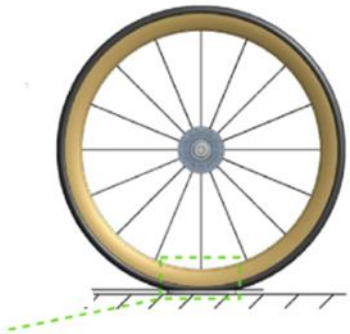
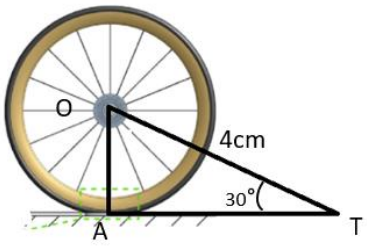
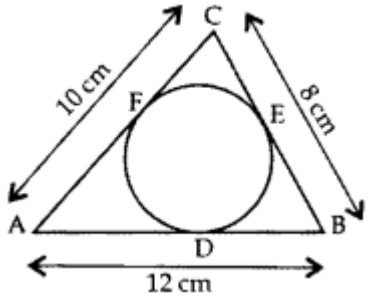
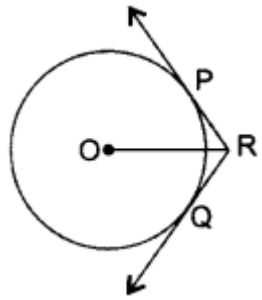
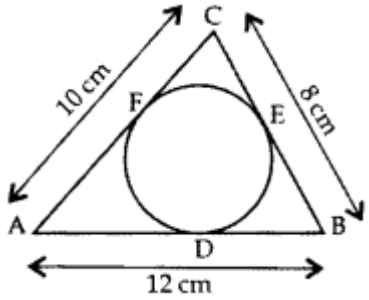
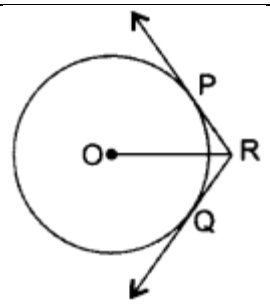
CHAPTER-10

CIRCLES

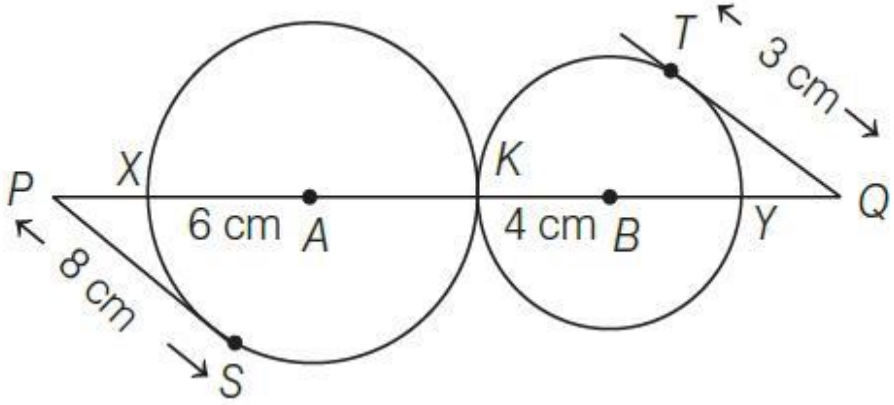
04 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	When a person is riding a bicycle, he applies some force on the pedals due to which the chain over the pulley attached to the pedals starts to rotate. Ultimately the wheel rotates and the bicycle covers a certain path. As the wheels rotate on their axis, they perform a rotational motion. Due to this rotation with the contact of the ground the bicycle covers a certain longitudinal distance. So, the wheels also perform a translational motion concerning the ground. The bicycle is dragged by a path due to the rotational motion performed by the wheels of the bicycle. In a moving bicycle all the spokes of a wheel are along its radii. (i) What is the angle between spokes of the wheel and its movement on the ground at the point of contact. (a) 45° (b) 90° (c) 60° (d) 180°  (ii) The shortest distance between the axel of the wheel and the point of contact will be equal to (a) the diameter of the circle (b) length of tangent to the circle (c) the radius of the circle (d) can be any length. (iii) Consider a point on ground in Fig. AT is a tangent to the circle with centre O such that OT = 4 cm and ∠OTA = 30°. Then AT is equal to (a) 4 cm (b) 2cm (c) $2\sqrt{3}$cm (d) $4\sqrt{3}$cm 	4

