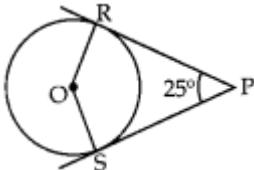
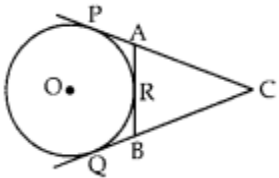






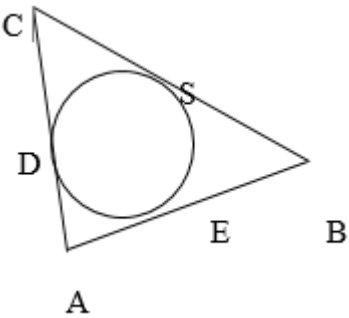









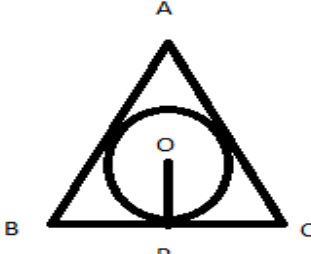
CHAPTER 10
CIRCLES
SYNOPSIS


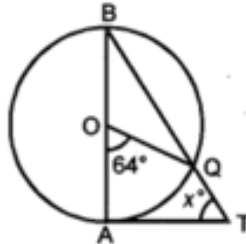





- A circle may be regarded as a collection of points in a plane at a fixed distance from a fixed point. The fixed point is called the centre of the circle. The fixed distance between the centre of the circle and the circumference, is called radius.
- The perimeter of the circle is referred to as the circumference of the circle.
- A chord of a circle is a line segment joining any two points on the circumference.
- An arc of a circle is a part of the circumference.
- A diameter of a circle is a chord which passes through the centre of the circle.
- A line, which intersects the circle in two distinct points, is called a secant.
- A line which has only one point common to the circle is called a tangent to the circle.
- There is one and only one tangent at a point of the circle.
- The tangent at any point of a circle is perpendicular to the radius through the point of contact.
- No tangent can be drawn from a point inside the circle.
- The lengths of tangents drawn from an external point to a circle are equal.
- The perpendicular at the point of contact to the tangent to a circle passes through the centre of the circle.
- Tangents drawn at the end points of a diameter of a circle are parallel.

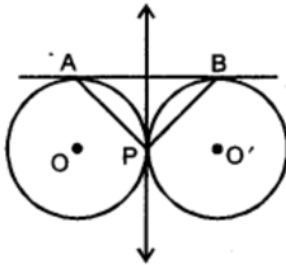


A.		Multiple choice questions (1 Mark)	Level
1.	?	The distance between two parallel tangents of a circle of radius 4 cm is (a) 2 cm (b) 4 cm (c) 6 cm (d) 8 cm	C
2.	?	In the given figure, if $\angle ZRPS = 25^\circ$, the value of $\angle ZROS$ is  (a) 135° (b) 145° (c) 165° (d) 155°	U
3.	!?	A tangent is drawn from a point at a distance of 17 cm of circle $C(0, r)$ of radius 8 cm. The length of its tangent is (a) 5 cm (b) 9 cm (c) 15 cm (d) 23 cm	U
4.	!?	The length of tangents drawn from an external point to the circle (a) are equal (b) are not equal (c) sometimes are equal (d) are not defined	C
5.	!?	Number of tangents drawn at a point of the , circle is/are (a) one (b) two (c) none (d) infinite	C
6.	?	The tangents drawn at the extremities of the diameter of a circle are (a) perpendicular (b) parallel (c) equal (d) none of these	U
7.	?	Tangents from an external point to a circle are (a) equal (b) not equal (c) parallel (d) perpendicular	U
8.	!?	The length of a tangent drawn from a point at a distance of 10 cm of circle is 8 cm. The radius of the circle is (a) 4 cm (b) 5 cm (c) 6 cm (d) 7 cm	C
9.	?	In given figure, CP and CQ are tangents to a circle with centre O. ARB is another tangent touching the circle at R. If $CP = 11$ cm and $BC = 6$ cm then the length of BR is	U

