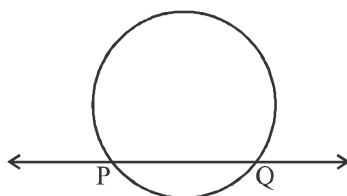# 10
Chapter

Circles

Key Points

1. A **circle** is a collection of all those points in a plane which are at a constant distance from a fixed point. The fixed point is called the **centre** and fixed distance is called the **radius**.

2. **Secant:** A line which intesects a circle in two distinct points is called a secant of the circle.

3. **Tangent**: It is a line that intersects the circle at only one point. The point where tangent touches the circle is called the point of contact.

   Here A is the poin of contact.
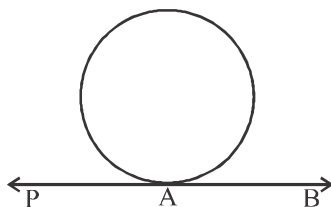
4. **Number of Tangent**: Infinitely many tangents can be drawn on a circle.

5. **Number of Secant**: There are infinitely many secants which can be drawn on a circle.

6. The proofs of the following theorems can be asked in the examination:–

   (i) The tangent at any point of a circle is perpendicular to the radius through the point of contact.

   (ii) The lengths of tangents drawn from an external point to a circle are equal.

VERY SHORT ANSWER TYPE QUESTIONS

1. In fig., ΔABC is circumscribing a circle. Find the length of BC.
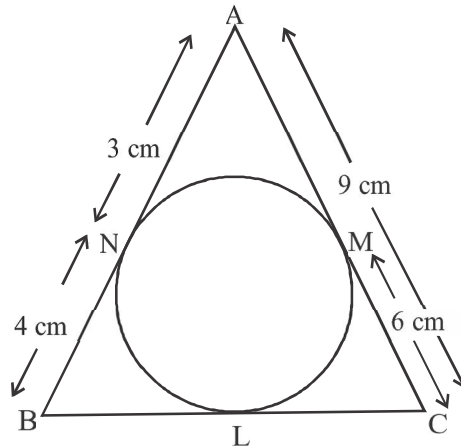
2. The length of the tangent to a circle from a point P, which is 25 cm away from the centre, is 24 cm. What is the radius of the circle.

3. In fig., ABCD is a cyclic quadrilatreral. If ∠BAC = 50° and ∠DBC = 60°, then find ∠BCD.
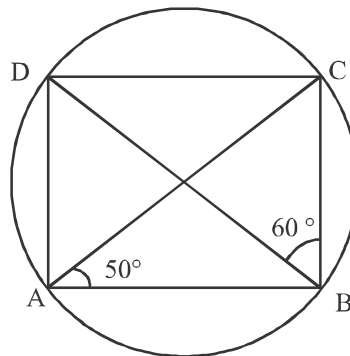
4. In figure, O is the centre of a circle, PQ is a chord and the tangent PR at P makes an angles of 50° with PQ. Find ∠POQ.
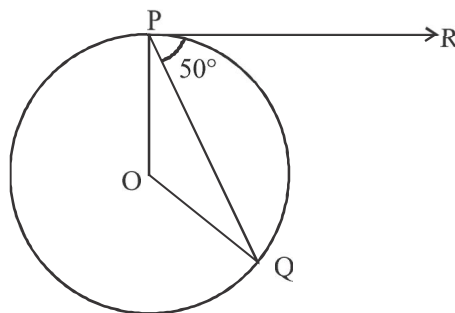
5. If two tangents inclined at an angle 60° are drawn to a circle of radius 3 cm, then find the length of each tangent.

6. If radii of two concentric circles are 4 cm and 5 cm, then find the length of the chord of one circle which is tangent to the other circle.