2.	Given below is the image of a traffic circle. A student conducting survey of the road wanted to find the relation between the sides of the parallelogram he obtained by drawing tangents to the circular roundabout. What is the relation and how can you prove it. 	4
3.	In the given figure, a circle inscribed in ΔABC touches its sides AB, BC and AC at points D, E & F K respectively. If AB = 12 cm, BC = 8 cm and AC = 10 cm, then find the lengths of AD, BE and CF. 	4
4.	In the figure, two tangents RQ and RP are drawn from an external point R to the circle with centre O. If ∠PRQ = 120°, then prove that OR = PR + RQ. 	4
5.	In the given figure, a circle inscribed in ΔABC touches its sides AB, BC and AC at points D, E & F K respectively. If AB = 12 cm, BC = 8 cm and AC = 10 cm, then find the lengths of AD, BE and CF. 	4
6.	In the figure, two tangents RQ and RP are drawn from an external point R to the circle with centre O. If ∠PRQ = 120°, then prove that OR = PR + RQ.	4



7. A Student draws two circles that touch each other externally at point K with centres A and B and radii 6 cm and 4 cm, respectively as shown in the figure



Based on the above information, answer the following questions.

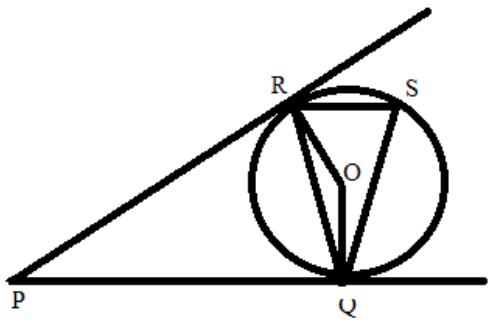
(i) The value of PA =
(a) 10 cm
(b) 5 cm
(c) 13 cm
(d) Can't be determined

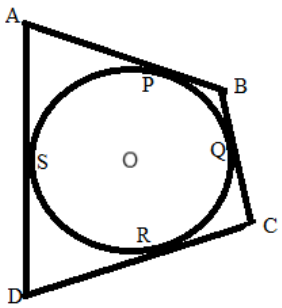
(ii) The value of BQ=
(a) 4 cm
(b) 5 cm
(c) 6 cm
(d) 18 cm

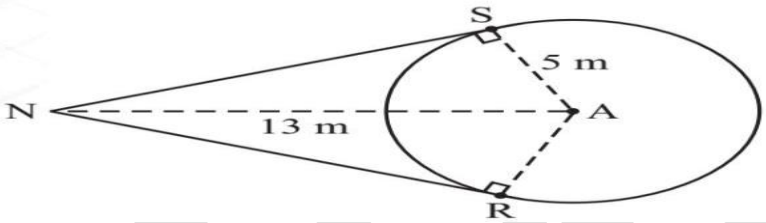
iii)The value of PK =
(a) 13 cm
(b) 15 cm
(c) 16 cm
(d) 18 cm

