 45° (d) 30°

Q 4. If there are two separate circles drawn apart from each other, then the maximum number of common points they have:

(a) 0 (b) 1 (c) 2 (d) 3

Q 5. Equal ____ of the congruent circles subtend equal angles at the centres.

(a) Segments (b) Radii (c) Arcs (d) Chords

Q 6. If chords AB and CD of congruent circles subtend equal angles at their centres, then:

(a) AB = CD (b) AB > CD (c) AB < AD (d) None of the above

Q 7. Equal ____ of the congruent circles subtend equal angles at the centres.

(a) Segments (b) Radii (c) Arcs (d) Chords

Q 8. Find the area of a right-angled triangle, if the radius of its circumcircle is 3 cm and altitude drawn to the hypotenuse is 2 cm:

(a) 3 cm^2 (b) 6 cm^2 (c) 2 cm^2 (d) None of these

Q 9. If the angle in major segment is acute, then angle opposite to it will be:

(a) Obtuse (b) Right angle (c) Acute (d) None of these

Q 10. If the angle in minor segment is obtuse then another angle on the same segment will be:

(a) Right angle (b) Acute (c) Obtuse (d) None of these

ANSWER KEY

1.(b)	2.(c)	3.(b)	4.(a)	5.(d)	6.(a)	7.(d)	8.(b)	9.(a)	10.(c)