		 <p>(a) 6 cm (b) 5 cm (c) 4 cm (d) 3 cm</p>	
10.	!?	<p>From a point P which is at a distance of 13 cm from the center O of a circle of radius 5 cm, the pair of tangents PQ and PR to the circle are drawn. Then the area of the quadrilateral PQOR is</p> <p>(a) 60 cm² (b) 65 cm² (c) 30 cm² (d) 32.5 cm²</p>	C
A.		Very Short Answer Questions (VSA) 1 Mark	Level
11.	?	Number of tangents a circle can have?	C
12.	?	A tangent to a circle intersects it in ----- points.	U
13.	!?	A line intersecting a circle in two points is called a	U
14.		From a point outside a circle exactly ----- tangents can be drawn to the circle.	C
15.	💡	The tangents at any point of a circle are ----- to the radius through the point of intersection	C
16.	💡	A tangent PQ at a point P of a circle of radius 5cm meets a line through the center O at a point Q so that OQ = 12 cm. Find the length PQ	C
17.	?	A point P is 25 cm from the center of a circle. The radius of the circle is 7cm and length of the tangent drawn from P to the circle is	U

18.		A point P is 20 cm from center of a circle .The radius of the circle is 12 cm and the length of the tangent drawn from P to the circle is	A
19.		A tangent PQ at a point P of a circle of radius 7 cm meets a line through the center O at a point Q so that $OQ = 11$ cm. Then length of PQ is	C
20.		A tangent PQ at a point P of a circle of radius 7 cm meets a line through the center O at a point Q so that $OQ = 11$ cm. Then length of PQ is	C
Short Answer Questions II (SA) 2 Marks			
21.		If ΔABC is isosceles with $AB = AC$, and $C(O, r)$ is the incircle of ΔABC touching BC at L. Prove that the point L bisects BC.	A
22.		P is the midpoint of an arc QPR of a circle. Show that the tangent at P is parallel to the chord QR.	A
23.		<p>In a given fig ABC is a right angled triangle, right angled at A with $AB = 6\text{cm}$ and $AC = 8\text{cm}$.A circle with centre O has been inscribed inside the Δ. Calculate the value of r ,the radius of inscribed circle.</p> 	H

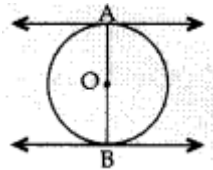
24.		Prove that tangents drawn at the end of a chord of a circle make equal angles with the chord.	U
25.		Prove that in two concentric circles the chord of the larger circle which touches the smaller circle is bisected at the point of contact.	A
Short Answer Questions II (SA) 3 Marks			Level
26.		Two tangents TP and TQ are drawn to a circle with center O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$	H
27.		From an external point A two tangents are drawn to the circle with center O. Prove that OA is perpendicular bisector of BC	A
28.		AB is the diameter and AC is a chord of a circle such that $\angle BAC = 30^\circ$. If then tangent at C intersects AB produced in D, Prove that $BC = BD$.	H
29.		In two concentric circles, a chord of length 24 m of larger circle becomes a tangent to the smaller circle whose radius is 5 cm. Find the radius of the larger circle.	U
30.		<p>A triangle ABC is drawn to circumscribe a circle of radius 10 cm such that the segments BP and PC into which BC is divided by the point of contact P, are of lengths 15 cm and 20 cm respectively .If the area of $\triangle ABC = 525 \text{ cm}^2$, then find the lengths of sides AB and AC.</p> 	A

