# SATISH SCIENCE ACADEMY

**DHANORI PUNE-411015**

## CIRCLES

### Class 10 - Mathematics

**Time Allowed: 3 hours** **Maximum Marks: 166**

1. If PA and PB are tangents to a circle with centre O such that $\angle APB = 70^o$, then $\angle AOB$ is **[1]**

   a) $35^o$ b) $110^o$

   c) $140^o$ d) $70^o$

2. The length of the tangent drawn from a point P, whose distance from the centre of a circle is 25 cm, and the radius of the circle is 7 cm, is: **[1]**

   a) 28 cm b) 24 cm

   c) 25 cm d) 22 cm

3. If four sides of a quadrilateral ABCD are tangential to a circle, then **[1]**

   a) AB + CD = AC + BC b) AC + AD = BC + DB

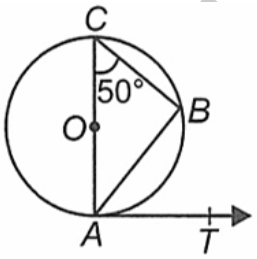
   c) AB + CD = BC + AD d) AC +AD = BD + CD

4. To draw a pair of tangents to a circle, which are inclined to each other at an angle of 45°, we have to draw tangents at the endpoints of those two radii, the angle between which is **[1]**

   a) 135° b) 145°

   c) 105° d) 140°

5. If O is the centre of a circle, AOC is its diameter and B is a point on the circle such that $\angle ACB = 50^o$. If AT is the tangent to the circle at the point A, then $\angle BAT$ = **[1]**




   a) $60^o$ b) $40^o$

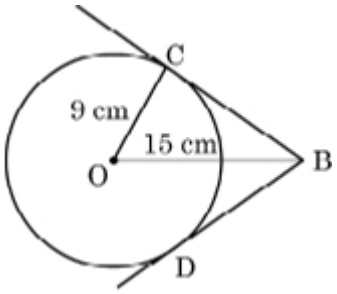
   c) $65^o$ d) $50^o$

6. Two chords PQ and RS intersect at T outside the circle. If PQ = 5 cm, QT = 3 cm, TR = 2 cm. length of RS is : **[1]**

   a) 8 cm b) 15 cm

   c) 12 cm d) 10 cm

7. In the given figure, BC and BD are tangents to the circle with centre O and radius 9 cm. If OB = 15 cm, then the length (BC + BD) is: **[1]**




a) 24 cm
b) 12 cm
c) 18 cm
d) 36 cm

8. The length of the tangent from an external point A to a circle, of radius 3 cm, is 4 cm. The distance of A from the centre of the circle is: **[1]**

a) 7 cm
b) 5 cm
c) 25 cm
d) $\sqrt{7}$ cm

9. Two circles touch each other externally at P. AB is a common tangent to the circle touching them at A and B. The value of $\angle APB$ is **[1]**

a) $30^o$
b) $45^o$
c) $90^o$
d) $60^o$

10. If PT is tangent drawn from a point P to a circle touching it at T and O is the centre of the circle, then $\angle OPT + \angle POT =$ **[1]**

a) $90^o$
b) $180^o$
c) $30^o$
d) $60^o$

11. A circle is of radius 3 cm. The distance between two of its parallel tangents is: **[1]**

a) 3 cm
b) 4.5 cm
c) 6 cm
d) 12 cm

12. AB is a chord of length 24 cm of a circle of radius 13 cm. The tangents at A and B intersect at a point C. Find the length AC. **[1]**

a) 12 cm
b) 31.2 cm
c) 25 cm
d) 28.8 cm

13. In a right triangle ABC, right angled at B, BC = 12 cm and AB = 5 cm. The radius of the circle inscribed in the triangle (in cm) is **[1]**

a) 4
b) 1
c) 2
d) 3

14. From an external point Q, the length of the tangent to a circle is 5 cm and the distance of Q from the centre is 8 cm. The radius of the circle is: **[1]**

a) 3 cm
b) 7 cm
c) 39 cm
d) $\sqrt{39}$ cm

15. AP and PQ are tangents drawn from a point A to a circle with centre O and radius 9 cm. If OA = 15 cm, then AP **[1]**

