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Areas Related to Circles — CBSE Class 10 Mathematics Chapter Test

FREE CHAPTER TEST · CLASS X · MATHEMATICS (041) · PATTERN OF THE CBSE SAMPLE QUESTION PAPER 2026-27

TIME ALLOWED	MAXIMUM MARKS	QUESTIONS	NAME / ROLL NO.
1½ hours	40	19 (A 10 · B 3 · C 2 · D 2 · E 2)	

GENERAL INSTRUCTIONS

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 19 questions. All questions are compulsory.
2. This question paper is divided into five sections: A, B, C, D and E.
3. In Section A, Questions 1 to 8 are multiple choice questions (MCQs) and Questions 9 and 10 are assertion-reason based questions of 1 mark each.
4. In Section B, Q11–13 are very short answer (VSA) type questions, carrying 2 marks each.
5. In Section C, Q14–15 are short answer (SA) type questions, carrying 3 marks each.
6. In Section D, Q16–17 are long answer (LA) type questions, carrying 5 marks each.
7. In Section E, Q18–19 are case study based questions, carrying 4 marks each, with sub-parts of the values of 1, 1 and 2 marks.
8. There is no overall choice. However, an internal choice has been provided in 1 question of Section B, 1 question of Section C, 1 question of Section D and in the 2-mark sub-part of each question of Section E.
9. Use of calculators is not allowed.
10. This chapter test follows the section structure, question types and marks per question of the CBSE Class X Mathematics (Standard, 041) Sample Question Paper 2026-27, at half the length of the 80-mark board paper: 40 marks in 1½ hours.
11. The answer key and the marking scheme are at the end of this booklet. Attempt the paper in 1½ hours before you look at them.

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Chapter: Areas Related to Circles · **Topics:** Arc length and area of a sector · Area of a segment (60°, 90°, 120°) · Perimeter of a sector · Clocks, umbrellas, wipers and grazing · Combination of plane figures

SECTION A

This section comprises 10 questions of 1 mark each: 8 multiple choice questions (MCQs) and 2 assertion-reason based questions.

1. The area of a sector of a circle of radius 6 cm with central angle 60° is 1

(A) 6π cm^2 (B) 12π cm^2

(C) 3π cm^2 (D) 36π cm^2

2. The length of an arc of a circle of radius 21 cm subtending 60° at the centre is ($\pi = \frac{22}{7}$) 1

(A) 44 cm (B) 22 cm

(C) 11 cm (D) 66 cm

3. The area of a quadrant of a circle of radius 14 cm is ($\pi = \frac{22}{7}$) 1

(A) 616 cm^2 (B) 308 cm^2

(C) 154 cm^2 (D) 44 cm^2

4. The perimeter of a sector of radius 7 cm and central angle 90° is ($\pi = \frac{22}{7}$) 1

(A) 11 cm (B) 22 cm

(C) 18 cm (D) 25 cm

5. The minute hand of a clock is 7 cm long. The area swept by it in 20 minutes is ($\pi = \frac{22}{7}$) 1

(A) $\frac{154}{3}$ cm^2 (B) $\frac{77}{3}$ cm^2

(C) 154 cm^2 (D) $\frac{308}{3}$ cm^2

6. If the circumference and the area of a circle are numerically equal, its radius is 1

(A) 1 unit (B) 2 units

(C) 4 units (D) π units

7. The area of the minor segment of a circle of radius 20 cm, cut off by a chord that subtends a right angle at the centre, is ($\pi = 3.14$) 1

(A) 314 cm^2 (B) 200 cm^2

(C) 114 cm^2 (D) 86 cm^2

8. The ratio of the areas of two sectors of the same circle with central angles 60° and 120° is 1

(A) 2 : 1 (B) 1 : 4

(C) 4 : 1 (D) 1 : 2

9. **Assertion (A):** The area of a sector with central angle 90° is one quarter of the area of the circle. 1

Reason (R): The area of a sector of angle θ is $\frac{\theta}{360°} \times \pi r^2$.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

10. **Assertion (A):** The area of the minor segment of a circle of radius r with central angle 60° is $\frac{\pi}{6} r^2$. 1

Reason (R): The area of a sector of a circle of radius r with central angle 60° is $\frac{\pi}{6} r^2$.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

SECTION B

This section comprises 3 very short answer (VSA) type questions of 2 marks each.

