Class 10 Maths Chapter 11: Areas Related to Circles - Notes, Important Questions and MCQs (2026-27)

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These Areas Related to Circles Class 10 notes cover NCERT Class 10 Maths Chapter 11: circumference and area of a circle, length of an arc, area of a sector and area of a segment – with a formula table, real-life solved problems (clock hands, wipers, grazing animals), 10 MCQs and a free PDF.

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Chapter Overview

A sector is the region between two radii and the arc they cut off; a segment is the region between a chord and its arc. The smaller ones are minor and the larger ones major.

For an angle θ (in degrees) at the centre of a circle of radius r, the arc length is $(\theta/360) \times 2\pi r$ and the sector area is $(\theta/360) \times \pi r^2$. The area of a minor segment is the sector area minus the area of the triangle formed by the two radii and the chord.

Important Topics and Concepts

Circle Basics

- Circumference = $2\pi r = \pi d$.

- Area = πr^2.
- Take $\pi = 22/7$ or 3.14 as instructed.
- Distance covered in one revolution of a wheel = its circumference.

Arc and Sector

- Length of arc = $(\theta/360) \times 2\pi r$.
- Area of sector = $(\theta/360) \times \pi r^2 = \frac{1}{2} \times$ arc length $\times r$.
- Major sector area = $\pi r^2 -$ minor sector area.
- A quadrant is a sector with $\theta = 90°$.

Segment

- Area of minor segment = area of sector − area of $\triangle OAB$.
- For $\theta = 60°$, $\triangle OAB$ is equilateral: area = $(\sqrt{3}/4)\, r^2$.
- For $\theta = 90°$, $\triangle OAB$ is right-angled: area = $\frac{1}{2} r^2$.
- For $\theta = 120°$, area of $\triangle OAB = (\sqrt{3}/4)\, r^2$ (using $\frac{1}{2} r^2 \sin 120°$).
- Area of major segment = πr^2 − area of minor segment.

Solved Examples

Board-pattern problems with full working.

- Find the arc length and sector area for r = 21 cm, $\theta = 60°$ ($\pi = 22/7$). Arc = $(60/360) \times 2 \times (22/7) \times 21 = 22$ cm. Sector = $(1/6) \times (22/7) \times 441 = 231$ cm².
- The minute hand of a clock is 14 cm long. Find the area swept in 5 minutes. $\theta = 30°$: $(30/360) \times (22/7) \times 196 = 154/3 \approx 51.33$ cm².
- A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the minor and major segment areas ($\pi = 3.14$). Sector = 78.5 cm²; triangle = 50 cm²; minor segment = 28.5 cm²; major segment = 314 − 28.5 = 285.5 cm².
- A horse is tied to a peg at one corner of a 15 m square field by a 5 m rope. Find the area it can graze ($\pi = 3.14$). Quadrant: $(1/4) \times 3.14 \times 25 = 19.625$ m².

Minor vs Major

Quick comparison.

Part	Angle	Formula
Minor sector	θ	$(\theta/360)\, \pi r^2$
Major sector	$360° - \theta$	πr^2 − minor sector
Minor segment	θ	sector − triangle
Major segment	—	πr^2 − minor segment

Key Formulas at a Glance

Quantity	Formula
Circumference	$2\pi r$
Area of circle	πr^2

Quantity	Formula
Length of arc	$(\theta/360) \times 2\pi r$
Area of sector	$(\theta/360) \times \pi r^2$
Area of minor segment	$(\theta/360)\ \pi r^2 -$ area of $\triangle$
Equilateral $\triangle$ ($\theta = 60°$)	$(\sqrt{3}/4)\ r^2$

Important Formulas and Definitions

Formula / Term	Meaning / Use
Sector	Region bounded by two radii and an arc
Segment	Region bounded by a chord and an arc
Arc	Part of the circumference
Minor arc/sector/segment	The smaller part
Major arc/sector/segment	The larger part
Quadrant	Sector with central angle 90°
Central angle	Angle subtended by an arc at the centre

Short Answer Questions

Q1. Find the area of a sector of radius 6 cm with angle 60° ($\pi = 22/7$).

$(60/360) \times (22/7) \times 36 = 132/7\ cm^2 \approx 18.86\ cm^2$.

Q2. Find the area of a quadrant of a circle whose circumference is 22 cm.

$2\pi r = 22 \rightarrow r = 7/2$. Quadrant $= (1/4) \times (22/7) \times (49/4) = 77/8\ cm^2$.

Q3. Find the length of an arc of a circle of radius 14 cm subtending 90°.

$(90/360) \times 2 \times (22/7) \times 14 = 22$ cm.

Q4. An umbrella has 8 equally spaced ribs. Treating it as a flat circle of radius 45 cm, find the area between two consecutive ribs.

$(1/8) \times (22/7) \times 2025 = 22275/28 \approx 795.54\ cm^2$.

Q5. A car has two wipers that do not overlap. Each blade is 25 cm long and sweeps 115°. Find the total area cleaned.

$2 \times (115/360) \times (22/7) \times 625 = 158125/126 \approx 1254.96\ cm^2$.

Q6. A lighthouse spreads a red beam over a sector of 80° to a distance of 16.5 km. Find the area of sea over which ships are warned ($\pi = 3.14$).

$(80/360) \times 3.14 \times 272.25 \approx 189.97\ km^2$.

Q7. If the perimeter and area of a circle are numerically equal, find the radius.

$2\pi r = \pi r^2 \rightarrow r = 2$ units.

