Class 10 Mathematics · Chapter 11: Areas Related to Circles

Answer key and marking scheme · 20 marks · about 40 minutes · based on NCERT

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1. Two radii of a circle make an angle of 120° at the centre. The angle of the major sector they form is [1]

(a) 60° (b) 240°
(c) 180° (d) 300°

Answer: (b) The major sector's angle is 360° − 120° = 240°. 60° is 180° − 120°, as if the angles made a straight line.

2. OA and OB are radii of a circle of radius 12 cm with ∠AOB = 90°. The area of triangle OAB is [1]

(a) 72 cm^2 (b) 144 cm^2
(c) $36\sqrt{3}$ cm^2 (d) 36 cm^2

Answer: (a) The triangle is right-angled at O with legs 12 cm and 12 cm: ½ × 12 × 12 = 72 cm^2. 144 forgets the ½; $36\sqrt{3}$ is the 60° (equilateral) formula.

3. OA and OB are radii of a circle of radius 10 cm with ∠AOB = 60°. The area of triangle OAB is [1]

(a) 50 cm^2 (b) 100 cm^2
(c) $50\sqrt{3}$ cm^2 (d) $25\sqrt{3}$ cm^2

Answer: (d) With a 60° angle between equal sides the triangle is equilateral of side 10 cm: $(\sqrt{3}/4) \times 10^2 = 25\sqrt{3}$ cm^2. 50 cm^2 treats it as right-angled.

4. Two radii of a circle of radius 28 cm are perpendicular. The area of the major sector they form is. [1]
Take π = 22/7.

(a) 616 cm^2 (b) 1232 cm^2
(c) 2464 cm^2 (d) 1848 cm^2

Answer: (d) Circle = $(22/7) \times 28^2 = 2464$ cm^2; minor sector = 2464/4 = 616 cm^2; major sector = 2464 − 616 = 1848 cm^2.

5. The angle of a sector is kept the same and its radius is doubled. Then [1]

(a) its arc length and its area both double
(b) its arc length doubles and its area becomes four times
(c) its arc length becomes four times and its area doubles
(d) its arc length and its area both become four times

Answer: (b) Arc = $(\theta/360) \times 2\pi r$ grows as r, so it doubles; area = $(\theta/360) \times \pi r^2$ grows as r^2, so it becomes $2^2 = 4$ times.

6. Two radii at 60° to each other divide a circular rangoli of radius 42 cm into a minor and a major sector. Find the area of the major sector. Take π = 22/7. [2]

Circle = $(22/7) \times 42^2 = 5544$ cm^2; minor sector = 5544/6 = 924 cm^2; major sector = 5544 − 924 = 4620 cm^2 (or (300/360) × 5544).

- minor sector 924 cm^2, or the major angle 300° (1)
- major sector 4620 cm^2 (1)

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7. A round roti with centre O and radius 21 cm is cut in two along a straight line AB, where $\angle AOB = 90°$. [2] Find the area of the smaller piece. Take $\pi = 22/7$.

The smaller piece is the minor segment. Sector = $(90/360) \times (22/7) \times 441 = 346.5$ cm^2. Triangle OAB = $\frac{1}{2} \times 21 \times 21 = 220.5$ cm^2. Segment = $346.5 - 220.5 = 126$ cm^2.

- sector 346.5 cm^2 and triangle 220.5 cm^2 (1)
- smaller piece 126 cm^2 (1)

8. A wedge of cheese has a top face in the shape of a sector of radius 28 mm and angle 90°. Find the length of the curved edge and the area of the top face. Take $\pi = 22/7$. [2]

Arc = $(90/360) \times 2 \times (22/7) \times 28 = 44$ mm. Area = $(90/360) \times (22/7) \times 28^2 = 616$ mm^2.

- arc length 44 mm (1)
- area 616 mm^2 (1)

9. A chord of a circle of radius 12 cm is equal to the radius. Find the area of the minor segment it cuts off. (Take $\pi = 3.14$ and $\sqrt{3} = 1.73$.) [3]

A chord equal to the radius makes an equilateral triangle with the two radii, so it subtends 60°. Sector = $(60/360) \times 3.14 \times 144 = 75.36$ cm^2. Triangle = $(\sqrt{3}/4) \times 144 = 36 \times 1.73 = 62.28$ cm^2. Segment = $75.36 - 62.28 = 13.08$ cm^2.

- angle 60° from the equilateral triangle (1)
- sector 75.36 cm^2 and triangle 62.28 cm^2 (1)
- segment 13.08 cm^2 (1)

10. A lawn sprinkler stands at an outer corner of a building, so the building blocks a 90° part of its turn and it sprays through the rest of the full circle. Its spray reaches 14 m. Find the area watered and the length of the outer edge of the watered region. Take $\pi = 22/7$. [3]

The sprinkler turns through $360° - 90° = 270°$, a major sector. Area = $(270/360) \times (22/7) \times 14^2 = \frac{3}{4} \times 616 = 462$ m^2. Edge = $(270/360) \times 2 \times (22/7) \times 14 = \frac{3}{4} \times 88 = 66$ m.

- angle 270° (1)
- area 462 m^2 (1)
- arc 66 m (1)

11. A circular metal plate of radius 14 cm has two circular holes, each of radius 3.5 cm, punched in it, as in the figure. Find the area of metal left. Take $\pi = 22/7$. [3]

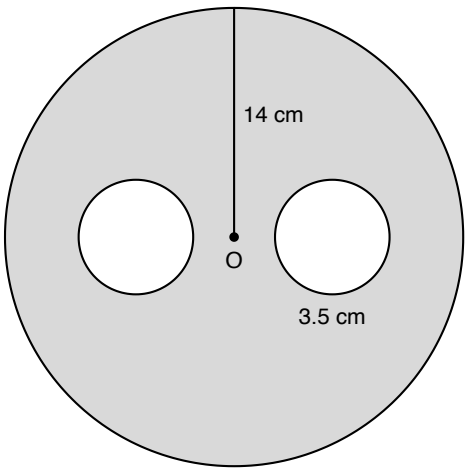


Plate = $(22/7) \times 14^2 = 616$ cm^2. One hole = $(22/7) \times 3.5^2 = 38.5$ cm^2; two holes = 77 cm^2. Metal left = $616 - 77 = 539$ cm^2.

- plate 616 cm^2 (1)
- two holes 77 cm^2 (1)
- metal left 539 cm^2 (1)