11. (a) Find the area of a sector of a circle of radius 4 cm with central angle 30°. ($\pi = \frac{22}{7}$) 2

OR

(b) Find the area of a quadrant of a circle whose circumference is 22 cm. ($\pi = \frac{22}{7}$)

12. A goat is tied to a peg at one corner of a rectangular field 20 m long and 16 m wide by a rope 6 m long. Find the area of the field over which the goat can graze. (π = 3.14) 2

13. The minute hand of a clock is 21 cm long. Find the area swept by it in 10 minutes. ($\pi = \frac{22}{7}$) 2

SECTION C

This section comprises 2 short answer (SA) type questions of 3 marks each.

14. (a) A chord of a circle of radius 14 cm subtends a right angle at the centre. Find the areas of the minor and the major segments. (π = 3.14) 3

OR

(b) A chord of a circle of radius 12 cm subtends an angle of 60° at the centre. Find the area of the minor segment. (π = 3.14, √3 = 1.73)

15. ABCD is a square of side 28 cm. With centres A, B, C and D, four quadrants of radius 14 cm are drawn inside the square. Find the area of the part of the square not covered by the quadrants. ($\pi = \frac{22}{7}$) 3

SECTION D

This section comprises 2 long answer (LA) type questions of 5 marks each.

16. (a) A chord of a circle of radius 6 cm subtends an angle of 120° at the centre. Find the area of the corresponding minor segment. ($\pi = 3.14$, $\sqrt{3} = 1.73$) 5

OR

(b) In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find (i) the length of the arc, (ii) the area of the sector, (iii) the area of the minor segment. ($\pi = 22/7$, $\sqrt{3} = 1.73$)

17. (i) An umbrella has 10 ribs, equally spaced. Taking it to be a flat circle of radius 42 cm, find the area between two consecutive ribs. (ii) A bus has two wipers that do not overlap, each with a blade 21 cm long, sweeping an angle of 120°. Find the total area cleaned at each sweep. ($\pi = \frac{22}{7}$) 5

SECTION E

This section comprises 2 case study based questions of 4 marks each, with sub-parts of 1, 1 and 2 marks.

18. A circular park has radius 21 m. A flower bed in the shape of a sector with central angle 60° is laid out in it. ($\pi = \frac{22}{7}$)

(i) Find the length of the arc of the flower bed. [1]

(ii) Find the area of the flower bed. [1]

(iii) Find the cost of planting flowers in the bed at ₹ 10 per m². [2]

OR

(iii) Find the length of fencing needed round the flower bed. [2]

19. A pendant is made of silver wire in the form of a circle of diameter 28 mm. The wire is also used to make 4 diameters that divide the circle into 8 equal sectors. ($\pi = \frac{22}{7}$)

(i) Find the circumference of the pendant. [1]

(ii) Find the angle of each sector. [1]

(iii) Find the total length of silver wire used. [2]

OR

(iii) Find the area of each sector. [2]

END OF THE QUESTION PAPER

ANSWER KEY — SECTION A

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(D)

MARKING SCHEME AND WORKED SOLUTIONS

Marks for each step are shown in brackets, as in the CBSE marking scheme. Any correct alternative method earns full marks.

Q1. Answer (A). $(60/360) \times \pi \times 36 = 6\pi$.

Q2. Answer (B). $(60/360) \times 2 \times (22/7) \times 21 = 22$ cm.

Q3. Answer (C). $¼ \times (22/7) \times 196 = 154$ cm².

Q4. Answer (D). Arc 11 cm + 2 × 7 cm = 25 cm.

Q5. Answer (A). In 20 minutes the hand turns 120°: $(120/360) \times (22/7) \times 49 = 154/3$ cm².

Q6. Answer (B). $2\pi r = \pi r^2$ gives r = 2.

Q7. Answer (C). Sector 314 − triangle 200 = 114 cm².

Q8. Answer (D). Areas are in the ratio of the angles.