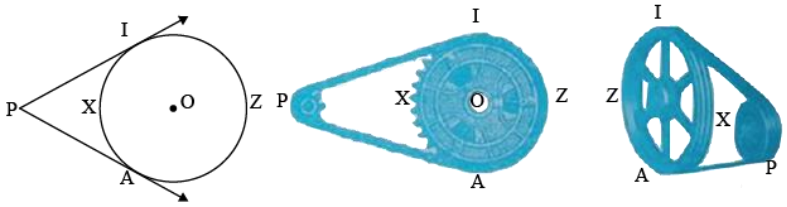
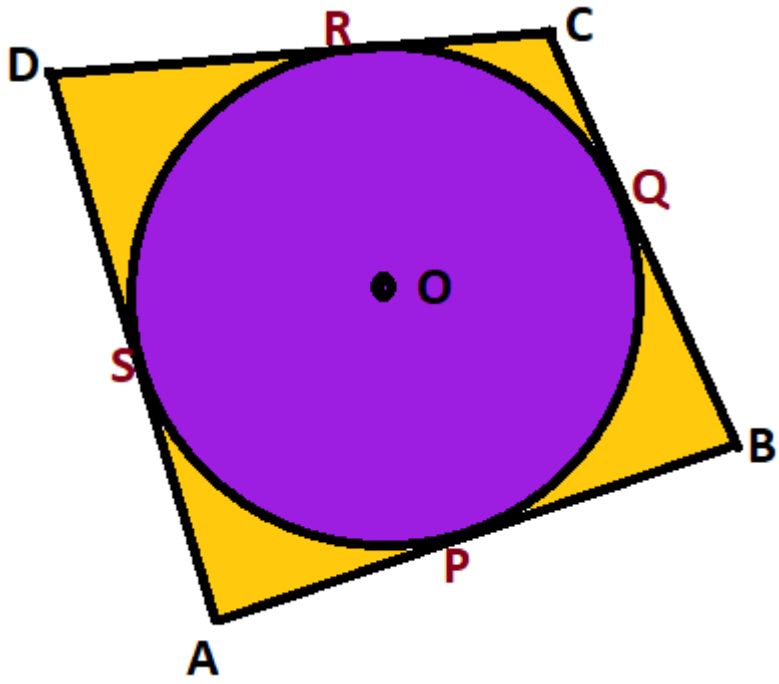
iv) The value of QY =
(a) 2 cm
(b) 5 cm
(c) 1 cm
(d) 3 cm

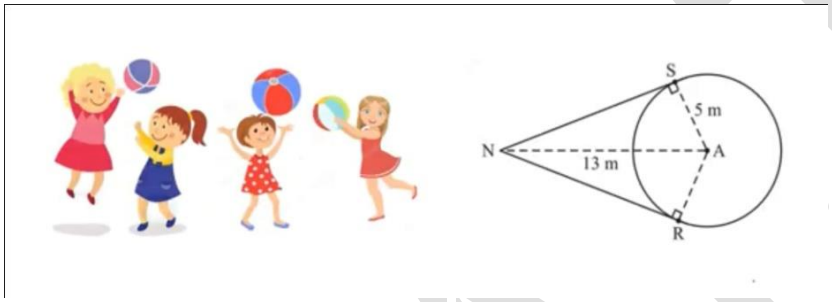
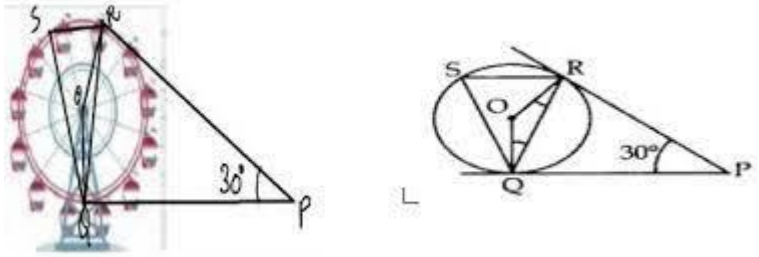
8. People of the village want to construct a road nearest to the circular village Parli. The road cannot pass through the village. But the people want the road to be at the shortest distance from the centre of the village. Suppose the road starts from point O which is outside the circular village and touches the boundary of the circular village at point A such that OA = 20 m. And also, the straight distance of the point O from the center C of the village is 25 m.