7. In the given figure, PQ is tangent to outer circle and PR is tangent to inner circle. If PQ = 4cm, OQ = 3 cm and QR = 2 cm then find the length of PR.
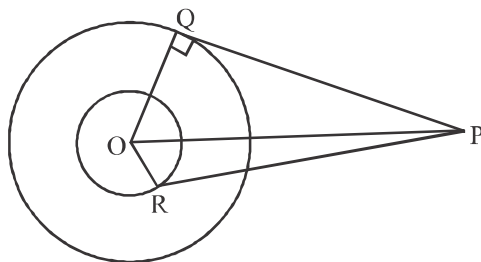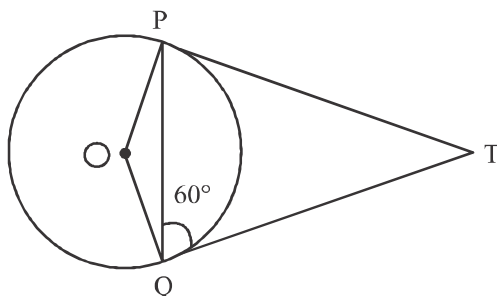

8. In the given figure, O is the centre of the circle, PA and PB are tangents to the circle then find ∠AQB.
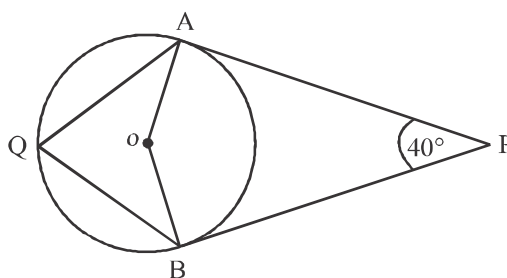


9. In the given figure, If ∠AOB = 125° then find ∠COD.
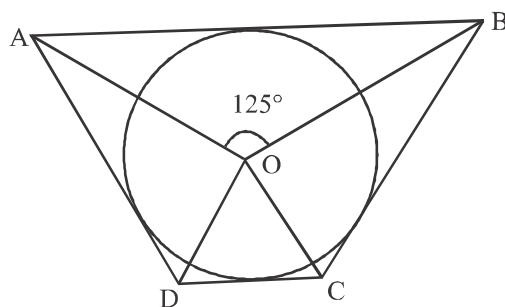
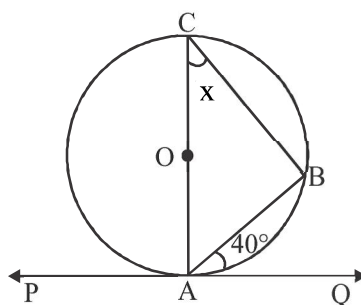10. If two tangent TP and TQ are drawn from an external point T such that $\angle TQP = 60°$ then find $\angle OPQ$.

SHORT ANSWER TYPE-I QUESTIONS

11. If diameters of two concentric circle are d_1 and d_2 $(d_2 > d_1)$ and and c is the length of chord of bigger circle which is tangent to the smaller circle. Show that $d_2^2 = c^2 + d_1^2$.

12. The length of tangent to a circle of radius 2.5 cm from an external point P is 6 cm. Find the distance of P from the nearest point of the circle.

13. TP and TQ are the tangents from the external point T of a circle with centre O. If $\angle OPQ = 30°$ then find the measure of $\angle TQP$.

14. In the given fig. AP = 4 cm, BQ = 6 cm and AC = 9 cm. Find the semi perimeter of $\triangle ABC$.
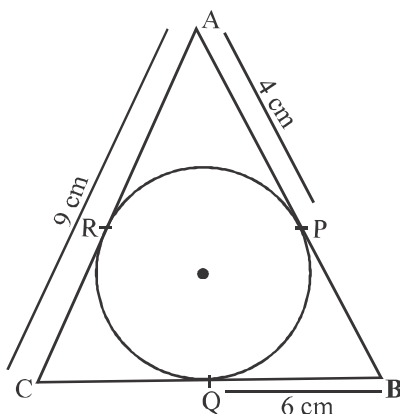
15. A circle is drawn inside a right angle triangle whose sides are a, b, c where c is the hypotenuse, which touches all the sides of the triangle. Prove $r = \dfrac{a + b - c}{2}$ where r is the radius of the circle.

16. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

17. Prove that in two concentric circles the chord of the larger circle which is tangent to the smaller circle is bisected at the point of contact.

