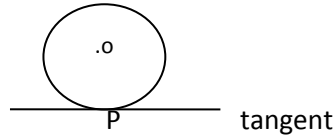# Circle

KEY POINTS

Tangent to a circle :

A tangent to a circle is a line that intersect the circle at only one point.

.o

P   tangent

P= point of contact

- There is only one tangent at a point on a circle.
- There are exactly two tangents to a circle through appoint lying out side the circle.
- The tangent at any point of a circle is perpendicular to the radius through the point of contact.
- The length of tangents drown from an external point to a circle are equal.

(1 Mark Questions)

1. If radii of the two concentric circles are 15cm and 17cm , then find the length of each chord of one circle which is tangent to one other.

Ans. 16cm

2. If two tangents making an angle of 120^0 with each other , are drawn to a circle of radius 6cm, then find the angle between the two radii, which are drawn to the tangents.

Ans. 60°

3. In the adjoining figure ,∆ ABC is circumscribing a circle , then find the length of BC.

Ans. 9cm

4. PQ is a chord of a circle and R is point on the minor arc. If PT is a tangent at point P such that $\angle QPT = 60°$ then find <PRQ.
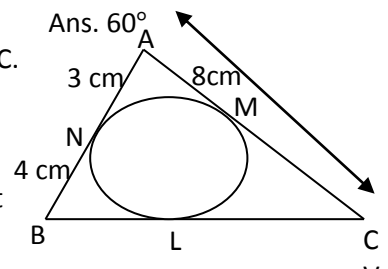
Ans. 120°

5. If a tangent PQ at a point P of a circle of radius 5cm meets a line through the centre O at a point Q such that OQ = 12 cm then find the length of PQ.

Ans. $\sqrt{119}$cm

6. From a point P, two tangents PA and PB are drawn to a circle C(O,r) . If OP =2r ,then what is the type of ∆ APB.

Ans. Equilateral triangle

7. If the angle between two radii of a circle is 130°,then find the angle between the tangents at the end of the radii.

Ans. 50°.

8. ABCD is a quadrilateral. A circle centred at O is inscribed in the quadrilateral. If AB = 7cm , BC = 4cm , CD = 5cm then find DA.

Ans. 8 cm

9. In a ∆ ABC , AB = 8cm , $\angle ABC = 90°$. Then find the radius of the circle inscribed in the triangle.

Ans. 2cm

(Two Marks Questions)

1. Two tangents PA and PB are drawn from an external point P to a circle with centre O. Prove that OAPB is a cyclic quadrilateral.

2. If PA and PB are two tangents drawn to a circle with centre O , from an external point P such that PA=5cm and $\angle$APB = 60°, then find the length of the chord AB.

   Ans. 5cm

3. CP and CQ are tangents from an external point C to a circle with centre O .AB is another tangent which touches the circle at R and intersects PC and QC at A and B respectively . If CP = 11cm and BR = 4cm, then find the length of BC.

   Ans. 7cm

4. If all the sides of a parallelogram touch a circle, show that the parallelogram is a rhombus.

5. Prove that the perpendicular at the point of contact to the tangent to a circle passes through the centre of the circle.

6. In adjacent figure; AB & CD are common tangents to two circles of unequal radii. Prove that AB=CD.
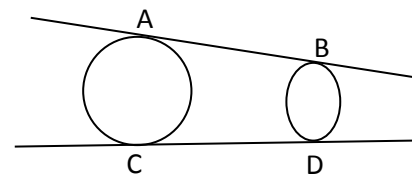
(Three Marks Questions)

1. If quadrilateral ABCD is drawn to circumscribe a circle then prove that AB+CD=AD+BC.

2. Prove that the angle between the two tangents to a circle drawn from an external point, is supplementary to the angle subtended by the line segment joining the points of contact to the centre.

3. AB is a chord of length 9.6cm of a circle with centre O and radius 6cm.If the tangents at A and B intersect at point P then find the length PA.

   Ans. 8cm

4. The incircle of a ΔABC touches the sides BC, CA &AB at D,E and F respectively. If AB=AC, prove that BD=CD.

5. Prove that the intercept of a tangent between two parallel tangents to a circle subtends a right angle at the centre of the circle.

6. PQ and PR are two tangents drawn to a circle with centre O from an external point P. Prove that $\angle$QPR=2$\angle$OQR.

(Four Marks Questions)

1. Prove that the length of tangents drawn from an external point to a circle are equal. Hence, find BC, if a circle is inscribed in a ΔABC touching AB,BC &CA at P,Q &R respectively, having AB=10cm, AR=7cm &RC=5cm.

    Ans. 8cm

2. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact. Using the above, do the following: If O is the centre of two concentric circles, AB is a chord of the larger circle touching the smaller circle at C, then prove that AC=BC.

3. A circle touches the side BC of a ΔABC at a point P and touches AB and AC when produced, at Q & R respectively. Show that AQ=1/2 (perimeter of ΔABC).

4. From an external point P, a tangent PT and a line segment PAB is drawn to circle with centre O, ON is perpendicular to the chord AB. Prove that $PA.PB=PN^2-AN^2$.

5. If AB is a chord of a circle with centre O, AOC is diameter and AT is the tangent at the point A, then prove that $\angle BAT=\angle ACB$.

6. The tangent at a point C of a circle and diameter AB when extended intersect at P. If $\angle PCA=110^0$, find $\angle CBA$.

    Ans. 70^0

[Self Evaluation/HOTS Questions]

1. If PA and PB are tangents from an external point P to the circle with centre O, the find $\angle AOP+\angle OPA$.

    Ans. 90^0

2. ABC is an isosceles triangle with AB=AC, circumscribed about a circle . Prove that the base is bisected by the point of contact.

3. AB is diameter of a circle with centre O. If PA is tangent from an external point P to the circle with $\angle POB=115^0$ then find $\angle OPA$.

    Ans. 25^0

4. PQ and PR are tangents from an external point P to a circle with centre . If $\angle RPQ=120^0$, Prove that OP=2PQ.

5. If the common tangents AB and CD to two circles C(O,r) and C'(O'r') intersect at E, then prove that AB=CD.

6. If a, b, c are the sides of a right triangle where c is the hypotenuse , then prove that radius r of the circle touches the sides of the triangle is given by r= (a+b-c)/2.