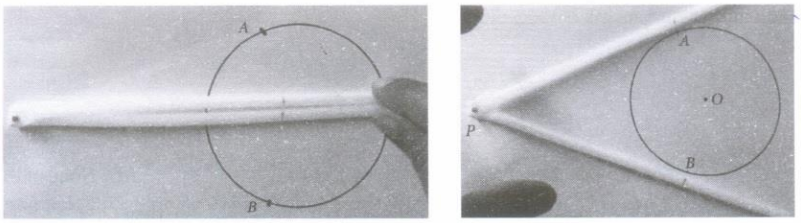
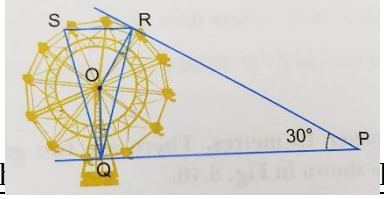
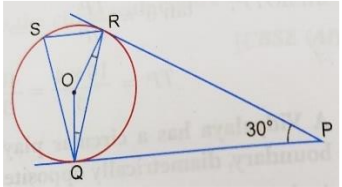
	1. Find the shortest distance of the road from the centre of the village a) 15m b) 14m c) 13m d) 12m 2. Which method should be applied to find the shortest distance? a) Concept of tangent to a circle b) Pythagoras theorem c)Both a and b d) None of these 3. If a point is inside the circle, how many tangents can be drawn from that point a) 0 b) 1 c) 2 d) 4.If we draw two tangents at the end of the diameter, these tangents are always a) Parallel b) perpendicular c) coincident d) None of these	
9.	A Ferris wheel is an amusement ride consisting of a rotating upright wheel with multiple passenger-carrying components attached to the rim in such a way that as the wheel turns, they are kept upright, usually by gravity. After taking a ride in Ferris wheel Sohum came out from the crowd and was observing his friends who were enjoying the ride. He was curious about different angles and measures that the wheel will form. He forms a figure as given below.  	

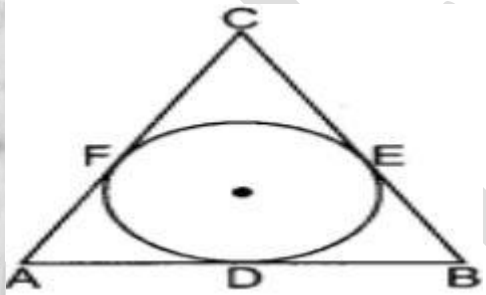
	a) If ∠QPR = 45°, find ∠ROQ. b) Find ∠RQO. c) Find ∠RQP.	
10.	There is a circular fountain in a park and four poles A,B, C and D are standing around the fountain such that fencing joining the poles touches the fountain at P, Q, R and S respectively as shown in figure below:  a) If O is the centre of the circle, find ∠OSD. b) Show that AB + DC = AD + BC c) If AP = 5cm and AD = 13 cm, find DR.	
11.	People of the village want to construct a road nearest to the circular village Parli. The road cannot pass through the village. But the people want the road to be at the shortest distance from the centre of the village. Suppose the road starts from point O which is outside the circular village and touches the boundary of the circular village at point A such that OA = 20 m. And also, the straight distance of the point O from the center C of the village is 25 m 1. Find the shortest distance of the road from the centre of the village a) 15m b) 14m c) 13m d) 12m 2. Which method should be applied to find the shortest distance? a) Concept of tangent to a circle b) Pythagoras formula c)Both a and b d) None of these 3. If a point is inside the circle, how many tangents can be drawn from that point a) 0 b) 1 c) 2 d) 3 4. If we draw two tangents roads at the end of the diameter, these tangents roads are always a) Parallel b) perpendicular c) coincident d) None of these	