18. In the given Fig., AC is diameter of the circle with centre O and A is point of contact, then find x.

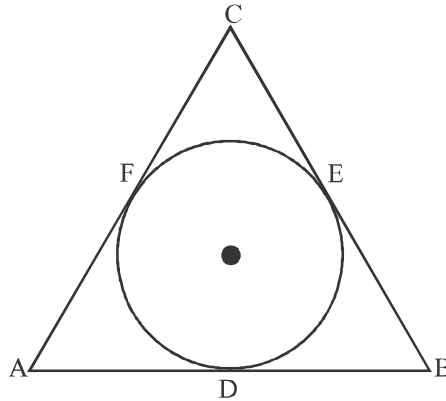19. In the given fig. KN, PA and PB are tangents to the circle. Prove that:

KN = AK + BN.
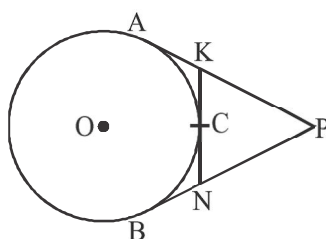
20. In the given fig. PQ is a chord of length 6 cm and the radius of the circle is 6 cm. TP and TQ are two tangents drawn from an external point T. Find $\angle PTQ$.
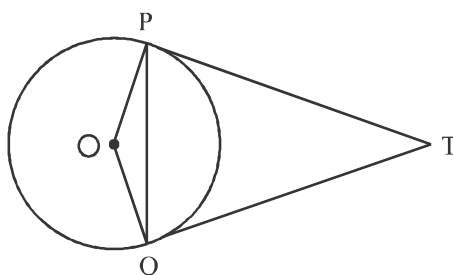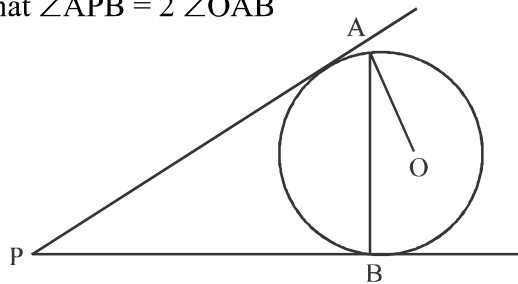
SHORT ANSWER TYPE-II QUESTIONS

21. In the given figure find AD, BE, CF where AB = 12 cm, BC = 8 cm and AC = 10 cm.

22. In a right triangle ABC a circle is drawn with AB as the diameter which interscet hypotenuse AC at point P. Prove PB = PC.

23. Two tangents PA and PB are drawn to a circle with centre O from an external point P. Prove that ∠APB = 2 ∠OAB

24. If an isosceles triangle ABC with sides AB = AC = 6 cm is inscribed a circle of radius 9 cm, find area of the triangle.

25. In the given fig. AB = AC, D is the mid point of AC, BD is the diameter of the circle,
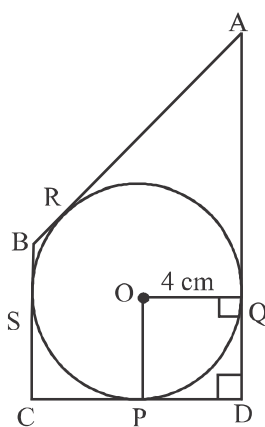
then prove $AE = \dfrac{1}{4}AC$
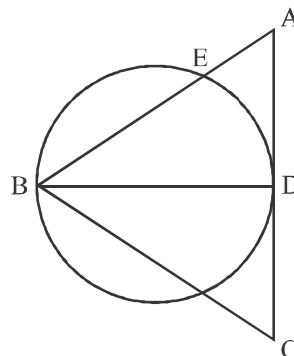
26. In the given fig. OP is equal to the diameter of the circle with centre O. Prove that $\triangle ABP$ is an equilateral triangle.
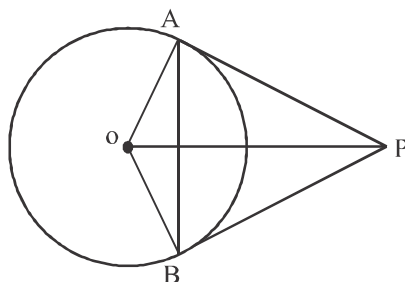
27. In the given fig., find PC. If AB = 13 cm, BC = 7 cm and AD = 15 cm.

