
CHAPTER 5

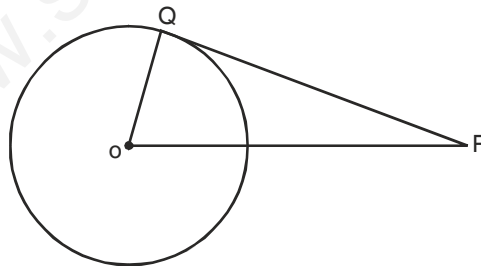
CIRCLE

KEY POINTS

1. **Tangent to a Circle** : It is a line that intersects the circle at only one point.
2. There is only one tangent at a point of the circle.
3. 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.

MULTIPLE CHOICE QUESTIONS

1. In the given fig. 1 PQ is tangent then $\angle POQ + \angle QPO$ is equal to

**Fig. 1**

- | | |
|-----------------|-----------------|
| (a) 120° | (b) 90° |
| (c) 80° | (d) 100° |

2. If PQ is a tangent to a circle of radius 5 cm and $PQ = 12$ cm, Q is point of contact, then OP is
- (a) 13 cm (b) 17 cm
- (c) 7 cm (d) $\sqrt{119}$ cm
3. In the given fig. 2 PQ and PR are tangents to the circle, $\angle QOP = 70^\circ$, then $\angle QPR$ is equal to

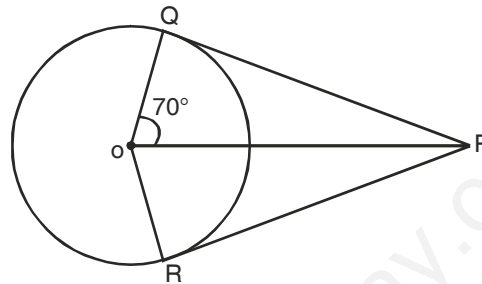


Fig. 2

- (a) 35° (b) 70°
- (c) 40° (d) 50°
4. In the given fig. 3 PQ is a tangent to the circle, $PQ = 8$ cm, $OQ = 6$ cm then the length of PS is

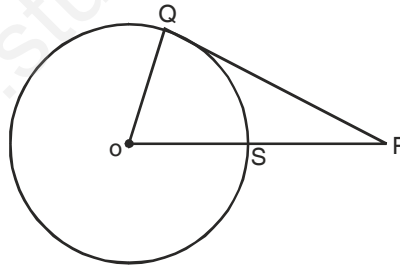


Fig. 3

- (a) 10 cm (b) 2 cm
- (c) 3 cm (d) 4 cm
5. In the given fig. 4 PQ is tangent to outer circle and PR is tangent to inner circle. If $PQ = 4$ cm, $OQ = 3$ cm and $OR = 2$ cm then the length of PR is

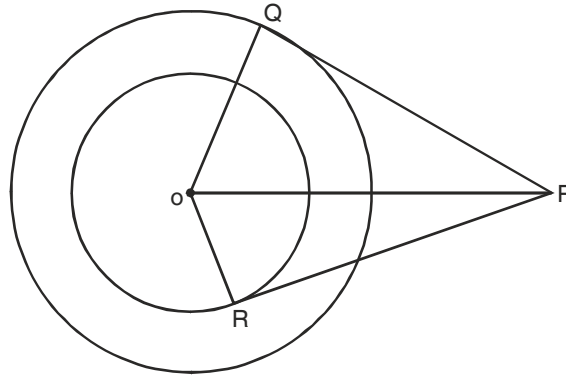


Fig. 4

- (a) 5 cm (b) $\sqrt{21}$ cm
(c) 4 cm (d) 3 cm

6. In the given fig. 5 P , Q and R are the points of contact. If $AB = 4$ cm, $BP = 2$ cm then the perimeter of $\triangle ABC$ is

