

**SA-II-2010-2011
MATHEMATICS
CLASS-X**

Time:3 hours

M.M.:80

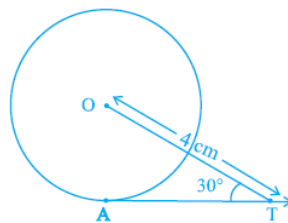
General Instruction

1. All questions are compulsory
2. The question paper consists of 34 questions divided into four sections A, B, C and D.
3. Section A contains 10 questions of 1 mark each, which are multiple choice type questions, Section B contain 8 questions of 2 marks each, Section C contains 10 questions of 3 marks each, and Section D contains 6 questions of 4 marks each.
4. There is no overall choice in the paper. However, internal choice is provided in one question of 2marks,3 questions of 3 marks and two questions of 4 marks
5. Use of calculators is not permitted.

Section-A(1 mark each)

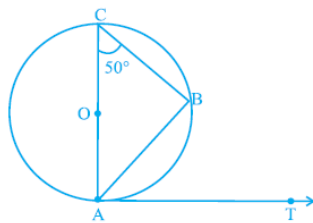
1. In fig AT is a tangent to the circle with centre O such that $OT=4\text{cm}$ and $\angle OTA = 30^\circ$. then AT is equal to

- a) 4cm
b) 2cm
c) $2\sqrt{3}$ cm
d) $4\sqrt{3}$ cm



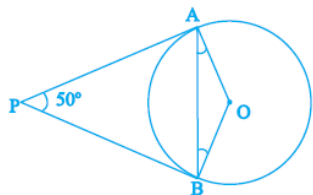
2. In fig AB is a chord of the circle AOC is its diameter such that $\angle ACB = 50^\circ$. If AT is the tangent to the circle at the point A. then $\angle BAT =$

- a) 65°
b) 60°
c) 50°
d) 40°



3. If PA and PB are tangents to the circle with centre O such that $\angle APB = 50^\circ$, then $\angle OAB =$

- a) 25°
b) 30°
c) 40°
d) 50°



4. To draw a pair of tangents to a circle which are inclined to each other at an angle of 35° , it is required to draw tangents at the end points of those two radii of the circle, the angle between which is

- a) 105°
b) 70°
c) 140°
d) 145°

5. If one root of the equation $px^2 - 14x + 8 = 0$ is six times the other, then p is equal to
 a) 2
 b) 3
 c) 1
 d) None of these
6. In an AP, if $a=3.5, d=0, n=101$, then a_n will be
 a) 0
 b) 3.5
 c) 103.5
 d) 104.5
7. The area of the largest possible square inscribed in a circle of unit radius (in sq.units) is
 a) $\frac{\pi}{2}$
 b) π
 c) 2
 d) $2\sqrt{2}$
8. The ratio of the volume of a cube to that of a sphere which will fit inside cube is
 a) $\sqrt{\pi} : \sqrt{6}$
 b) $\sqrt{\pi} : \sqrt{3}$
 c) $\sqrt{6} : \sqrt{\pi}$
 d) $\sqrt{3} : \sqrt{\pi}$
9. During conversion of a solid from one shape to another, the.....remain the same
 a) Volume
 b) Surface area
 c) Curved surface area
 d) Length
10. If $P(A)$ denotes the probability of an event A , then
 a) $P(A) < 0$
 b) $P(A) > 1$
 c) $0 \leq P(A) \leq 1$
 d) $-1 \leq P(A) \leq 1$

Section-B(2 marks each)

11. Check whether the equation $6x^2 - 7x + 2 = 0$ has real roots, and if it has, find them
12. Find a, b and c such that the following numbers are in AP: $a, 7, b, 23, c$.
13. Two tangents PQ and PR are drawn from an external point to a circle with centre O . Prove that $QORP$ is a cyclic quadrilateral.
14. In Fig. 11.7, AB is a diameter of the circle, $AC = 6$ cm and $BC = 8$ cm. Find the area of the shaded region (Use $\pi = 3.14$).

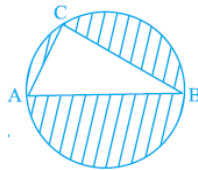


Fig. 11.7

15. A solid metallic sphere of radius 10.5 cm is melted and recast into a number of smaller cones, each of radius 3.5 cm and height 3 cm. Find the number of cones so formed.

16. If P $(9a - 2, -b)$ divides line segment joining A $(3a + 1, -3)$ and B $(8a, 5)$ in the ratio 3 : 1, find the values of a and b .

