

CLASS 9 · HOTS · OLYMPIAD PREPARATION · SHORT NOTES

Chapter 5: HOTS: Up and Down, Round and Round, Circles (Class 9)

Topic-wise short notes with solved examples

Higher order thinking questions on circles for Class 9: chords and their distance from the centre, angles at the centre and the circumference, the angle in a semicircle and cyclic quadrilaterals, each with a full solution.

1 Solved HOTS questions

- Facts: the perpendicular from the centre to a chord bisects it; equal chords are equally far from the centre; the angle at the centre is twice the angle at the circumference on the same arc; the angle in a semicircle is 90° ; opposite angles of a cyclic quadrilateral add up to 180° .

Example 1.1 A chord of length 10 cm is at a distance of 12 cm from the centre of a circle. Find the radius.

SOLUTION

The perpendicular from the centre bisects the chord, so half the chord is 5 cm.

$$r = \sqrt{5^2 + 12^2} = \sqrt{169}.$$

13 cm

Example 1.2 An arc AB of a circle subtends an angle of 100° at the centre. Find the angle it subtends at a point C on the major arc.

SOLUTION

The angle at the circumference is half the angle at the centre.

50°

Example 1.3 In a cyclic quadrilateral ABCD, $\angle A = 85^\circ$ and $\angle B = 70^\circ$. Find $\angle C$ and $\angle D$.

SOLUTION

Opposite angles add up to 180° : $\angle C = 180^\circ - 85^\circ = 95^\circ$ and $\angle D = 180^\circ - 70^\circ = 110^\circ$.

Check: $85 + 70 + 95 + 110 = 360$.

$\angle C = 95^\circ$ and $\angle D = 110^\circ$

Example 1.4 Two equal chords of length 8 cm are drawn in a circle of radius 5 cm. Find the distance of each from the centre.

SOLUTION

Half the chord is 4 cm. Distance $= \sqrt{5^2 - 4^2} = 3$ cm.

Equal chords are the same distance from the centre.

3 cm for each

Example 1.5 AB is a diameter of a circle and C is a point on the circle. If $\angle CAB = 35^\circ$, find $\angle ABC$.

SOLUTION

The angle in a semicircle is a right angle, so $\angle ACB = 90^\circ$.

In triangle ABC: $\angle ABC = 180^\circ - 90^\circ - 35^\circ$.

55°