11. Areas Related to Circles - Board Exam Questions

The detailed solution for all the questions can be found at pschool.in/math/ncert/g10/chap-11

1 Mark Questions (MCQ)

1) The length of the arc of the sector of a circle with radius 21 cm and of central angle 60°, is:
2) The hour hand of a clock is 7 cm long. The angle swept by it between 7:00 a.m. and 8:10 a.m. is:
3) Area of a segment of a circle of radius 'r' and central angle 60° is:
4) A circle is divided into 16 identical sectors. If radius of the circle is 7 cm, area of each sector is
5) Arc PQ subtends an angle θ at the centre of the circle with radius 6.3 cm. If arc PQ = 11 cm, then the value of θ is
6) An arc of length 2.2 cm subtends an angle θ at the centre of the circle with radius 2.8 cm. The value of θ is
7) The diameter of a car wheel is 21 cm. The number of complete revolutions it will make in moving 66 km is:
8) The arc of a circle is of length 6π cm and the sector it bounds has an area of 24π cm^2. The radius of the circle is:
9) If a sector of a circle has an area of 40π sq. units and a central angle of 72°, the radius of the circle is:
10) A piece of wire 20 cm long is bent into the form of an arc of a circle of radius $\frac{60}{\pi}$ cm. The angle subtended by the arc at the centre of the circle is:
11) If a large circular pizza is divided into 5 equal sectors, then the central angle of each sector will be:
12) If the area of a sector of circle of radius 36 cm is 54π cm^2, then the length of the corresponding arc of the sector is:

13) Given below is the picture of the Olympic rings made by taking five congruent circles of radius 1 cm each, intersecting in such a way that the chord formed by joining the point of intersection of two circles is also of length 1 cm. Total area of all the dotted regions (assuming the thickness of the rings to be negligible) is



14) The area (in cm^2) of a sector of a circle of radius 21 cm cut off by an arc of length 22 cm is

15) Perimeter of a sector of a circle whose central angle is 90° and radius 7 cm is:

16) If an arc subtends an angle of 90° at the centre of a circle, then the ratio of its length to the circumference of the circle is:

17) The area of the sector of a circle of radius 12 cm is 60π cm^2. The central angle of this sector is:

18) The perimeter of the sector of a circle of radius 21 cm which subtends an angle of 60° at the centre of circle, is:

19) The length of an arc of a circle with radius 12 cm is 10π cm. The angle subtended by the arc at the centre of the circle, is:

20) What is the length of the arc of the sector of a circle with radius 14 cm and of central angle 90°?

21) The hour-hand of a clock is 6 cm long. The angle swept by it between 7:20 a.m. and 7:55 a.m. is:

22) What is the area of a semi-circle of diameter 'd'?

23) The circumferences of two circles are in the ratio 4 : 5. What is the ratio of their radii?

24) If the perimeter and the area of a circle are numerically equal, then the radius of the circle is

25) It is proposed to build a new circular park equal in area to the sum of areas of two circular parks of diameters 16 m and 12 m in a locality. The radius of the new park is

26) The area of the circle that can be inscribed in a square of 6 cm is

27) The number of revolutions made by a circular wheel of radius 0.25 m in rolling a distance of 11 km is

Assertion and Reason

1) ASSERTION (A): If the circumference of a circle is 176 cm, then its radius is 28 cm.
REASON (R): Circumference = 2π × radius of a circle.

2) ASSERTION (A): If the radius of sector of a circle is reduced to its half and angle is doubled then the perimeter of the sector remains the same.
REASON (R): The length of the arc subtending angle θ at the centre of a circle of radius $r = \frac{\pi r\theta}{180}$.

2 Mark Questions

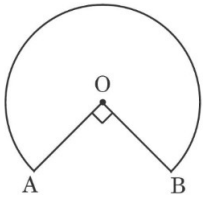
1) Find the length of the arc of a circle which subtends an angle of 60° at the centre of the circle of radius 42 cm.