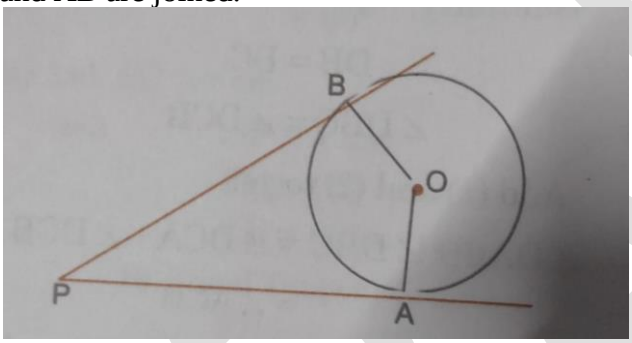
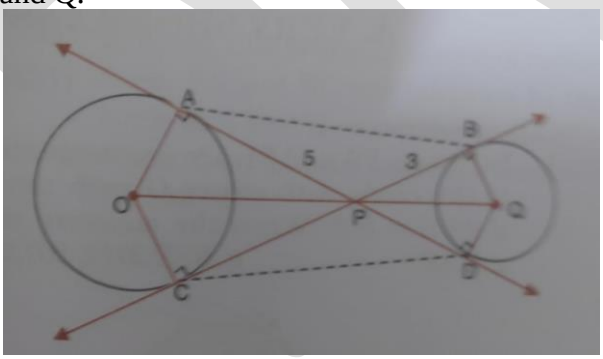
12.	In an international school in Hyderabad organised an Interschool Throwball Tournament for girls just after the pre-board exam. The throw ball team was very excited. The team captain Anjali directed the team to assemble in the ground for practices. Only three girls Priyanshi, Swetha and Aditi showed up. The rest did not come on the pretext of preparing for pre-board exam. Anjali drew a circle of radius 5 m on the ground. The centre A was the position of Priyanshi. Anjali marked a point N, 13 m away from centre A as her own position. From the point N, she drew two tangential lines NS and NR and gave positions S and R to Swetha and Aditi. Anjali throws the ball to Priyanshi, Priyanshi throws it to Swetha, Swetha throws it to Anjali, Anjali throws it to Aditi, Aditi throws it to Priyanshi, Priyanshi throws it to Swetha and so on.   Q A. What is the measure of ∠NSA? (I) 30° (*II*)45° (*III*)60° (*IV*)90° Q B. Find the distance between Swetha and Anjali. (i) 8 m (ii) 12 m (iii) 15 m (iv) 18 m Q C. How far does Anjali have to throw the ball towards Aditi? (i) 18 m (ii) 15 m (iii) 12 m (iv) 8 m Q D. If ∠SNR is equal to θ, then which of the following is true? (i) ∠ANS = 90° – θ (ii) ∠SAN = 90° – θ (iii) ∠RAN = θ (iv) ∠RAS = 180° – θ	

13.	The chain and gears of bicycles or motorcycles or belt around pulleys are some real-life illustrations of tangents to circles.  Based on the above information exhibited in the above diagrams, answer the following questions: (i) PI and PA are tangents to the circle from point P. If arc IZA subtends an angle of 240° at the centre of the circle, then ∠IPA = (a) 120° (b) 90° (c) 60° (d) 30° (ii) If IP = 15 cm, then AI = (a) 7.5 cm (b) 15 cm (c) 30 cm (d) 18 cm (iii) If IP = 21 cm and measure of AP is $x^2 + 5$, then x = (a) 4 cm (b) 16 cm (c) $\sqrt{26}$ cm (d) $\sqrt{30}$ cm (iv) ∠OIP + ∠APO = (a) 90° (b) 180° (c) 120° (d) 150°	4
14.	A student constructed a quadrilateral ABCD and inside it he also drew a circle with centre O such that the circle touched its side AB, BC, CD and AD at P, Q, R and S respectively.  Based on the above information now answer the following questions. (i) Find the sum of ∠AOB and ∠DOC. (a) 90° (b) 100° (c) 180° (d) 120° (ii) If ∠A = 90° and AP = 7 cm, then area of circle is (a) 49 cm^2 (b) 77 cm^2 (c) 44 cm^2 (d) 154 cm^2 (iii) If ∠QCO = 60° , then ∠QOR = ?	4