28. In the given fig. from an external point P, a tangent PT and a secant PAB is drawn to a circle with centre O. ON is perpendicular on the chord AB. Prove

    (i) $PA.PB = PN^2 - AN^2$

    (ii) $PN^2 - AN^2 = OP^2 - PT^2$

    (iii) $PA.PB = PT^2$
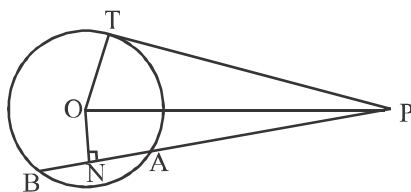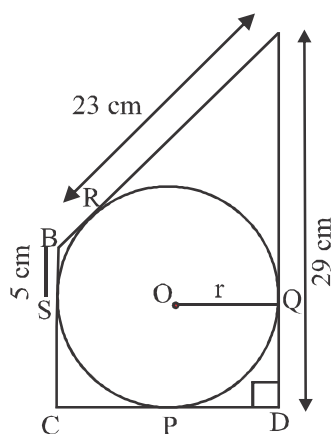

29. In a circle with centre O, AB is a diameter and AC is the chord and $\angle BAC = 30°$. A tangent drawn at the point C meets AB produced at D. Prove BC = BD.

30. In the given fig. PA and PB are tangents to the circle with centre O. Prove that OP bisects AB and is perpendicular to it.
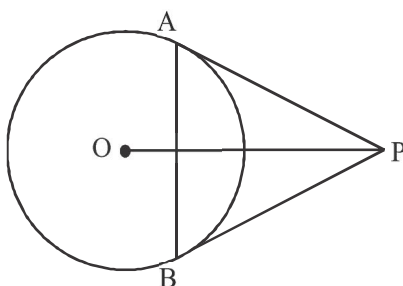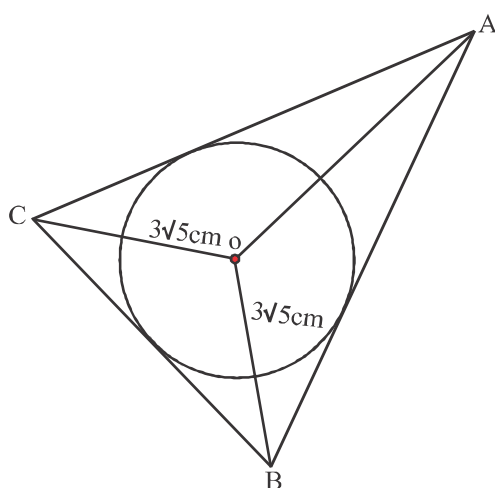

LONG ANSWER TYPE QUESTIONS

31. In the given fig. find the radius of the circle.

32. In the given fig. if radius of circle is 3 cm. Find the perimeter of $\triangle ABC$.

33. A circle touches the side BC of a $\triangle ABC$ at P and AB and AC are extended respectively to points Q and R. Prove that AQ is half the perimeter of $\triangle ABC$.

34. In the given fig. XP and XQ are tangents from X to the circle with centre O. R is a point on the circle. Prove that $XA + AR = XB + BR$.
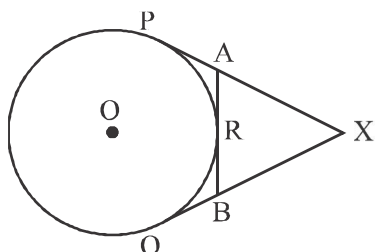
35. In the given fig. PQ is tangent and PB is diameter. Find the value of x and y.
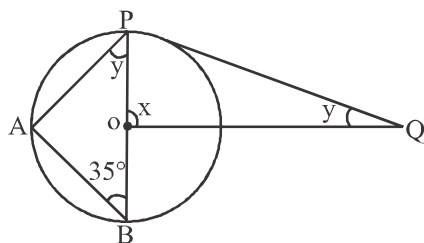
ANSWERS

1. 10 cm   2. 7 cm
3. 70°   4. 100°
5. $3\sqrt{3}$ cm   6. 6 cm
7. $\sqrt{21}$ cm   8. 70°
9. 55°   10. 30°
12. 4 cm   13. 60°
14. 15 cm   18. 40°
20. 120°
21. AD = 7 cm, BE = 5 cm, CF = 3 cm
24. $8\sqrt{2}$ cm³   27. 5 cm
31. 11 cm   32. 32 cm
35. $x = 35°, y = 55°$

