Areas Related to Circles

Standard difficulty · 20 questions · 40 marks · Time: 37 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. The area of a sector of angle 135° in a circle of radius 7 cm (π = 22/7) is:
(a) 16 1/2 cm^2 **(b)** 115 1/2 cm^2 **(c)** 154 cm^2 **(d)** 57 3/4 cm^2

2. The length of an arc of angle 270° in a circle of radius 35 cm (π = 22/7) is:
(a) 165 cm **(b)** 330 cm **(c)** 2,887 1/2 cm **(d)** 82 1/2 cm

3. The circumference of a circle is 352 cm (π = 22/7). Its radius is:
(a) 112 cm **(b)** 63 cm **(c)** 176 cm **(d)** 56 cm

4. The minute hand of a clock is 7 cm long. The area it sweeps in 25 minutes (π = 22/7) is:
(a) 18 1/3 cm^2 **(b)** 10 25/36 cm^2 **(c)** 128 1/3 cm^2 **(d)** 64 1/6 cm^2

5. The area of a sector of angle θ in a circle of radius r is:
(a) $(\theta/360) \times \pi r^2$ **(b)** $(\theta/360) \times 2\pi r$ **(c)** $(\theta/180) \times \pi r^2$ **(d)** $\theta \times \pi r^2$

6. A sector of a circle of radius 14 cm has an area of 256 2/3 cm^2 (π = 22/7). Its angle is:
(a) 150° **(b)** 160° **(c)** 300° **(d)** 210°

7. A chord of a circular field of radius 91 m makes a right angle at the centre. The area of the minor segment (π = 22/7) is:
(a) 23,660 m^2 **(b)** 6,506 1/2 m^2 **(c)** 4,140 1/2 m^2 **(d)** 2,366 m^2

8. Assertion (A): An arc of angle 270° in a circle of radius 7 cm is 33 cm long (π = 22/7).
Reason (R): The length of an arc of angle θ is $(\theta/360) \times \pi r^2$.
(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.

Section B — Short answer — 8 × 2 = 16 marks

9. Find the perimeter of a sector of angle 180° in a circle of radius 21 cm (π = 22/7).

10. Find the area of the ring between two concentric circles of radii 21 cm and 14 cm (π = 22/7).

11. A wheel has a diameter of 28 cm. How far does it travel in 650 complete turns (π = 22/7)? Give the answer in metres.

12. Find the area of the major sector of a circle of radius 21 cm when the minor sector has an angle of 90° (π = 22/7).

13. Find the area of a quadrant of a circle whose circumference is 308 cm (π = 22/7).

14. The circumference of a circle is 88 cm. Find its area (π = 22/7).

15. A chord of a circular field of radius 49 m makes a right angle at the centre. Find the area of the major segment (π = 22/7).

16. An umbrella has 6 equally spaced ribs. Taking it as a flat circle of radius 35 cm, find the area between two neighbouring ribs (π = 22/7).

Section C — Word problems — 4 × 4 = 16 marks

17. A horse is tied to a peg at one corner of a square field of side 35 m with a rope 21 m long. (a) What area can it graze? (b) How much more could it graze if the rope were 28 m long? (π = 22/7)

18. A car has two wipers that do not overlap. Each blade is 42 cm long and sweeps through an angle of 105°. Find the total area cleaned at each sweep (π = 22/7).

19. A lighthouse spreads a red warning light over a sector of 100° up to a distance of 28 km. Over what area of sea are ships warned (π = 22/7)?

20. A circular park of radius 35 m has a path 7 m wide around it on the outside. Find the area of the path and the cost of paving it at Rs 41 per m^2 (π = 22/7).

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Answer key

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Q	Answer	Working
1	**(d) 57 3/4 cm^2**	(135/360) × 22/7 × 7^2 = 57 3/4
2	**(a) 165 cm**	(270/360) × 2 × 22/7 × 35 = 165
3	**(d) 56 cm**	2 × 22/7 × r = 352, so r = 56
4	**(d) 64 1/6 cm^2**	25 minutes = 150°; (150/360) × 22/7 × 7^2
5	**(a) (θ/360) × πr^2**	—
6	**(a) 150°**	θ/360 × 22/7 × 14^2 = 256 2/3, so θ = 150
7	**(d) 2,366 m^2**	quadrant − triangle = 6,506 1/2 − 4,140 1/2 = 2366
8	**(c) A is true, but R is false.**	A is true: (270/360) × 2 × 22/7 × 7 = 33. R is false.
9	**108 cm**	2r + arc = 42 + 66
10	**770 cm^2**	22/7 × (21^2 − 14^2) = 770
11	**572 m**	one turn = 22/7 × 28 = 88 cm; 650 turns = 57,200 cm
12	**1,039 1/2 cm^2**	major sector angle = 360° − 90° = 270°
13	**1,886 1/2 cm^2**	r = 49; quadrant = (1/4) × 22/7 × 49^2
14	**616 cm^2**	r = 14; area = 22/7 × 14^2
15	**6,860 m^2**	circle − minor segment = 7,546 − 686
16	**641 2/3 cm^2**	22/7 × 35^2 ÷ 6
17	**(a) 346 1/2 m^2; (b) 269 1/2 m^2 more**	a quadrant each time: (1/4) × 22/7 × r^2
18	**3,234 cm^2**	2 × (105/360) × 22/7 × 42^2
19	**684 4/9 km^2**	(100/360) × 22/7 × 28^2
20	**1,694 m^2; Rs 69,454**	22/7 × (42^2 − 35^2) = 1,694

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