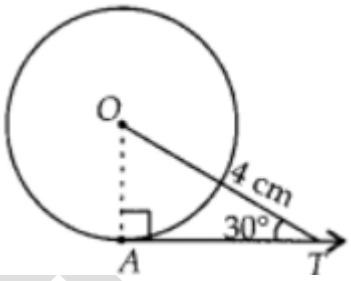
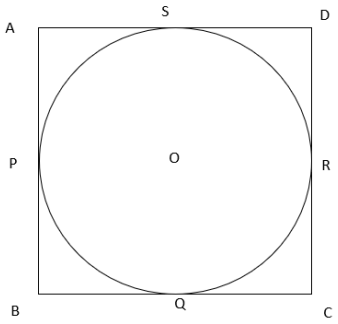
	(a) 60° (b) 120° (c) 30° (d) 90° (iv) If DR = 7 cm and AD = 11 cm, then AP = (a) 4 cm (b) 18 cm (c) 11 cm (d) 7 cm	
15.	In an international school in Hyderabad organised an Interschool Throwball Tournament for girls just after the pre-board exam. The throw ball team was very excited. The team captain Anjali directed the team to assemble in the ground for practices. Only three girls Priyanshi, Swetha and Aditi showed up. The rest did not come on the pretext of preparing for pre-board exam. Anjali drew a circle of radius 5 m on the ground. The centre A was the position of Priyanshi. Anjali marked a point N, 13 m away from centre A as her own position. From the point N, she drew two tangential lines NS and NR and gave positions S and R to Swetha and Aditi. Anjali throws the ball to Priyanshi, Priyanshi throws it to Swetha, Swetha throws it to Anjali, Anjali throws it to Aditi, Aditi throws it to Priyanshi, Priyanshi throws it to Swetha and so on.  (i) What is the measure of ∠NSA? a) 30° b) 40° c)60° d) 90° (ii) Find the distance between Sweta and Anjali. (a) 8 m b) 12m c) 10 m d) 9 m (iii) How far does Anjali have to throw the ball towards Aditi? a) 18 m b) 15 m c) 12 m d) 8m (iv) If ∠SNR=θ then which of the following is true a) ∠ANS=90° - θ b) ∠SAN=90° - θ c) ∠RAN= θ d) ∠ RAS=180° - θ	4
16.	A Ferris wheel (or a big wheel in the United Kingdom) is an amusement ride consisting of a rotating upright wheel with multiple passenger-carrying components (commonly referred to as passenger cars, cabins, tubs, capsules, gondolas, or pods) attached to the rim in such a way that as the wheel turns, they are kept upright, usually by gravity. After taking a ride in Ferris wheel, Aarti came out from the crowd and was observing her friends who were enjoying the ride . She was curious about the different angles and measures that the wheel will form. She forms the figure as given below.  **(i) In the given figure find ∠ROQ** a) 60° b) 100° c) 150° d) 90°	4