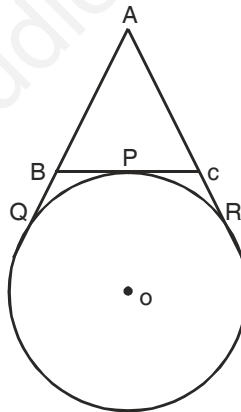


Fig. 5

- (a) 12 cm (b) 8 cm
(c) 10 cm (d) 9 cm

7. In the given fig. 6 the perimeter of $\triangle ABC$ is

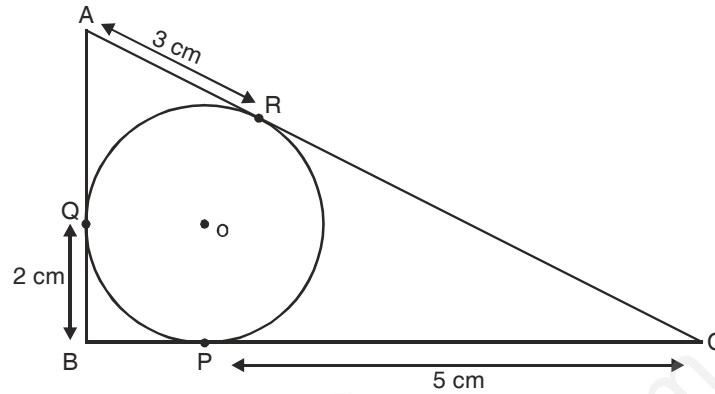


Fig. 6

- (a) 10 cm (b) 15 cm
(c) 20 cm (d) 25 cm
8. The distance between two tangents parallel to each other to a circle is 12 cm. The radius of circle is
- (a) 13 cm (b) 6 cm
(c) 10 cm (d) 8 cm
9. In the given fig. 7 a circle touches all sides of a quadrilateral. If $AB = 6$ cm, $BC = 5$ cm and $AD = 8$ cm. Then the length of side CD is

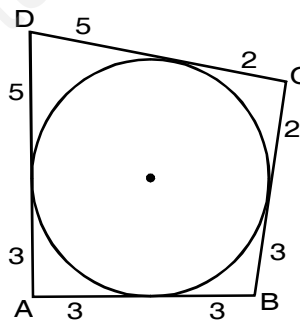


Fig. 7

- (a) 6 cm (b) 8 cm
(c) 5 cm (d) 7 cm

10. In a circle of radius 17 cm, two parallel chords are drawn on opposite sides of diameter. The distance between two chords is 23 cm and length of one chord is 16 cm, then the length of the other chord is
- (a) 34 cm (b) 17 cm
(c) 15 cm (d) 30 cm
11. In the given fig. 8 P is point of contact then $\angle OPB$ is equal to

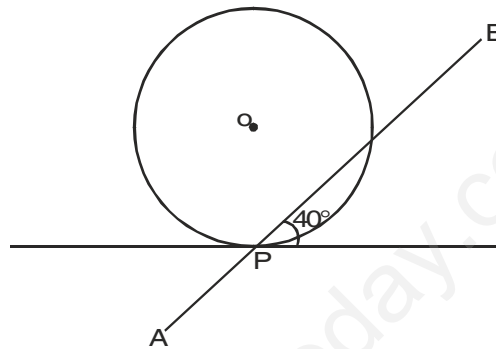


Fig. 8

- (a) 50° (b) 40°
(c) 35° (d) 45°
12. In the given fig. 9 PQ and PR are tangents to the circle with centre O , if $\angle QPR = 45^\circ$ then $\angle QOR$ is equal to

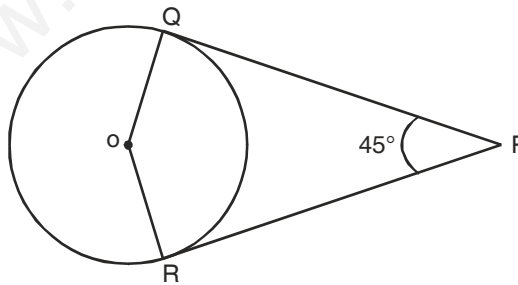


Fig. 9

- (a) 90° (b) 110°
(c) 135° (d) 145°

13. In the given fig. 10 O is centre of the circle, PA and PB are tangents to the circle, then $\angle AQB$ is equal to

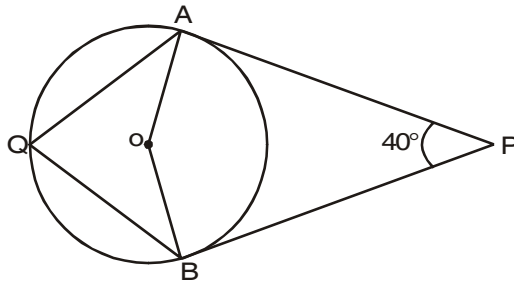


Fig. 10

- (a) 70° (b) 80°
(c) 60° (d) 75°
14. In the given fig. 11 $\triangle ABC$ is circumscribed touching the circle at P , Q and R . If $AP = 4$ cm, $BP = 6$ cm, $AC = 12$ cm, then value of BC is