+ AQ =

a) 18 cm

b) 36 cm

c) 12 cm

d) 24 cm

16. The radii of two concentric circles are 13 cm and 8 cm. AB is a diameter of the bigger circle. BD is a tangent to the smaller circle touching it at D. Find the length AD. **[1]**

a) 20 cm

b) $\sqrt{105}$ cm

c) 19 cm

d) 16 cm

17. QP is a tangent to a circle with centre O at the point P on the circle. If △OPQ is an isosceles, then ∠OQP equals. **[1]**

a) $60^o$

b) $45^o$

c) $90^o$

d) $30^o$

18. From a point A which is at distance of 13 cm from the centre O of a circle of radius 5 cm, the pair of tangents AB and AC to the circle are drawn. Then the area of quadrilateral ABOC is **[1]**

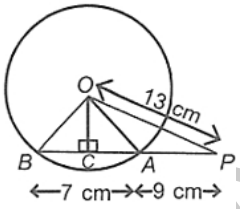
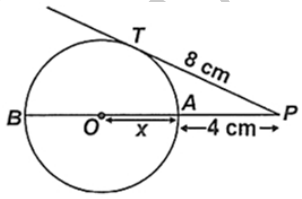
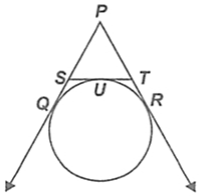
a) 60 $cm^2$

b) 50 $cm^2$

c) 120 $cm^2$

d) 80 $cm^2$

19. Match the following: **[1]**

| **Column-I** | **Column-II** |
|---|---|
| (a) Radius s of the given circle is   | (i) 20 cm |
| (b) In the given figure, value of x is   | (ii) 6 cm |
| (c) Perimeter of △PST with PQ = 10 cm is   | (iii) 5 cm |

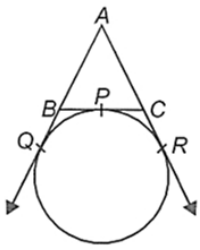
a) (a) - (i), (b) - (iii), (c) - (ii)

b) (a) - (iii), (b) - (ii), (c) - (i)

c) (a) - (ii), (b) - (iii), (c) - (i)

d) (a) - (iii), (b) - (i), (c) - (ii)

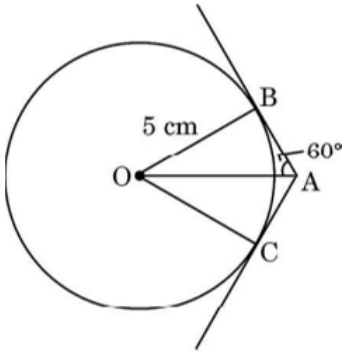
20. In the given figure, a circle touches the side BC of △ABC at P and touches AB and AC produced at Q and R respectively. If AQ = 5 cm, then find the perimeter of △ABC. **[1]**




a) 6 cm
b) 10 cm
c) 7 cm
d) 11 cm

21. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of larger circle (in cm) which touches the smaller circle. **[1]**

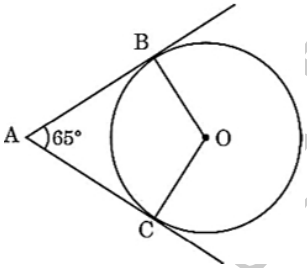
22. In the given figure, tangents AB and AC are drawn to a circle centred at O. If $\angle OAB = 60^o$ and OB = 5 cm, find lengths OA and AC. **[1]**