2) Find the area of a sector of a circle with diameter 28 cm, if the length of the corresponding arc is 22 cm.

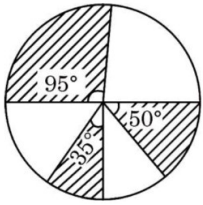
3) The minute hand of a clock is 14 cm long. Find the area on the face of the clock described by the minute hand in 5 minutes.

4) The length of the minute hand of a clock is 6 cm. Find the area swept by it when it moves from 7:05 p.m. to 7:40 p.m.

5) In the given figure, the shape of the top of a table is that of a sector of a circle with centre O and $\angle AOB = 90^\circ$. If $AO = OB = 42$ cm, then find the perimeter of the top of the table.



6) In the given figure, three sectors of a circle of radius 5 cm, making angles 35°, 50° and 95° at the centre are shaded. Find the area of the shaded region. [Use $\pi = \frac{22}{7}$]

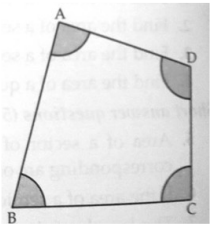


7) Find the area of the major segment (in terms of π) of a circle of radius 5 cm, formed by a chord subtending an angle of 90° at the centre.

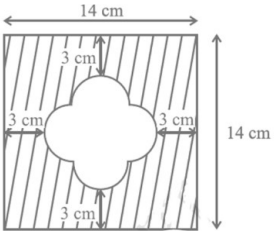
8) A horse, a cow and a goat are tied, each by ropes of length 14 m, at the corners A, B and C respectively, of a grassy triangular field ABC with sides of lengths 35 m, 40 m and 50 m. Find the area of grass field that can be grazed by them.

9) With vertices A, B and C of $\triangle ABC$ as centres, arcs are drawn with radii 14 cm and the three portions of the triangle so obtained are removed. Find the total area removed from the triangle.

10) In the given figure, arcs have been drawn of radius 7 cm each with vertices A, B, C and D of quadrilateral ABCD as centres. Find the area of the shaded region.



11) Find the area of the unshaded region shown in the given figure.



3 Mark Questions

1) In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find the area of the sector formed by the arc. Also, find the length of the arc.

2) Find the area of the sector of a circle of radius 42 cm and of central angle 30°. Also, find the area of the corresponding major sector. [Use $\pi = \frac{22}{7}$]

3) A circle of diameter 20 cm is equally divided into five sectors. Find the area and perimeter of one of the sectors.

4) The length of the hour hand of a clock is 10 cm. Find the area of the minor sector swept by the hour hand of the clock between 5 a.m. to 8 a.m. Also, find the area of the major sector.

5) The minute hand of a wall clock is 18 cm long. Find the area of

the face of the clock described by the minute hand in 35 minutes.

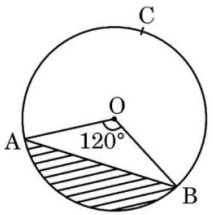
6) A car has two wipers which do not overlap. Each wiper has a blade of length 21 cm sweeping through an angle of 120°. Find the total area cleaned at each sweep of the two blades.

7) An arc of a circle of radius 10 cm subtends a right angle at the centre of the circle. Find the area of the corresponding major sector. (Use $\pi = 3.14$)

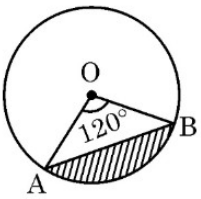
8) A chord of a circle of radius 10 cm subtends a right angle at the centre of the circle. Find the area of the corresponding minor segment. [Use $\pi = 3.14$]

9) AB is a chord of a circle centred at O such that $\angle AOB = 60^\circ$. If $OA = 14$ cm then find the area of the minor segment. (take $\sqrt{3} = 1.73$)

10) In the given figure, chord AB subtends an angle of 120° at the centre of the circle with radius 7 cm. Find (i) perimeter of major sector OACB, and (ii) area of the shaded segment, if area of $\triangle OAB = 21.2\ \text{cm}^2$.