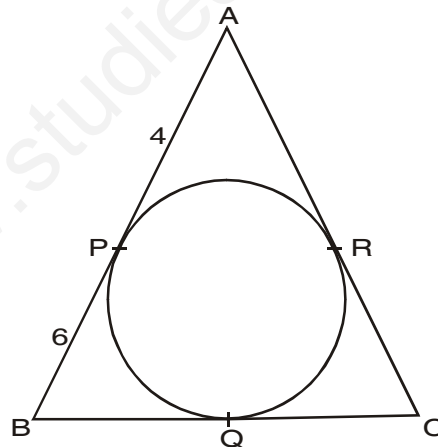


Fig. 11

- (a) 6 cm (b) 14 cm
(c) 10 cm (d) 18 cm

15. In the given fig. 12 $\triangle ABC$ is circumscribing a circle and P is mid point of side BC . If $AR = 4$ cm, $AC = 9$ cm, then value of BC is equal to

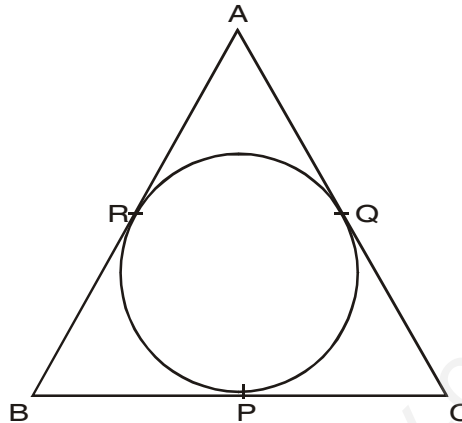


Fig. 12

- | | |
|-----------|-----------|
| (a) 10 cm | (b) 11 cm |
| (c) 8 cm | (d) 9 cm |

SHORT ANSWER TYPE QUESTIONS

16. In two concentric circles, prove that all chords of the outer circle which touch the inner circle are of equal length.
17. An incircle is drawn touching the equal sides of an isosceles triangle at E and F . Show that the point D , where the circle touches the third side is the mid point of that side.
18. 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.
19. TP and TQ are the tangents from the external point of a circle with centre O . If $\angle OPQ = 30^\circ$, then find the measure of $\angle TQP$.
20. In the given fig. 13 $AP = 4$ cm, $BQ = 6$ cm and $AC = 9$ cm. Find the semi perimeter of $\triangle ABC$.

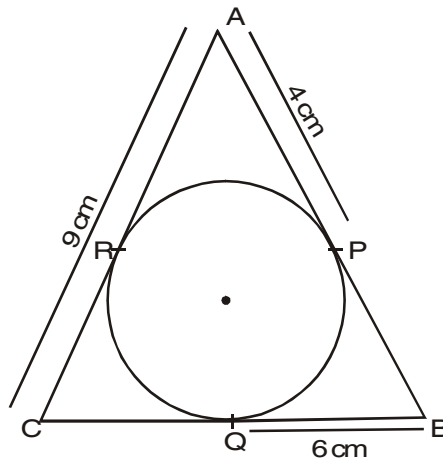


Fig. 13

21. In the given fig. 14 OP is equal to the diameter of the circle with centre O . Prove that $\triangle ABP$ is an equilateral triangle.

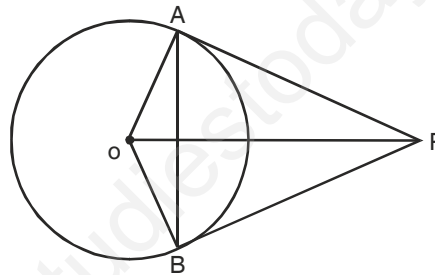


Fig. 14

22. In the given fig. (15) a semicircle is drawn outside the bigger semicircle. Diameter BE of smaller semicircle is half of the radius BF of the bigger semicircle. If radius of bigger semicircle is $4\sqrt{3}$ cm. Find the length of the tangent AC from A on a smaller semicircle.