Q9. Answer (A). $\theta/360° = 90/360 = ¼$. Answer (A).

Q10. Answer (D). $\pi r^2/6$ is the sector; the segment is the sector minus the equilateral triangle $(\sqrt{3}/4)r^2$. A is false, R is true. Answer (D).

Q11. (2 marks) Answer: (a) 88/21 cm²; (b) 77/8 cm².
(a) Area = $(30/360) \times (22/7) \times 16$ [1] = 88/21 cm² (about 4.19 cm²). [1]
OR (b) $2\pi r = 22$ gives r = 3.5 cm. [1] Quadrant = $¼ \times (22/7) \times 12.25 = 77/8$ cm². [1]

Q12. (2 marks) Answer: 28.26 m².
The corner angle is 90° and the rope is shorter than both sides, so the goat grazes a quadrant of radius 6 m. [1] Area = ¼ × 3.14 × 36 = 28.26 m². [1]

Q13. (2 marks) Answer: 231 cm².
In 10 minutes the hand turns 60°. [1] Area = $(60/360) \times (22/7) \times 441 = 231$ cm². [1]

Q14. (3 marks) Answer: (a) 55.86 cm², 559.58 cm²; (b) 13.08 cm².
(a) Sector = ¼ × 3.14 × 196 = 153.86 cm²; triangle = ½ × 14 × 14 = 98 cm². [1] Minor segment = 55.86 cm². [1] Major segment = 615.44 − 55.86 = 559.58 cm². [1]
OR (b) Sector = $(60/360) \times 3.14 \times 144 = 75.36$ cm². [1] The triangle is equilateral: $(\sqrt{3}/4) \times 144 = 36 \times 1.73 = 62.28$ cm². [1] Segment = 13.08 cm². [1]

Q15. (3 marks) Answer: 168 cm².
Four quadrants of radius 14 cm make one full circle: $(22/7) \times 196 = 616$ cm². [1½] Area left = 784 − 616 = 168 cm². [1½]

Q16. (5 marks) Answer: (a) 22.11 cm²; (b) 22 cm, 231 cm², 40.27 cm².
(a) Sector = $(120/360) \times 3.14 \times 36 = 37.68$ cm². [2] Draw OM ⊥ AB: OM = 3 cm, AM = $3\sqrt{3}$ cm, so triangle OAB = $½ \times 6\sqrt{3} \times 3 = 9\sqrt{3} = 15.57$ cm². [2] Segment = 37.68 − 15.57 = 22.11 cm². [1]
OR (b) (i) Arc = $(60/360) \times 2 \times (22/7) \times 21 = 22$ cm. [1] (ii) Sector = $(60/360) \times (22/7) \times 441 = 231$ cm². [2] (iii) The triangle is equilateral: $(\sqrt{3}/4) \times 441 = 190.7325$ cm²; segment = 231 − 190.7325 = 40.2675 cm², i.e. about 40.27 cm². [2]

Q17. (5 marks) Answer: (i) 554.4 cm²; (ii) 924 cm².
(i) Each part is a sector of angle 360°/10 = 36°: (36/360) × (22/7) × 1764 [1] = 554.4 cm². [1½]
(ii) 2 × (120/360) × (22/7) × 441 [1] = 924 cm². [1½]

Q18. (4 marks) Answer: (i) 22 m; (ii) 231 m²; (iii) ₹ 2310, or 64 m.
(i) (60/360) × 2 × (22/7) × 21 = 22 m. [1]
(ii) (60/360) × (22/7) × 441 = 231 m². [1]
(iii)(a) 231 × 10 [1] = ₹ 2310. [1]
OR (iii)(b) Arc + two radii = 22 + 42 [1] = 64 m. [1]

Q19. (4 marks) Answer: (i) 88 mm; (ii) 45°; (iii) 200 mm, or 77 mm².
(i) (22/7) × 28 = 88 mm. [1]
(ii) 360°/8 = 45°. [1]
(iii)(a) 88 + 4 × 28 [1] = 200 mm. [1]
OR (iii)(b) (1/8) × (22/7) × 14² [1] = 77 mm². [1]

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