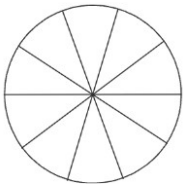


11) Chord AB of a circle with centre O and radius 21 mm subtends an angle of 120° at the centre. Find the perimeters of the shaded region. (Use $\sqrt{3} = 1.73$)



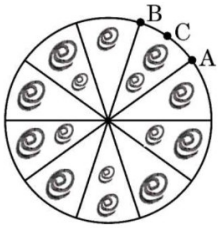
4 Mark Questions

1) A brooch is crafted from silver wire in the shape of a circle with a diameter of 35 cm. The wire is also used to create 5 diameters, dividing the circle into 10 equal sectors as shown in figure.



(i) What is the radius of circle? (1)
(ii) What is the circumference of the brooch? (1)
(iii) (a) What is the total length of silver wire required? (2)
OR (b) What is the area of each sector of the brooch?

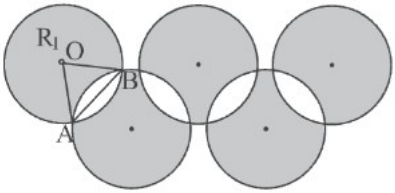
2) A brooch is a decorative piece often worn on clothing like jackets, blouses or dresses to add elegance. Made from precious metals and decorated with gemstones, brooches come in many shapes and designs.



One such brooch is made with silver wire in the form of a circle with diameter 35 mm. The wire is
also used in making 5 diameters which divide the circle into 10 equal sectors as shown in the figure.
(i) Find the central angle of each sector. (1)
(ii) Find the length of the arc ACB. (1)
(iii) (a) Find the area of each sector of the brooch. (2)
OR (b) Find the total length of the silver wire used.

3) The Olympic symbol comprising five interlocking rings represents the union of the five continents of the world and the meeting of athletes from all over the world at the Olympic games. In order to spread awareness about Olympic games, students of Class-X took part in various activities organised by the school. One such group of students made 5 circular rings in the school lawn with the help of ropes. Each circular ring required 44 m of rope.
Also, in the shaded regions as shown in the figure, students made rangoli showcasing various sports and games. It is given that $\triangle$OAB is an equilateral triangle and all unshaded regions are congruent.

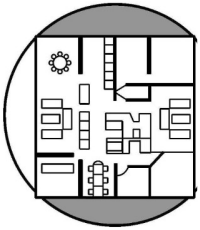




(i) Find the radius of each circular ring. (1)
(ii) What is the measure of $\angle$AOB? (1)
(iii) (a) Find the area of shaded region R_1. (2)
OR (b) Find the length of rope around the unshaded regions.

4) A farmer has a circular piece of land. He wishes to construct his house in the form of largest possible square within the land as shown below.





The radius of circular piece of land is 35 m.

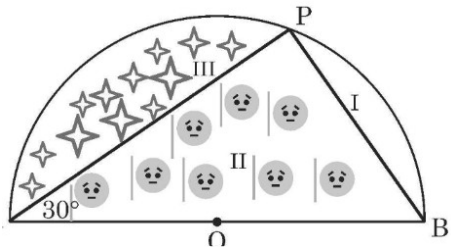
(i) Find the length of wire needed to fence the entire land. (1)

(ii) Find the length of each side of the square land on which house will be constructed. (1)

(iii) (a) The farmer wishes to grow grass on the shaded region around the house. Find the cost of growing the grass at the rate of ₹50 per square metre. (2)

OR (b) Find the ratio of area of land on which house is built to remaining area of circular piece of land.

5) Anurag purchased a farmhouse which is in the form of a semicircle of diameter 70 m. He divides it into three parts by taking a point P on the semicircle in such a way that $\angle PAB = 30^\circ$ as shown in the following figure, where O is the centre of semicircle.