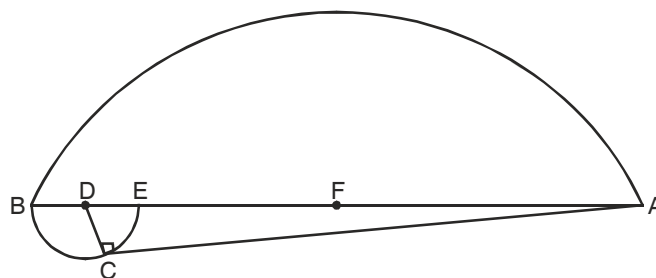


Fig. 15

23. A circle is inscribed in a $\triangle ABC$ having sides 8 cm, 10 cm and 12 cm find AD, BC, CF.

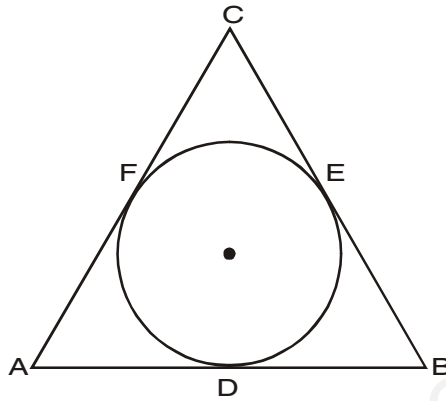


Fig. 16

24. On the side AB as diameter of a right angled triangle ABC a circle is drawn intersecting the hypotenuse AC in P. Prove that $PB = PC$.
25. Two tangents PA and PB are drawn to a circle with centre O from an external point P. Prove that $\angle APB = 2 \angle OAB$

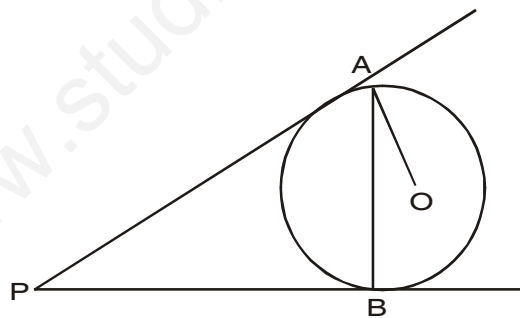


Fig. 17

26. If an isosceles triangle ABC in which $AB = AC = 6$ cm is inscribed in a circle of radius 9 cm, find the area of the triangle.
27. In the given fig. (18) $AB = AC$, D is the mid point of AC, BD is the diameter of the circle, then prove that $AE = \frac{1}{4} AC$.

31. In the given fig. (21) find the radius of the circle.

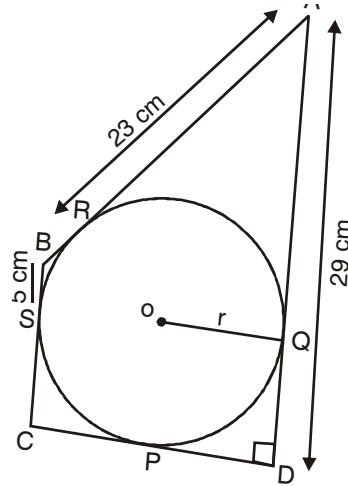


Fig. 21

32. In the given fig. (22) if radius of circle $r = 3\sqrt{5}$ cm. Find the perimeter of $\triangle ABC$.

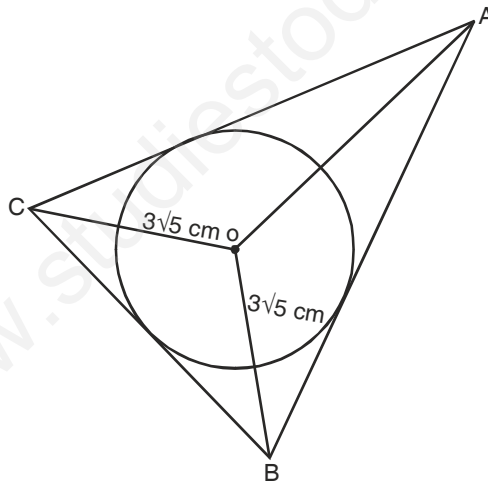


Fig. 22

33. A circle touches the side BC of a $\triangle ABC$ at P and AB and AC produced at Q and R respectively. Prove that AQ is half the perimeter of $\triangle ABC$.
34. In the given fig. (23) XP and XQ are tangents from X to the circle with centre O. R is a point on the circle. Prove that
- $$XA + AR = XB + BR.$$