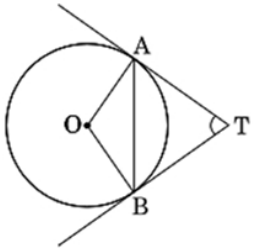

23. How many common tangents can be drawn to two circles intersecting at two distinct points? **[1]**

24. To draw a pair of tangents to a circle which are inclined to each other at an angle of 30°, it is required to draw tangents at end points of two radii of the circle, what will be the angle between them? **[1]**

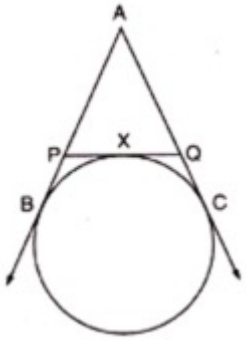
25. In the given figure, O is the centre of the circle. AB and AC are tangents drawn to the circle from point A. If $\angle BAC = 65^o$, then find the measure of $\angle BOC$. **[1]**



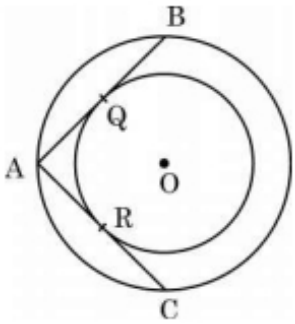

26. In Figure, TA and TB are two tangents to a circle with centre at O. If $\angle OAB = 15^o$, then find the value of $\angle ATB$. **[1]**




27. In the given figure,AB, AC and PQ are tangents. If AB = 5 cm, then find the perimeter of $\triangle APQ$. **[1]**



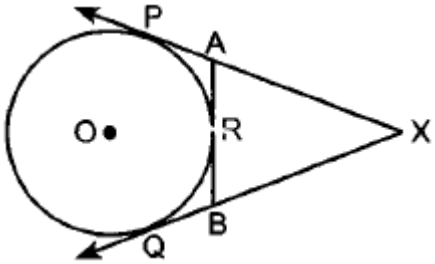

28. In Fig., there are two concentric circles with centre O. If ARC and AQB are tangents to the smaller circle from the point A lying on the larger circle, find the length of AC, if AQ = 5 cm. **[2]**




29. From a point Q, the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm. Find the radius of the circle. **[2]**

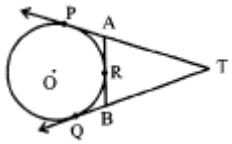
30. Let s denote the semi perimeter of a triangle ABC in which BC = a, CA = b and AB = c. If a circle touches the sides BC, CA, AB at D, E, F respectively, prove that **[2]**
AF = AE = s - a, BD = BF = s - b and CD = CE = s - c.

31. In Figure, XP and XQ are tangents from X to the circle with centre O. R is a point on the circle and AB is tangent at R. Prove that : XA + AR = XB + BR **[2]**

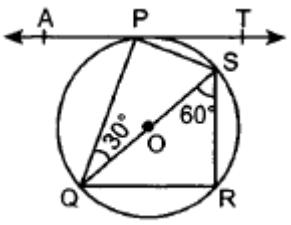



32. Find the length of a chord which is at a distance of 12 cm from the centre of a circle of radius 13 cm. **[2]**

33. In the given figure, TP and TQ are tangents from T to the circle with centre O and R is any point on the circle. If AB is a tangent to the circle at R, prove that TA + AR = TB + BR. **[2]**

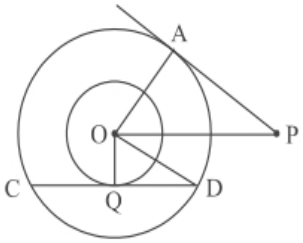



34. In the following figure, QS is the diameter and O is the centre of circle. APT is the tangent at P. Find ∠APQ **[2]**

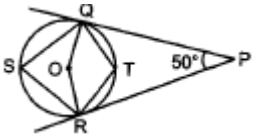



35. In two concentric circles, the radii are OA = r cm and OQ = 6 cm, as shown in the figure. Chord CD of larger **[2]**

circle is a tangent to smaller circle at Q. PA is tangent to larger circle. If PA = 16 cm and OP = 20 cm, find the length CD.