In part I, he planted saplings of Mango tree, in part II, he grew tomatoes and in part III, he grew oranges.

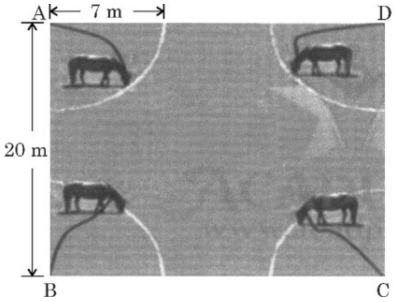
(i) What is the measure of ∠POA? (1)

(ii) Find the length of wire needed to fence entire piece of land. (1)

(iii) (a) Find the area of region in which saplings of Mango tree are planted. (2)

OR (b) Find the length of wire needed to fence the region III.

6) A stable owner has four horses. He usually tie these horses with 7 m long rope to pegs at each corner of a square shaped grass field of 20 m length, to graze in his farm. But tying with rope sometimes results in injuries to his horses, so he decided to build fence around the area so that each horse can graze.



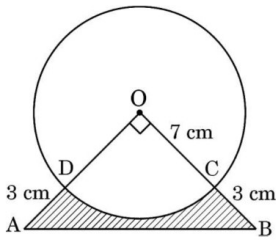
(i) Find the area of the square shaped grass field. (1)

(ii) (a) Find the area of the total field in which these horses can graze. (2)

OR (b) If the length of the rope of each horse is increased from 7 m to 10 m, find the area grazed by one horse. (Use $\pi = 3.14$)

(iii) What is area of the field that is left ungrazed, if the length of the rope of each horse is 7 m? (1)

7) In an annual day function of a school, the organizers wanted to give a cash prize along with a memento to their best students. Each memento is made as shown in the figure and its base ABCD is shown from the front side. The rate of silver plating is ₹20 per cm^2.



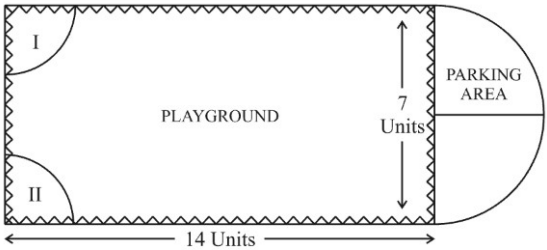
(i) What is the area of the quadrant ODCO? (1)

(ii) Find the area of $\triangle AOB$. (1)

(iii) (a) What is the total cost of silver plating the shaded part ABCD? (2)

OR (b) What is the length of arc CD?

8) Governing council of a local public development authority of Dehradun decided to build an adventurous playground on the top of a hill, which will have adequate space for parking.



After survey, it was decided to build rectangular playground, with a semi-circular area allotted for parking at one end of the playground. The length and breadth of the rectangular playground are 14 units and 7 units, respectively. There are two quadrants of radius 2 units on one side for special seats.
(i) What is the total perimeter of the parking area? (1)
(ii) (a) What is the total area of parking and the two quadrants? (2)
OR (b) What is the ratio of area of playground to the area of parking area?
(iii) Find the cost of fencing the playground and parking area at the rate of ₹2 per unit. (1)

5 Mark Questions

1) The perimeter of a certain sector of a circle of radius 5.6 m is 20.0 m. Find the area of the sector.
2) An arc of a circle of radius 21 cm subtends an angle of 60° at the centre. Find: (i) the length of the arc. (ii) the area of the minor segment of the circle made by the corresponding chord.
3) A chord of a circle of radius 14 cm subtends an angle of 60° at the centre. Find the area of the corresponding minor segment of the circle. Also find the area of the major segment of the circle.
4) A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope. Find the area of that part of the field in which the horse can graze. Also, find the increase in grazing area if length of rope is increased to 10 m. (Use $\pi = 3.14$)