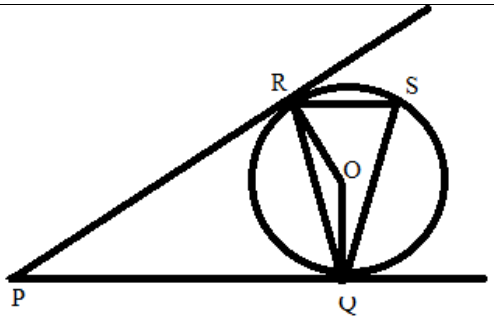
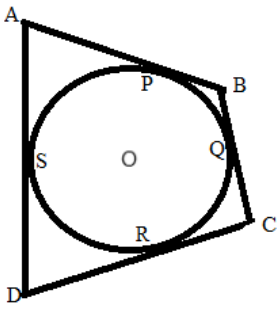
	(ii) Find ∠**RQP** a) **75°** **b) 30°** **c) 45°** **d) 60°** **(iii) Find ∠RSQ** a) **60°** **b) 75°** **c) 100°** **d) 30°** **(iv)Find ∠ORP** a) **90°** **b) 100°** **c) 120°** **d) 80°**	
17.	Prem did an activity on tangents drawn to a circle from an external point using 2 straws and a nail for maths project as shown in figure.  Based on the above information, answer the following questions. (i) Number of tangents that can be drawn to a circle from an external point is a) 1 b) 2 c) Infinite d) Any number depending on the radius of a circle (ii) If ∠AOB = 150°, then ∠APB = a) 75° **b) 45° c) 30° d) 40°** (iii) If ∠APB = 40°, then ∠BAO = 40° **b) 30° c) 50° d) 20°** **iv)** ∠PAO = a) 75° **b) 45° c) 30° d) 90°**	4
18.	**Case Study-based Questions:** Read the following and answer all five questions from (i) to (v). A Ferris wheel (or a big wheel in the United Kingdom) is an amusement ride consisting of rotating upright wheel with multiple passenger-carrying components (commonly referred to a passenger cars, cabins, tubs, capsules, gondolas, or pods) attached to the rim in such a way that as the wheel turns, they are kept upright, usually by gravity. After taking a ride in Ferris wheel Aarti came out from the crowd and was observing her friends who were enjoying the ride. She was curious about the different angles and measures that the wheel will form. She forms the figure as given below.   (i) In tl l to	4

	(a) 60° (b)100° (c)150° (d)90° (ii)the measurement of ∠ROP is (a)75° (b)60° (c)30° (d)90° (iii)the measurement of ∠RSQ is (a)60° (b)75° (c)100° (d) 30°	
19.	Varun has been selected by his School to design logo for Sports Day T-shirts for students and staff . The logo design is as given in the figure and he is working on the fonts and different colours according to the theme. In given figure, a circle with centre O is inscribed in a ΔABC, such that it touches the sides AB, BC and CA at points D, E and F respectively. The lengths of sides AB, BC and CA are 12 cm, 8 cm and 10 cm respectively.   **(i).Find the length of AD** a) 7 cm b) 8cm c) 5cm d) 9cm **(ii). Find the Length of BE** a) 8cm b) 5cm c) 2cm d) 9cm **(iii). Find the length of CF** a) 9cm	4

	b) 5cm c) 2cm d) 3cm **(iv). If radius of the circle is 4cm, Find the area of ΔOAB** a) $20cm^2$ b) $36cm^2$ c) $24cm^2$ d) $48cm^2$	
20.	PA and PB are two tangents to a circle with centre O, diameter 10 cm, OP = 10 cm. OA, OB and AB are joined.  (i) Find the measure of angle PAO. (ii) Find the measure of angle APB (iii) Find the length of PB.	4
21.	In the given figure, AD and BC are common tangents to the two circles with the centres O and Q.  (i) If PA = 5 cm and PB = 3 cm, then find BC. (ii) If angle APC = 50^0, then find angle AOC. (iii) If radius OA = 4 cm, then find OP.	4

ANSWERS:

Q. NO	ANSWER	MARKS
1.	(i) (b)90° (ii) length of tangent to the circle (iii) (c)Join OA. We know that, the tangent at any point of a circle is perpendicular to the radius through the point of contact. In right angles ΔOAT  $\frac{AT}{OT} = \cos 30°$ $\frac{\sqrt{3}}{2} = \frac{AT}{4}$ AT= $\frac{\sqrt{3}\times 4}{2}$ AT = $2\sqrt{3}$	4
2.	As the roundabout is a circle and the shape obtained is a parallelogram circumscribing the circle it will be a rhombus**.** The situation can geometrically be represented by the figure As the length of any two tangents which are drawn from the same point to the circle is equal DR = DS BP = BQ CR = CQ AP = AS These are the tangents to the circle at D, B, C, and A, respectively.  Adding all these, we get DR+BP+CR+AP = DS+BQ+CQ+AS or, (BP+AP)+(DR+CR) = (CQ+BQ)+(DS+AS) or, AB+CD = BC+AD or, 2AB = 2BC (since AB = CD and BC = AD ∴ AB = BC Since AB = BC = CD = DA, it can be said that ABCD is a rhombus.	4
3.	AD = x = 7 cm BE = 12 – x = 12 – 7 = 5 cm CF = 10 – x = 10 – 7 = 3 cm	4
4.	OR = PR + RQ (Join OP and OQ)	4
5.	AD = x = 7 cm BE = 12 – x = 12 – 7 = 5 cm CF = 10 – x = 10 – 7 = 3 cm	4
6.	OR = PR + RQ (Join OP and OQ)	4
7.	I) (C)PA=13 cm II) (B)BQ=5cm III) (d): PK = PA + AK = 13 + 5 = 18 cm	4