31.		<p>In the given figure AB is the diameter of the circle ,with center O and AT is the tangent . Calculate the numerical value of x .</p> 	H
		Long Answer Questions (LA) 4 Marks	Level
32.		A circle touches the sides 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 $\triangle ABC$.	U
33.		Prove that the line segment joining the points of contact of two parallel tangents to a circle is a diameter of the circle	C
34.		O is the center of a circle .PA and PB are tangents to the circle from a point P. Prove that PAOB is a cyclic quadrilateral and prove that PO is the bisector of $\angle APB$.	H
35.		PQ is a chord of length 8cm of a circle of radius 5cm, the tangent at P and Q intersect at the point T outside the circle. Find the length TP.	H
36.		<p>In the given figure two circles touch each other externally at point P .AB is the direct common tangent of these circles .Prove that</p> <p>i) Tangent P bisects AB ii) $\angle APB = 90^\circ$</p>	A

			
37.		Two circles with centers O and O' of radii 3cm and 4cm respectively intersect at 2 points P and Q, such that OP and O'P are tangent to the 2 circles. Find the length of common chord PQ	H
38.		<p>If a hexagon ABCDEF circumscribe a circle,</p> <p>Prove that $AB + CD + EF = BC + DE + FA$</p>	U

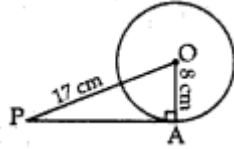
CIRCLES

ANSWERS

<p>1. Answer: d:</p>  <p>Reason: Here radius, $r = 4$ cm Required distance, $AB = OA + OB$ $= r + r = 2r = 2 \times 4 = 8$ cm</p>
<p>2. Answer: d</p> <p>Reason: Since $OR \perp PR$ and $OS \perp PS$ $\therefore \angle ORP = \angle OSP = 90^\circ$</p>

In \square ORPS, $\angle ROS + \angle ORP + \angle RPS + \angle OSP = 360^\circ$
 $\angle ROS + 90^\circ + 25^\circ + 90^\circ = 360^\circ$
 $\angle ROS = 360^\circ - 205^\circ = 155^\circ$

3. Answer: c



Reason: In rt $\triangle OAP$, $AP^2 + OA^2 = OP^2$
 $\Rightarrow AP^2 + (8)^2 = (17)^2 \Rightarrow AP^2 + 64 = 289$
 $\Rightarrow AP^2 = 289 - 64 = 225$
 $\therefore AP = \sqrt{225} = 15 \text{ cm}$

4. Answer: a: Reason: Since the length of tangents drawn from an external point to a circle are equal.

5. Answer: a

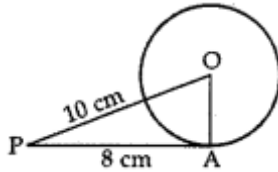
Reason: There is only one tangent at a point of the circle.

6. I equal

7. Answer: a

Reason: Tangents from external points to a circle are equal.

8. Answer: c:



Reason: In rt. $\triangle OAP$, we have
 $OA^2 + AP^2 = OP^2$
 $\Rightarrow OA^2 + (8)^2 = (10)^2$
 $\Rightarrow OA^2 + 64 = 100$
 $\Rightarrow OA^2 = 100 - 64 = 36$
 $\therefore OA = \sqrt{36} = 6 \text{ cm}$

9. Answer: b

Reason: Since

$BQ = BR \dots(i) [\because \text{Tangents drawn from external points are equal}]$

$CQ = CP \dots[\text{Using (i)}]$

$BC + BQ = 11$

$\Rightarrow 6 + BR = 11$

$\Rightarrow BR = 11 - 6 = 5 \text{ cm}$

10. Answer: a

Reason: $OP^2 = OQ^2 + PQ^2$

$169 = 25 + PQ^2$

$PQ^2 = 144$

$PQ = 12$

Area $PQOR = \text{ar}(\triangle AOPQ) + \text{ar}(\triangle AOPR)$

$= 12 \times 12 \times \frac{1}{2} + 12 \times 12 \times \frac{1}{2} = 60 \text{ cm}^2$

11) infinite	12) 2	13) secant	14) 2	15) perpendicular		
16) $\sqrt{119}$	17) 24cm	18) 16cm	19) $6\sqrt{2}$	20) 7cm	21) 1	22) 0
23) 2	24) 24	25) 11				
29) r=2 cm	37) 13 cm		58°		20/3	