Class 9 Maths Chapter 6: Measuring Space: Perimeter and Area - Notes, Important Questions and MCQs (2026-27)

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These Class 9 Maths Chapter 6 notes cover “Measuring Space: Perimeter and Area” from the new NCERT textbook Ganita Manjari (Part I, 2026-27): perimeters of polygons and circles, the story of π, arc length, areas of rectangles, parallelograms, triangles and circles, sector area, Heron’s formula and Brahmagupta’s formula for cyclic quadrilaterals – with a formula table, solved examples, Q&A, 10 MCQs and a free PDF.

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Chapter Overview

Perimeter is the total length of the boundary of a shape, and area is the amount of surface it covers. For circles, the ratio of circumference to diameter is always the same number π, approximately 22/7 or 3.14, which mathematicians from Mesopotamia, Greece, China and India tried to estimate ever more accurately.

The chapter builds area formulas step by step – from rectangles to parallelograms, triangles and circles – and introduces formulas that need only side lengths: Heron’s formula for triangles and Brahmagupta’s formula for cyclic quadrilaterals.

Important Topics and Concepts

Perimeter

- Perimeter = sum of all side lengths.
- Square of side a: 4a; rectangle a × b: 2(a + b).
- Circumference of a circle: C = 2πr = πd.
- Arc length for central angle θ: l = 2πr × θ/360°.

The Story of π

- π = circumference ÷ diameter, the same for every circle.
- Archimedes: 3 10/71 < π < 3 1/7; Zu Chongzhi: π ≈ 355/113.
- Āryabhaṭa: π ≈ 3.1416; Brahmagupta used √10 for convenience.
- Mādhava gave the exact series π = 4(1 – 1/3 + 1/5 – 1/7 + ...).
- π is irrational.

Areas of Rectangles, Parallelograms and Triangles

- Rectangle: length × breadth.
- Parallelogram: base × height (it can be cut and rearranged into a rectangle).
- Triangle: ½ × base × height (half of a parallelogram).
- A median divides a triangle into two triangles of equal area.

Heron’s Formula

- For a triangle with sides a, b, c, semi-perimeter s = (a + b + c)/2.
- Area = √[s(s – a)(s – b)(s – c)].
- Useful when the height is not known.
- Example: sides 13, 14, 15 → s = 21, area = √(21 × 8 × 7 × 6) = 84.

Circles, Sectors and Cyclic Quadrilaterals

- Area of a circle: πr².
- Area of a sector with angle θ: πr² × θ/360°.
- Brahmagupta’s formula for a cyclic quadrilateral with sides a, b, c, d: area = √[(s – a)(s – b)(s – c)(s – d)], where s = (a + b + c + d)/2.
- Puzzles and paradoxes show that shapes with the same perimeter can have different areas.

Solved Examples

Board-pattern practice (π = 22/7).

- Circumference of a circle of radius 14 cm. 2 × 22/7 × 14 = 88 cm.
- Arc length for r = 21 cm, θ = 60°. 2 × 22/7 × 21 × 60/360 = 22 cm.
- Area of sector, r = 7 cm, θ = 90°. 22/7 × 49 × ¼ = 38.5 cm².
- Area of triangle with sides 5, 12, 13. s = 15; √(15 × 10 × 3 × 2) = √900 = 30 cm².
- Area of an equilateral triangle of side 6 cm by Heron. s = 9; √(9 × 3 × 3 × 3) = √243 = 9√3 cm².

Formula Sheet

Shape	Perimeter	Area
Square (side a)	4a	a^2
Rectangle (a × b)	2(a + b)	ab
Parallelogram	sum of sides	base × height
Triangle	a + b + c	½bh or √[s(s–a)(s–b)(s–c)]
Circle (radius r)	2πr	πr^2
Arc / sector (θ)	2πr × θ/360°	πr^2 × θ/360°
Cyclic quadrilateral	a + b + c + d	√[(s–a)(s–b)(s–c)(s–d)]

Important Terms and Formulas

Term	Meaning
Perimeter	Total boundary length
Area	Surface enclosed by a shape
π	Circumference ÷ diameter ≈ 3.14
Circumference	2πr
Arc length	2πr × θ/360°
Sector	Region between two radii and an arc
Semi-perimeter	s = half the perimeter
Heron’s formula	√[s(s–a)(s–b)(s–c)]
Brahmagupta’s formula	√[(s–a)(s–b)(s–c)(s–d)] for cyclic quadrilateral
Median	Joins a vertex to the midpoint of the opposite side

Short Answer Questions

Q1. What is π?

The constant ratio of the circumference of a circle to its diameter, about 3.14 or 22/7.

Q2. Find the circumference of a circle of diameter 35 cm.

πd = 22/7 × 35 = 110 cm.

Q3. Write the formula for arc length.

l = 2πr × θ/360°.

Q4. Why is the area of a parallelogram base × height?

It can be cut and rearranged into a rectangle with the same base and height.

Q5. State Heron’s formula.