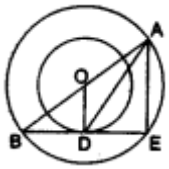



36. In the given figure, find ∠QSR. **[2]**

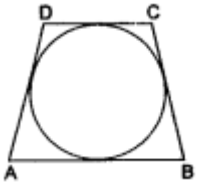



37. A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 13 cm. Find the length of PQ. **[2]**

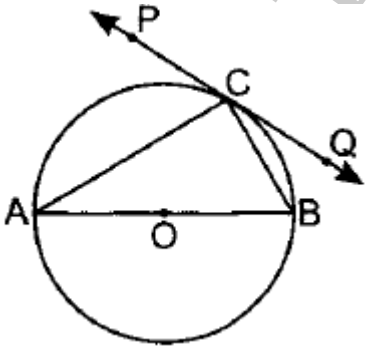
38. In the given figure, the radii of two concentric circles are 13 cm and 8 cm. AB is a diameter of the bigger circle and BD is a tangent to the smaller circle touching it at D. Find the length of AD. **[3]**



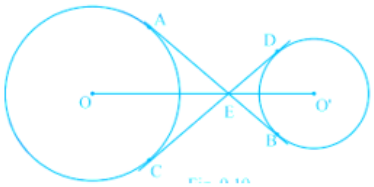

39. In Figure, a circle touches all the four sides of a quadrilateral ABCD with AB = 6 cm, BC = 7 cm and CD = 4 cm. Find AD. **[3]**



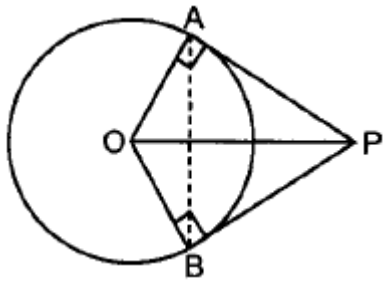

40. In figure, PQ is a tangent at a point C to a circle with centre O. If AB is a diameter and ∠CAB = 30°, find ∠PCA. **[3]**



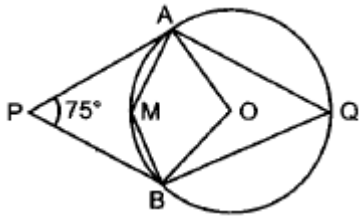

41. The common tangents AB and CD to two circles with centres O and O' intersect at E between their centres. Prove that the points O, E and O' are collinear. **[3]**



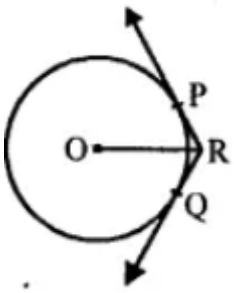

42. In figure, OP is equal to diameter of the circle. Prove that △APB is an equilateral triangle. **[3]**




43. In the given figure, O is the centre of the circle. Determine ∠AQB and ∠AMB, if PA and PB are tangents **[3]**

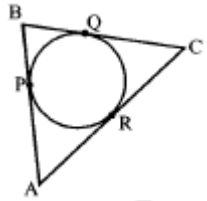



44. In the given figure, two tangents RQ and RP are drawn from an external point R to the circle with centre O. If ∠PRQ = 120°, then prove that OR = PR + RQ. **[3]**



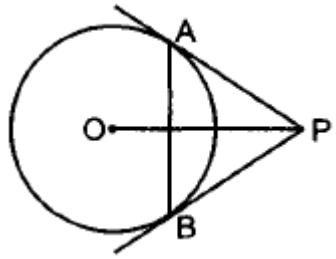

45. ABC is a right triangle in which ∠B = $90^o$. If AB = 8 cm and BC = 6 cm, find the diameter of the circle inscribed in the triangle. **[3]**