Practice Test
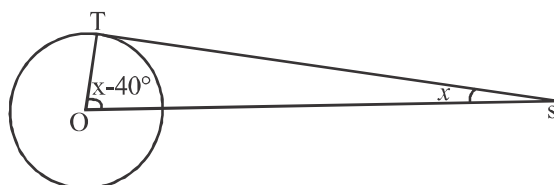
Circle

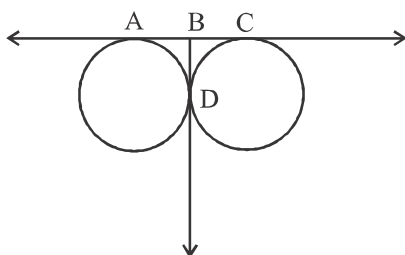| Time: 50 minutes	M.M: 20

SECTION-A

1. In the given figure find x, where ST is the tangent.   1

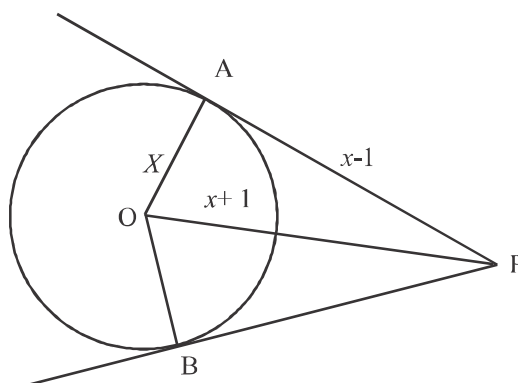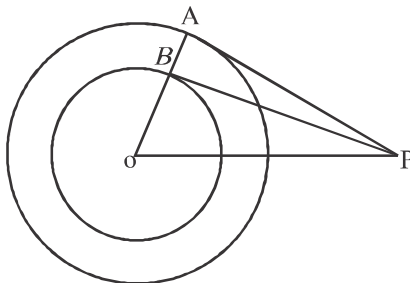2. In the given figure if AC = 9, find BD.   1

SECTION-B

3. In the following figure find x.   2

4. Two concentric circle with centre O are of radii 6 cm and 3 cm. From an external point P, tangents PA and PB are drawn to these circle as shown in the figure. If AP = 10 cm. Find BP   2
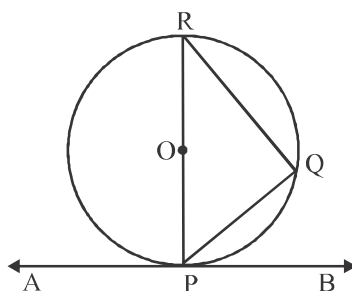

SECTION–C
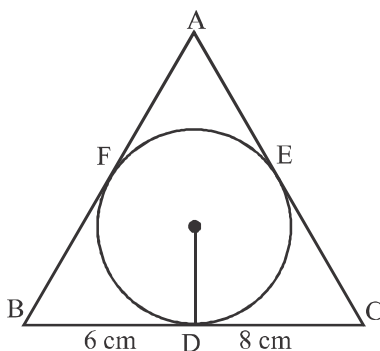
5. In the given figure, AB is a tangent to a circle with centre O. Prove $\angle BPQ = \angle PRQ$.   3
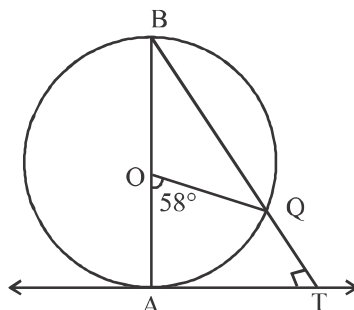

6. In the given figure $\triangle ABC$ is drawn to circumscribe a circle of radius 3 cm, such that the segment BD and DC into which BC is divided by the point of contact D are of length 6 cm and 8 cm respectively, find side AB if the $ar(\triangle ABC) = 63$ cm²   3
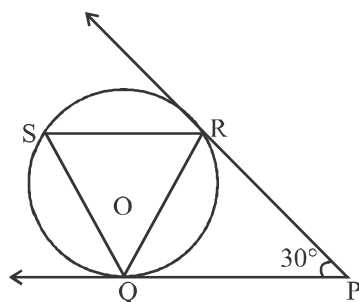
SECTION-D

7. AB is a diameter of a circle with centre O and AT is a tangent. If $\angle AOQ = 58°$ find $\angle ATQ$. **4**

8. Tangent PQ and PR are drawn from external point P to a circle with centre O, such that $\angle RPQ = 30°$. A chord RS is drawn parallel to the tangent PQ find $\angle RQS$. **4**

□□□