Q8. Find the area of a sector whose arc length is 22 cm and radius 10 cm.

Area $= ½ \times l \times r = ½ \times 22 \times 10 = 110\ cm^2$.

Long Answer Questions

Q1. A chord of a circle of radius 15 cm subtends 60° at the centre. Find the areas of the minor and major segments (π = 3.14, √3 = 1.73).

Sector area = (60/360) × 3.14 × 225 = 117.75 cm².

△OAB is equilateral: area = (1.73/4) × 225 ≈ 97.31 cm².

Minor segment = 117.75 − 97.31 = 20.44 cm².

Circle area = 3.14 × 225 = 706.5 cm².

Major segment = 706.5 − 20.44 = 686.06 cm².

Q2. A chord of a circle of radius 12 cm subtends 120° at the centre. Find the area of the minor segment (π = 3.14, √3 = 1.73).

Sector area = (120/360) × 3.14 × 144 = 150.72 cm².

Area of △OAB = ½ r² sin 120° = ½ × 144 × (√3/2) = 36√3 ≈ 62.28 cm².

Minor segment = 150.72 − 62.28 = 88.44 cm².

So the minor segment is about 88.44 cm².

(Draw the perpendicular from O to the chord if you prefer finding base and height.)

Q3. The length of the minute hand of a clock is 7 cm. Find the area swept by it between 9:00 a.m. and 9:35 a.m.

In 60 minutes the hand turns 360°, so in 35 minutes it turns 210°.

Area = (210/360) × (22/7) × 49.

= (7/12) × 154.

= 89.83 cm² (approximately).

Area swept ≈ 89.83 cm².

MCQs with Answers

1. Area of a sector of angle θ is(a) (θ/360) × 2πr (b) (θ/360) × πr² (c) (θ/180) × πr² (d) πr²θAnswer: (b) (θ/360) × πr²

2. Length of arc of angle θ is(a) (θ/360) × 2πr (b) (θ/360) × πr² (c) 2πrθ (d) πr/θAnswer: (a) (θ/360) × 2πr

3. Area of a quadrant of a circle of radius 14 cm (π = 22/7) is(a) 154 cm² (b) 616 cm² (c) 77 cm² (d) 44 cm²Answer: (a) 154 cm²

4. If the circumference of a circle is 44 cm, its radius is(a) 7 cm (b) 14 cm (c) 22 cm (d) 3.5 cmAnswer: (a) 7 cm

5. Area of minor segment =(a) sector + triangle (b) sector − triangle (c) circle − sector (d) triangle − sectorAnswer: (b) sector − triangle

6. The angle swept by a minute hand in 20 minutes is(a) 60° (b) 90° (c) 120° (d) 180°Answer: (c) 120°

7. If perimeter and area of a circle are numerically equal, r =(a) 1 (b) 2 (c) 4 (d) πAnswer: (b) 2

9. A circle of radius 7 cm has area (π = 22/7)(a) 44 cm² (b) 154 cm² (c) 49 cm² (d) 22 cm²Answer: (b) 154 cm²

10. For θ = 60°, the triangle formed by two radii and the chord is(a) right-angled (b) equilateral (c) obtuse (d) scaleneAnswer: (b) equilateral

Quick Revision Points

- C = 2πr; A = πr².
- Arc = (θ/360) 2πr; sector = (θ/360) πr² = ½ lr.
- Minor segment = sector − △; major = circle − minor.
- θ = 60° → equilateral △ (√3/4 r²); θ = 90° → ½ r².
- Minute hand: 6° per minute.
- Use the π value stated in the question.

Chapter Summary

Areas Related to Circles extends circumference and area to parts of a circle. An arc of angle θ has length (θ/360) × 2πr and the corresponding sector has area (θ/360) × πr².

A segment’s area is the sector minus the triangle formed by the radii and chord; major parts are found by subtracting from the whole circle. These formulas solve real problems involving clock hands, wipers, umbrellas, lighthouses and grazing animals.

Exam Tips and PYQ Pattern

- Sector and segment questions appear every year (2–3 marks).
- Note the π and √3 values given in the question and use them consistently.
- Convert minutes on a clock to degrees: 1 minute = 6°.
- Draw the figure and shade the required region before calculating.
- Combination-of-figures questions are not in the 2026-27 syllabus.

Frequently Asked Questions

Is this chapter in the 2026-27 CBSE syllabus?

Yes. It is part of the NCERT Class 10 Mathematics textbook and the rationalised CBSE syllabus for 2026-27.

Can I download these notes as a PDF?

Yes. Use the free PDF link at the top of this page – no signup needed.

What is the formula for area of a sector?

Area = (θ/360) × πr², where θ is the central angle in degrees.

How do you find the area of a segment?

Area of minor segment = area of sector − area of the triangle formed by the two radii and the chord.

Conclusion

Areas Related to Circles is formula-based and highly scoring. Learn the formula table, practise the real-life solved problems here, and keep the free PDF for revision.

More Notes: Class 10 Maths Chapter 10: Circles notes | Class 10 Maths Chapter 12: Surface Areas and Volumes notes | All Class 10 Maths notes

Author Bio: Written and reviewed by the Nextoper Editorial Team, a group of CBSE mathematics educators who build chapter notes directly from the NCERT textbook and past board paper patterns.

Freshness Note: These notes follow the NCERT Class 10 Maths textbook, Mathematics (Reprint 2026-27), and the CBSE syllabus for the 2026-27 session. Last checked on 16 November 2026.