46. In the adjoining figure, if PA = 5 cm, BQ = 2 cm and CR = 3 cm, then what is the perimeter of △ABC? **[3]**



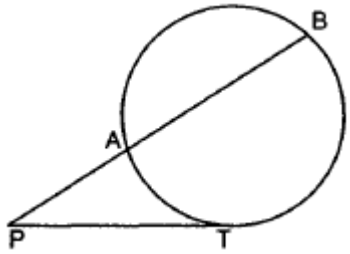

47. Prove that the tangents drawn at the ends of a chord of a circle make equal angles with chord. **[3]**

48. In figure, PA and PB are two tangents drawn from an external point P to a circle with centre O. Prove that OP is the right bisector of line segment AB. **[5]**

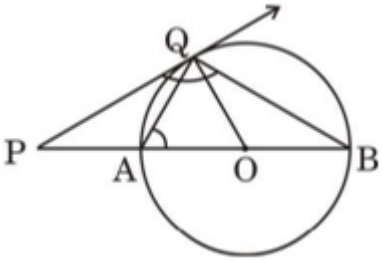



49. Two tangents PA and PB are drawn to the circle with centre O, such that ∠APB = 120°. Prove that OP = 2AP. **[5]**

50. In the given figure, PT is tangent to the circle at T. If PA = 4 cm and AB = 5 cm, find PT. **[5]**

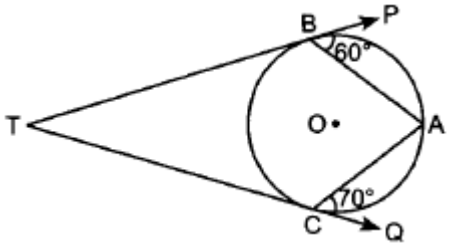



51. In the given Figure, PQ is a tangent to the circle centred at O such that $\angle PQB = 120^o$. Find the measure of $\angle QAB$. **[5]**



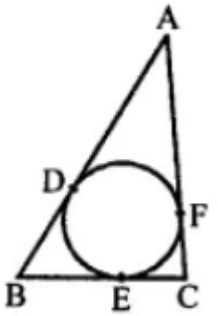

52. AB is a chord of length 24 cm of a circle of radius 13 cm. The tangents at A and B intersect at a point M. Find the length AM. **[5]**

53. In the given figure, TBP and TCQ are tangents to the circle whose centre is O. Also $\angle PBA = 60^o$ and $\angle ACQ = 70^o$. Determine $\angle BAC$ and $\angle BTC$. **[5]**

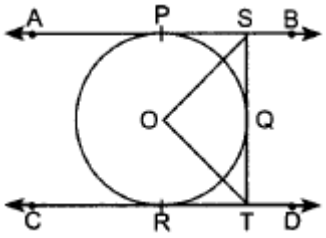



54. O is the centre of a circle. PA and PB are tangents to touch the circle from a point P. Prove that (i) quadrilateral PAOB is a cyclic quadrilateral (ii) PO is the bisector of $\angle APB$ (iii) $\angle OAB = \angle OPA$. **[5]**

55. In the given figure, a circle inscribed in a triangle ABC touches the sides AB, BC and CA at points D, E and F respectively. If AB = 14 cm, BC = 8 cm and CA = 12 cm. Find the lengths AD, BE and CF. **[5]**



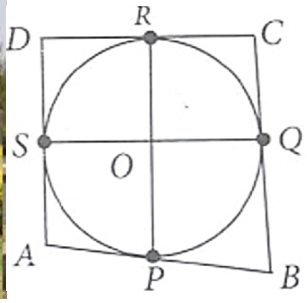

56. In figure AB and CD are two parallel tangents to a circle with centre O. ST is tangent segment between the two parallel tangents touching the circle at Q. Show that $\angle SOT = 90^o$ **[5]**