17. Find the value of m if the points $(5, 1)$, $(-2, -3)$ and $(8, 2m)$ are collinear.

18. I toss three coins together. The possible outcomes are no heads, 1 head, 2 heads and 3 heads. So, I say that probability of no heads is $\frac{1}{4}$. What is wrong with this conclusion?

OR

Two dice are thrown at the same time. Find the probability of getting

(i) same number on both dice.

(ii) different numbers on both dice.

Section-C(3 marks each)

19. If the roots of the equation $(b-c)x^2 + (c-a)x + (a-b) = 0$ are equal then prove that $2b = a + c$

OR

Solve $abx^2 + (b^2 - ac)x - bc = 0$ ($a, b, c \in \mathbb{R}$)

20. Find the 20th term of the AP whose 7th term is 24 less than the 11th term, first term being 12.

21. The tangent at a point C of a circle and a diameter AB when extended intersect at P. If $\angle PCA = 110^\circ$, find $\angle CBA$ [see Fig. 9.21].

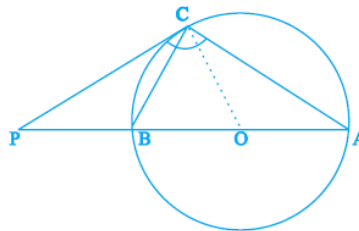


Fig. 9.21

OR

Prove that the tangent drawn at the mid-point of an arc of a circle is parallel to the chord joining the end points of the arc.

22. Draw a right triangle ABC in which $BC = 12$ cm, $AB = 5$ cm and $\angle B = 90^\circ$. Construct a triangle similar to it and of scale factor $\frac{2}{3}$. Is the new triangle also a right triangle?

23. Find the area of the shaded region in Fig. 11.10, where arcs drawn with centres A, B, C and D intersect in pairs at mid-points P, Q, R and S of the sides AB, BC, CD and DA, respectively of a square ABCD (Use $\pi = 3.14$).

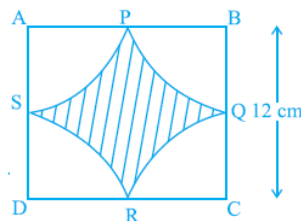


Fig. 11.10

24. Water flows at the rate of 10m/minute through a cylindrical pipe 5 mm in diameter. How long would it take to fill a conical vessel whose diameter at the base is 40 cm and depth 24 cm?

OR

A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 4 cm and the diameter of the base is 8 cm.

25. From a balloon vertically above a straight road, the angles of depression of two cars at an instant are found to be 45° and 60° . If the cars are 100 m apart, find the height of the balloon.

26. A (6, 1), B (8, 2) and C (9, 4) are three vertices of a parallelogram ABCD. If E is the midpoint of DC, find the area of $\triangle ADE$.

27. The mid-points D, E, F of the sides of a triangle ABC are (3, 4), (8, 9) and (6, 7). Find the coordinates of the vertices of the triangle.

28. What is the probability of 53 Sundays in a leap year and non leap year? And what will be the probability of 54 Sundays in each year?

Section-D(4 marks each)

29. A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 km/h more than its original speed. If it takes 3 hours to complete the total journey, what is its original average speed?

OR

Had Ajita scored 10 more marks in her mathematics test out of 30 marks, 9 times these marks would have been the square of her actual marks. How many marks did she get in the test?

30. The sum of the first five terms of an AP and the sum of the first seven terms of the same AP is 167. If the sum of the first ten terms of this AP is 235, find the sum of its first twenty terms.

31. Prove that the lengths of the tangent drawn from an external point to a circle are equal.

32. A bucket is in the form of a frustum of a cone of height 30 cm with radii of its lower and upper ends as 10 cm and 20 cm, respectively. Find the capacity and surface area of the bucket. Also, find the cost of milk which can completely fill the container, at the rate of Rs 25 per litre (use $\pi = 3.14$).

33. A heap of rice is in the form of a cone of diameter 9 m and height 3.5 m. Find the volume of the rice. How much canvas cloth is required to just cover the heap?

OR

How many cubic centimetres of iron is required to construct an open box whose external dimensions are 36 cm, 25 cm and 16.5 cm provided the thickness of the iron is 1.5 cm. If one cubic cm of iron weighs 7.5 g, find the weight of the box.

34. The angle of elevation of a cloud from a point h metres above the surface of a lake is θ and the angle of depression of its reflection in the lake is ϕ . Prove that the height of the cloud above the lake is $h \left(\frac{\tan \phi + \tan \theta}{\tan \phi - \tan \theta} \right)$