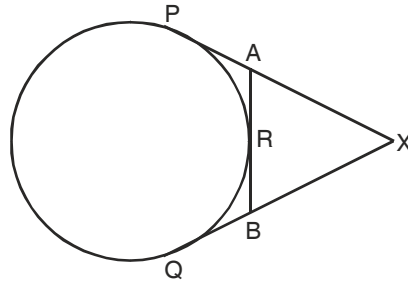


Fig. 23

LONG ANSWER TYPE QUESTIONS

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

Rider :

1. Prove that in two concentric circles the chord of the larger circle which touches the smaller circle is bisected at the point of contact.
2. PT is a tangent to the circle with centre O and T is point of contact. If $OT = 6$ cm, $OP = 10$ cm find the length of tangent PT.
3. In the given fig. (24) PQ is tangent and PB is diameter. Find the value of x and y .

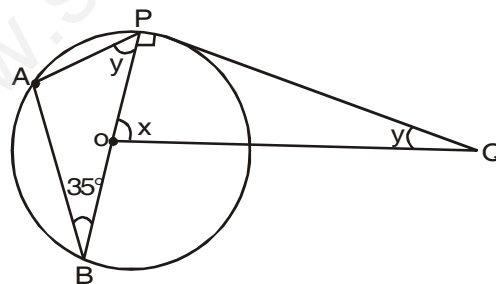


Fig. 24

4. In the given fig. (25) AC is diameter of the circle with centre O and A is point of contact, then find x .

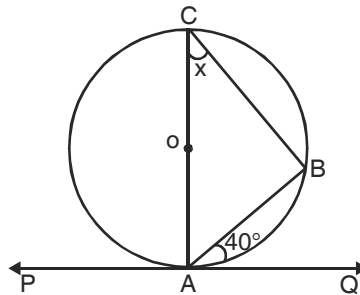


Fig. 25

36. Prove that the length of tangents, drawn from an external point to a circle are equal.

Rider :

1. In the given fig. (26) PA and PB are tangents from point P. Prove that $KN = AK + BN$.

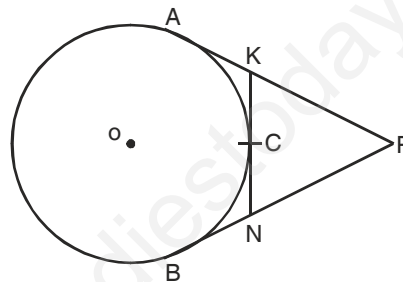


Fig. 26

2. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which is tangent to the smaller circle.
3. In the given fig. (27) PA and PB are tangents to the circle with centre O. Prove that OP is perpendicular bisector of AB.

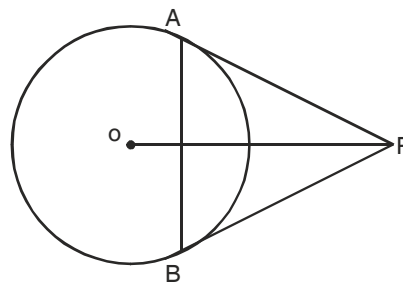


Fig. 27

4. In the given fig. (28) PQ is chord of length 6 cm of the circle of radius 6 cm. TP and TQ are tangents. Find $\angle PTQ$.

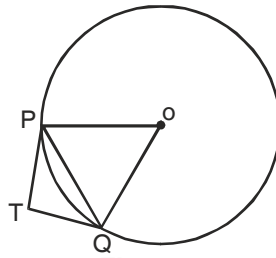


Fig. 28

ANSWERS

- | | |
|-------------------------------------|--|
| 1. b | 2. d |
| 3. c | 4. d |
| 5. b | 6. a |
| 7. c | 8. b |
| 9. d | 10. a |
| 11. a | 12. c |
| 13. a | 14. b |
| 15. a | 16. 30° |
| 18. 4 cm | 19. 60° |
| 20. 15 cm | 22. 12 cm |
| 23. 4 cm | 24. $AD = 7\text{cm}, BE = 5\text{ cm}, CF = 3\text{cm}$ |
| 25. Radius = 3 cm. | 26. $8\sqrt{2}\text{ cm}^2$ |
| 28. $2\sqrt{66}\text{ cm}$ | 29. 1 cm. |
| 30. 5 cm | 31. 11 cm. |
| 32. 32 cm | 35.(2) 8 cm |
| 35.(3) $x = 35^\circ, y = 55^\circ$ | 35.(4) 40° |
| 36.(2) 8 cm | 36.(4) 120° |