57. Equal circles with centres O and O' touch each other at X. OO' is produced to meet the circle with centre O' at A and AC is a tangent to the circle with centre O. If O'D is perpendicular to AC, find $\frac{DO'}{CO}$ **[5]**

58. **Read the following text carefully and answer the questions that follow:** **[4]**

In a park, four poles are standing at positions A, B, C and D around the fountain such that the wire joining the poles AB, BC, CD and DA touches the fountain at P, Q, and Rand S respectively as shown in the figure.




i. If O is the center of the circular fountain, then find ∠OSA. (1)

ii. If DR = 7 cm and AD = 11cm, then find AP. (1)

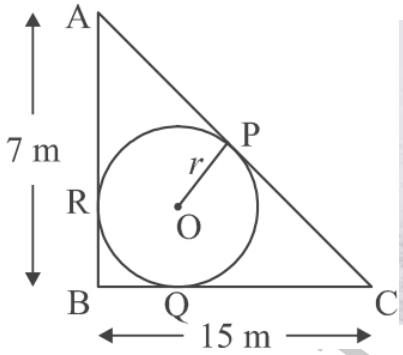
iii. If O is the center of the fountain, with ∠QCR = 60°, then ∠QOR. (2)

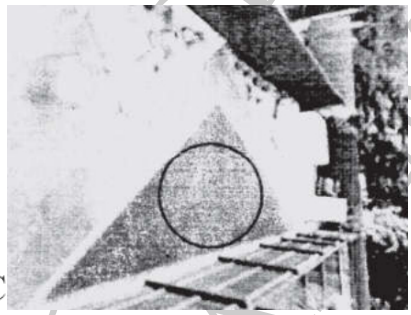
**OR**

Prove that AD + BC = AB + CD. (2)

59. **Read the following text carefully and answer the questions that follow:** **[4]**

A backyard is in the shape of a triangle ABC with right angle at B. AB = 7m and BC = 15 m. A circular pit was dug inside it such that it touches the walls AC, BC and AB at P, Q and R respectively such that AP = x m.



Based on the above information, answer the following questions:

i. Find the length of AR in terms of x. **(1)**

ii. Write the type of quadrilateral BQOR. **(1)**

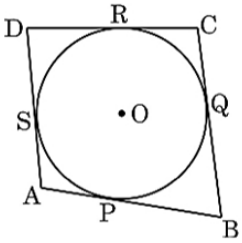
iii. a. Find the length PC in terms of x and hence find the value of x. **(2)**

**OR**

b. Find x and hence find the radius r of circle. **(2)**

60. **Read the following text carefully and answer the questions that follow:** **[4]**

In a park, four poles are standing at positions A, B, C and D around the circular fountain such that the cloth joining the poles AB, BC, CD and DA touches the circular fountain at P, Q, R and S respectively as shown in the figure.




i. If O is the centre of the circular fountain, then ∠OSA = ... (1)

ii. If AB = AD, then write the name of the figure ABCD. (1)

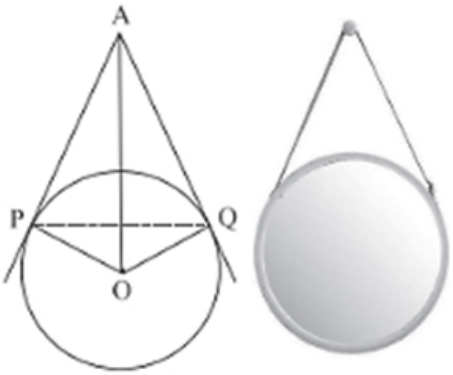
iii. If DR = 7 cm and AD = 11 cm, then find the length of AP. (2)

**OR**

If O is the centre of the circular fountain with $\angle QCR = 60^o$, then find the measure of $\angle QOR$. (2)

61. **Read the following text carefully and answer the questions that follow:** **[4]**

The picture given below shows a circular mirror hanging on the wall with a cord. The diagram represents the mirror as a circle with centre O. AP and AQ are tangents to the circle at P and Q respectively such that AP = 30 cm and $\angle PAQ = 60^o$.