Area = √[s(s – a)(s – b)(s – c)], where s = (a + b + c)/2.

Q6. Find the area of a circle of radius 7 cm.

Q7. Who gave the series π = 4(1 – 1/3 + 1/5 – …)?

Mādhava of Sangamagrāma.

Q8. What does a median do to the area of a triangle?

It divides it into two triangles of equal area.

Long Answer Questions

Q1. Find the area of a triangular park with sides 50 m, 120 m and 130 m.

s = (50 + 120 + 130)/2 = 150 m.

s – a = 100, s – b = 30, s – c = 20.

Area = √(150 × 100 × 30 × 20).

= √9000000 = 3000 m².

Check: $50^2 + 120^2 = 130^2$, so ½ × 50 × 120 = 3000 ✓.

Q2. A sector of a circle of radius 14 cm has angle 45°. Find its arc length, perimeter and area.

Arc = 2 × 22/7 × 14 × 45/360 = 11 cm.

Perimeter = 11 + 14 + 14 = 39 cm.

Area = 22/7 × 196 × 45/360.

= 616 × 1/8 = 77 cm².

Use π = 22/7 throughout.

Q3. Use Brahmagupta’s formula to find the area of a cyclic quadrilateral with sides 6, 6, 6, 6 cm (a square).

s = (6 + 6 + 6 + 6)/2 = 12.

s – a = 6 for each side.

Area = √(6 × 6 × 6 × 6) = 36 cm².

This matches 6^2 for a square.

The formula works only for cyclic quadrilaterals.

MCQs with Answers

1. Circumference of circle radius 7 cm (π = 22/7)(a) 22 cm (b) 44 cm (c) 154 cm (d) 14 cmAnswer: (b) 44 cm

2. Area of circle radius 14 cm(a) 616 cm² (b) 308 cm² (c) 88 cm² (d) 154 cm²Answer: (a) 616 cm²

3. Semi-perimeter of triangle 7, 8, 9(a) 12 (b) 24 (c) 8 (d) 9Answer: (a) 12

4. Area of triangle 3, 4, 5(a) 6 (b) 12 (c) 10 (d) 7.5Answer: (a) 6

5. Āryabhaṭa’s value of π(a) 3.14 (b) 3.1416 (c) 22/7 (d) √10Answer: (b) 3.1416

6. Sector area formula(a) πr² (b) 2πr (c) πr² × θ/360° (d) πr × θAnswer: (c) πr² × θ/360°

8. Brahmagupta’s formula is for(a) any quadrilateral (b) cyclic quadrilateral (c) triangle (d) circleAnswer: (b) cyclic quadrilateral

9. π is(a) rational (b) irrational (c) integer (d) exactly 22/7Answer: (b) irrational

10. Arc of 90° in circle radius 14 cm(a) 11 cm (b) 22 cm (c) 44 cm (d) 88 cmAnswer: (b) 22 cm

Quick Revision Points

- Perimeter: boundary; area: surface.
- C = 2πr; arc = 2πr·θ/360°.
- π history: Archimedes, Zu Chongzhi, Āryabhaṭa, Mādhava; π irrational.
- Rectangle, parallelogram, triangle areas.
- Heron: √[s(s–a)(s–b)(s–c)].
- Circle πr²; sector πr²·θ/360°; Brahmagupta for cyclic quadrilaterals.

Chapter Summary

Perimeter measures a boundary and area measures surface. For circles, π – the constant ratio of circumference to diameter – gives C = 2πr and area πr², and fractions of these give arc length and sector area. Mathematicians across cultures, including Āryabhaṭa and Mādhava, refined the value of π, which is irrational.

Areas of parallelograms and triangles follow from the rectangle, and Heron’s formula gives a triangle’s area from its sides alone. Brahmagupta’s formula does the same for cyclic quadrilaterals.

Exam Tips and PYQ Pattern

- Keep the formula sheet handy and revise daily.
- Write s first when using Heron’s formula.
- Use π = 22/7 when radius is a multiple of 7.
- Check right triangles with Baudhāyana–Pythagoras.
- Include units (cm, cm²) in every answer.

Frequently Asked Questions

Is this chapter in the 2026-27 CBSE syllabus?

Yes. It is part of the new NCERT Class 9 Maths textbook “Ganita Manjari” (Part I), prescribed for the 2026-27 session.

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 Heron’s formula?

Area of a triangle = √[s(s – a)(s – b)(s – c)], where s is the semi-perimeter.

How do you find the area of a sector?

Conclusion

Measuring Space brings together perimeter, area and the fascinating story of π. Learn the formula sheet, practise the solved examples here and save the free PDF for revision.

More Notes: Class 9 Maths Chapter 5: I’m Up and Down, and Round and Round notes | Class 9 Maths Chapter 7: The Mathematics of Maybe: Introduction to Probability notes | All Class 9 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 9 Maths textbook, Ganita Manjari (Parts I and II, first edition 2026, NCF-SE 2023), and the CBSE syllabus for the 2026-27 session. Last checked on 24 November 2026.