	IV) C): QY = BQ – BY = 5 – 4 = 1 cm	
8.	I) A)15 m II) B) Pythagoras theorem III) A) 0 IV) A) parallel	4
9.	 a) ROQ = 180^o - 45^o = 135^o b) OR = OQ (Radius) ∠ORQ = ∠OQR = x x + x + 135^o = 180^o 2x = 180^o - 135^o x = 45^o/2 = 22.5^o c) ∠RQP = ∠OQP - ∠OQR = 90^o - 22.5^o = 67.5^o	4
10.	 a) ∠OSD = 90^o (Tangent to a circle is perpendicular to the radius through the point of contact) b) Tangents drawn from an external point to a circle are equal in length AP = AS …… 1 BP = BQ ……. 2 CR = CQ …….3	4

	DR = DS ……. 4 Adding 1 to 4, AB + DC = AD + BC c) AP = AS = 5cm Therefore, DS = 13 – 5 = 8cm DR = DS = 8 cm	
11.	1. 15 m 2. Phythagoras formula 3. 0 4. Parallel	4
12.	A. $\angle NSA = 90°$ B. 12 m C. 12 m D. (iv) ∠RAS = 180° – θ	4
13.	(i) Ans:- (c) = 60° (ii) Ans:- (b) 15 cm (iii) Ans:- (a) 4 cm (iv) Ans:- (c) 120°	4
14.	(i) Ans (c) 180° (ii) Ans (d) 154 cm^2 (iii) Ans (a) 60° (iv) Ans (a) 4 cm	4
15.	(i) ∠NSA=90° (ii) NS=$\sqrt{13^2 - 5^2}$=$\sqrt{169 - 25}$=12 m (iii) NS=NR=12 m (iv) ∠RAS=180°- θ	4
16.	(i) **∠ROQ=90°** (ii) **∠PRQ=∠RQP since PR=PQ** **Let ∠PRQ=∠RQP=x** **Now, x+x+30°=180°** Or, 2x=150° Or,x=75° (iii) **∠ROQ=150°** **∠RSQ=$\frac{1}{2}$(∠ROQ)** **=150°/2=75°** (iv) **∠ORP=90°**	4
17.	(i) b) 2 (ii) ∠APB=180°-150°=30° (iii) ∠AOB=180°-40∠BAO =140° Let ∠BAO=x then, x+x+140°=180 or, x= 20° iv) d) 90°	4
18.	(i)-c (ii)-a (iii)-b (iv)-a	4
19.	(i)-a	4

	(ii)-b (iii)-d (iv)-a		
20.	(i)	90^0 [Radius is perpendicular to the tangent at the point of contact]	4
	(ii)	60^0	
	(iii)	$PB = \sqrt{(OP^2 - OB^2)} = \sqrt{(10^2 - 5^2)} = \sqrt{(100 - 25)} = \sqrt{75} = 5\sqrt{3}$ cm.	
21.	(i)	$BC = BP + CP = BP + AP = 3 + 5 = 8$ cm.	4
	(ii)	Angle $AOC = 180^0 - 50^0 = 130^0$	
	(iii)	$OP = \sqrt{(OA^2 + AP^2)} = \sqrt{(4^2 + 5^2)} = \sqrt{(16 + 25)} = \sqrt{41}$ cm.	