Based on the above information, answer the following questions:

i. Find the length PQ.

ii. Find m$\angle$POQ.

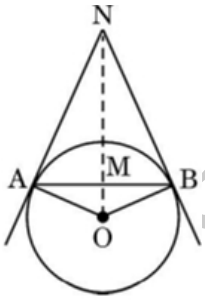
iii. a. Find the length OA.

**OR**

b. Find the radius of the mirror.

62. **Read the following text carefully and answer the questions that follow:** **[4]**

Circles play an important part in our life. When a circular object is hung on the wall with a cord at nail N, the cords NA and NB work like tangents. Observe the figure, given that $\angle ANO = 30^o$ and OA = 5 cm.




i. Find the distance AN. (1)

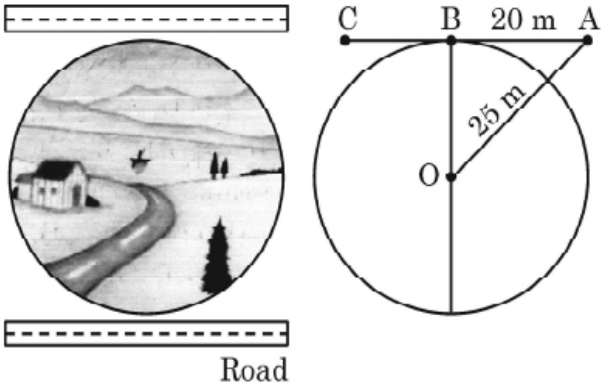
ii. Find the measure of $\angle AOB$. (1)

iii. Find the total length of cords NA, NB and the chord AB. (2)

**OR**

If $\angle ANO$ is $45^o$, then name the type of quadrilateral OANB. Justify your answer. (2)

63. **Read the following text carefully and answer the questions that follow:** **[4]**




People of a circular village Dharamkot want to construct a road nearest to it. The road cannot pass through the village. But the people want the road at a shortest distance from the centre of the village. Suppose the road starts from A which is outside the circular village (as shown in the figure) and touch the boundary of the circular village at B such that AB = 20 m. Also the distance of the point A from the centre O of the village is 25 m.

i. If B is the mid-point of AC, then find the distance AC. (1)

ii. Find the shortest distance of the road from the centre of the village. (1)

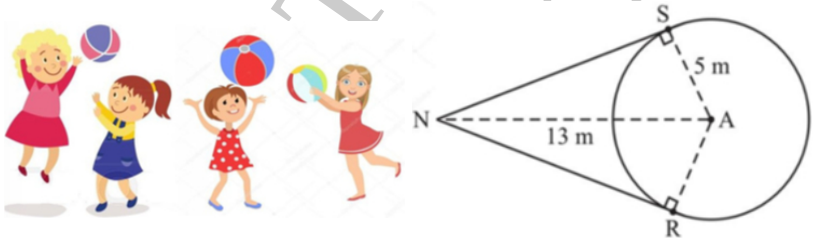
iii. Find the circumference of the village. (2)

**OR**

Find the area of the village. (2)

64. **Read the following text carefully and answer the questions that follow:** **[4]**

In an international school in Hyderabad organised an Interschool Throwball Tournament for girls just after the pre-board exam. The throwball team was very excited. The team captain Anju directed the team to assemble in the ground for practices. Only three girls Aarushi, Sarika and Avni showed up. The rest did not come on the pretext of preparing for pre-board exam. Anju drew a circle of radius 5 m on the ground. The centre A was the position of Aarushi. Anju 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 Sarika and Avni. Anju throws the ball to Aarushi, Aarushi throws it to Sarika, Sarika throws it to Anju, Anju throws it to Avni, Avni throws it to Aarushi, Aarushi throws it to Sarika and so on.




i. Find the measure of ∠NSA. (1)

