

CLASS 10 · HOTS · OLYMPIAD PREPARATION · SHORT NOTES

Chapter 10: HOTS: Circles (Class 10)

Topic-wise short notes with solved examples

Higher order thinking questions on tangents to a circle for Class 10: angles between tangents, lengths of tangents, quadrilaterals around a circle and concentric circles, each with a full solution.

1 Solved HOTS questions

- Facts: a tangent is perpendicular to the radius at the point of contact; the two tangents from an outside point are equal in length; and a quadrilateral drawn around a circle has $AB + CD = BC + DA$. Join the centre to the points of contact and you get right triangles.

Example 1.1 Two tangents PA and PB are drawn from an outside point P to a circle with centre O. If $\angle APB = 80^\circ$, find $\angle POA$.

SOLUTION

$\angle OAP = \angle OBP = 90^\circ$, so in quadrilateral OAPB: $\angle AOB = 360^\circ - 90^\circ - 90^\circ - 80^\circ = 100^\circ$.

OP bisects $\angle AOB$, so $\angle POA = 50^\circ$.

50°

Example 1.2 A point P is 13 cm from the centre of a circle of radius 5 cm. Find the length of a tangent from P to the circle.

SOLUTION

The radius to the point of contact is perpendicular to the tangent, so $PT^2 = OP^2 - r^2 = 169 - 25 = 144$.

12 cm

Example 1.3 A quadrilateral ABCD is drawn around a circle. If $AB = 6$ cm, $BC = 7$ cm and $CD = 4$ cm, find AD .

SOLUTION

For a quadrilateral around a circle, $AB + CD = BC + AD$.

$6 + 4 = 7 + AD$.

3 cm

Example 1.4 Two concentric circles have radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.

SOLUTION

The chord touches the smaller circle, so the radius of the smaller circle to the point of contact is perpendicular to the chord and bisects it.

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

8 cm

Example 1.5 The tangent from a point Q at a distance of 25 cm from the centre of a circle is 24 cm long. Find the radius of the circle.

SOLUTION

$$r^2 = OQ^2 - PQ^2 = 625 - 576 = 49.$$

7 cm