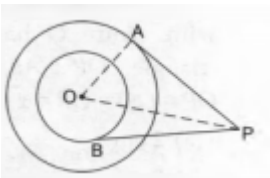
ii. Find the distance between Sarika and Anju. (1)

iii. If ∠SNR is equal to $\theta$, then find ∠NAS. (2)

**OR**

Find ∠SNR + ∠SAR. (2)

65. In the given figure, O is the centre of two concentric circles of radii 5 cm and 3 cm. From an external point P tangents PA and PB are drawn to these circles. If PA = 12 cm, then PB is equal to **[1]**




66. **Assertion (A):** If the length of a tangent from an external point to a circle is 8 cm, then the length of the other **[1]**

tangent from the same point is 8 cm.

**Reason (R):** Lengths of the tangents drawn from an external point to a circle are equal.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

67. **Assertion (A):** A tangent to a circle is perpendicular to the radius through the point of contact. **[1]**

**Reason (R):** The lengths of tangents drawn from the external point to a circle are equal.

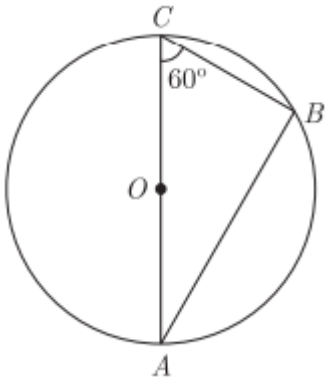
a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

68. **Assertion (A):** In the given figure, O is the centre of a circle and AT is a tangent at point A, then $\angle BAT = 60^o$ **[1]**




**Reason (R):** A straight line can meet a circle at one point only.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

69. **Assertion (A):** The tangents drawn at the end points of a diameter of a circle, are parallel. **[1]**

**Reason (R):** Diameter of a circle is the longest chord.

a) Both A and R are true and R is the correct explanation of A.

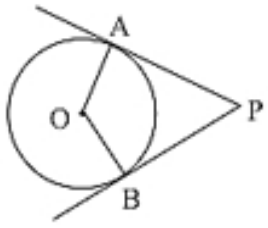
b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

70. **Assertion (A):** If PA and PB are tangents drawn to a circle with centre O from an external point P, then the quadrilateral OAPB is a cyclic quadrilateral. **[1]**

**Reason (R):** In cyclic quadrilateral opposite angles are equal.




a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

71. **Assertion (A):** A tangent to a circle is perpendicular to the radius through the point of contact. **[1]**

**Reason (R):** The lengths of tangents drawn from an external point to a circle are equal.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

72. **Assertion (A):** If PA and PB are tangents drawn from an external point P to a circle with centre O, then the quadrilateral AOBP is cyclic. **[1]**

**Reason (R):** The angle between two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

73. **Assertion (A):** If in a circle, the radius of the circle is 3 cm and the distance of a point from the centre of a circle is 5 cm, then length of the tangent will be 4 cm. **[1]**

**Reason (B):** $(\text{hypotenuse})^2 = (\text{base})^2 + (\text{height})^2$

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

74. **Assertion (A):** PA and PB are two tangents to a circle with centre O. Such that $\angle AOB = 110^o$, then $\angle APB = 90^o$. **[1]**

**Reason (R):** The length of two tangents drawn from an external point are equal.

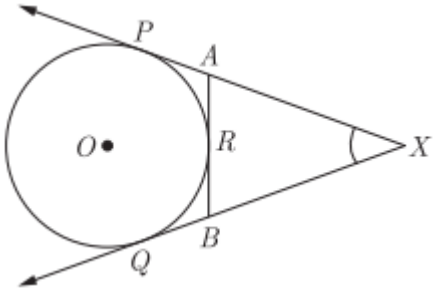
a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

75. **Assertion (A):** In the given figure, XA + AR = XB + BR, where XP, XQ and AB are tangents. **[1]**




**Reason (R):** A tangent to the circle can be drawn from a point inside the circle.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.