Class 9 Maths Chapter 12: Quadrilaterals - Notes, Important Questions and MCQs (2026-27)

Free PDF notes from Nextoper.in | Session 2026-27 | Read online:
https://nextoper.in/class-9-maths-chapter-12-pdf-notes/

These Class 9 Maths Chapter 12 notes (Part II, Chapter 12) cover “Quadrilaterals” from the new NCERT textbook Ganita Manjari (Part II, 2026-27): the precise definition of a quadrilateral, convex and concave quadrilaterals, properties of parallelograms and their converses, the Midpoint Theorem and its converse, medians and the centroid, the midpoint parallelogram and tiling the plane – with theorem tables, proofs, Q&A, 10 MCQs and a free PDF.

Use the table of contents below to jump to the part you need, or read top to bottom for a complete revision of the chapter.

Table of Contents

- Chapter Overview
- Important Topics and Concepts
- Solved Examples
- Parallelogram: Properties and Tests
- Important Terms and Formulas
- Short Answer Questions
- Long Answer Questions
- MCQs with Answers
- Quick Revision Points
- Chapter Summary
- Exam Tips and PYQ Pattern
- Frequently Asked Questions
- Conclusion

Want notes for every chapter? Explore the full Class 9 Maths notes on Nextoper, arranged book-wise and chapter-wise.

Chapter Overview

A quadrilateral is formed by four points, no three collinear, joined in order so that the sides meet only at their endpoints. It is convex if every interior angle is less than 180° (equivalently, its diagonals intersect).

Parallelograms have equal opposite sides, equal opposite angles and diagonals that bisect each other – and each of these properties, if true for a quadrilateral, makes it a parallelogram. Parallelograms help prove the Midpoint Theorem, which in turn shows that the medians of a triangle meet at the centroid in a 2 : 1 ratio and that the midpoints of any quadrilateral form a parallelogram.

Important Topics and Concepts

What is a Quadrilateral?

- Four distinct points A, B, C, D, no three collinear, joined by segments AB, BC, CD, DA.
- Each point other than the vertices lies on exactly one side (sides do not cross).
- Convex: all interior angles < 180°, diagonals intersect inside.
- Concave: one interior angle > 180° (a “dent”); diagonals do not intersect.

Parallelograms and Their Tests

- Definition: both pairs of opposite sides parallel.
- Properties: opposite sides equal, opposite angles equal, diagonals bisect each other, each diagonal divides it into two congruent triangles.
- Converses (tests): a quadrilateral is a parallelogram if (i) opposite sides are equal, or (ii) opposite angles are equal, or (iii) diagonals bisect each other, or (iv) one pair of opposite sides is equal and parallel.
- Proofs use congruent triangles and alternate angles with a diagonal as transversal.

Midpoint Theorem

- The segment joining the midpoints of two sides of a triangle is parallel to the third side and half its length.
- Converse: a line through the midpoint of one side, parallel to a second side, bisects the third side.
- Proof idea: extend the midpoint segment to form a parallelogram and use congruent triangles.

Medians and the Centroid

- A median joins a vertex to the midpoint of the opposite side.
- The three medians of a triangle are concurrent – they meet at the centroid.
- The centroid divides each median in the ratio 2 : 1 (from vertex to midpoint).
- Proved using the Midpoint Theorem.

Midpoint Parallelogram and Tiling

- Joining the midpoints of the sides of any quadrilateral (even concave) always gives a parallelogram (Varignon’s result).
- Its sides are parallel to the diagonals and half their lengths.
- Any quadrilateral can tile the plane: rotate copies by 180° about midpoints of sides so that the four angles (sum 360°) meet at each vertex.

Solved Examples

Board-pattern practice.

- In $\triangle ABC$, D and E are midpoints of AB and AC; BC = 14 cm. Find DE. DE = 7 cm and DE $\parallel$ BC.
- In parallelogram PQRS, $\angle P = 70°$. Find the other angles. $\angle R = 70°$, $\angle Q = \angle S = 110°$.
- Median AD = 12 cm; G is the centroid. Find AG and GD. AG = 8 cm, GD = 4 cm.
- Diagonals of a quadrilateral bisect each other. What is it? A parallelogram.

- A quadrilateral has diagonals 10 cm and 16 cm. Perimeter of its midpoint parallelogram?
  2(5 + 8) = 26 cm.

Parallelogram: Properties and Tests

Property of a parallelogram	Converse test (true)
Opposite sides are equal	If opposite sides are equal → parallelogram
Opposite angles are equal	If opposite angles are equal → parallelogram
Diagonals bisect each other	If diagonals bisect each other → parallelogram
Opposite sides parallel and equal	If one pair is equal and parallel → parallelogram
Adjacent angles supplementary	—

Important Terms and Formulas

Term	Meaning
Quadrilateral	Four-sided closed figure with non-crossing sides
Convex quadrilateral	All interior angles < 180°
Concave quadrilateral	One interior angle > 180°
Parallelogram	Both pairs of opposite sides parallel
Midpoint Theorem	Midpoint segment ∥ third side, = ½ of it
Median	Vertex to midpoint of opposite side
Centroid	Meeting point of medians; 2 : 1 ratio
Concurrent lines	Lines passing through one point
Midpoint parallelogram	Formed by joining midpoints of a quadrilateral
Tiling	Covering a plane without gaps or overlaps

Short Answer Questions

Q1. When is a quadrilateral convex?

When all its interior angles are less than 180° (its diagonals intersect).

Q2. State any two properties of a parallelogram.

Opposite sides are equal; diagonals bisect each other.

Q3. State the Midpoint Theorem.

The segment joining the midpoints of two sides of a triangle is parallel to the third side and half of it.

Q4. State the converse of the Midpoint Theorem.

A line through the midpoint of one side parallel to another side bisects the third side.

Q5. In what ratio does the centroid divide a median?

2 : 1 from the vertex.

A parallelogram.

Q7. If one pair of opposite sides is equal and parallel, what is the quadrilateral?

A parallelogram.

Q8. Can every quadrilateral tile the plane?

Yes, using copies rotated 180° about side midpoints.

Long Answer Questions

Q1. Prove that the diagonals of a parallelogram bisect each other.

Let diagonals AC and BD of parallelogram ABCD meet at O.

AB ∥ CD, so ∠OAB = ∠OCD and ∠OBA = ∠ODC (alternate angles).

AB = CD (opposite sides).

So △OAB ≅ △OCD (ASA).

Hence OA = OC and OB = OD.

Q2. Prove the Midpoint Theorem.

In △ABC, D and E are midpoints of AB and AC; extend DE to F with EF = DE.

△ADE ≅ △CFE (SAS), so CF = AD = DB and CF ∥ AB.

So DBCF has a pair of opposite sides equal and parallel – a parallelogram.

Hence DF ∥ BC and DF = BC.

DE = ½DF = ½BC and DE ∥ BC.

Q3. Show that joining the midpoints of any quadrilateral gives a parallelogram.

Let P, Q, R, S be midpoints of AB, BC, CD, DA.

In △ABC, PQ ∥ AC and PQ = ½AC (Midpoint Theorem).

In △ADC, SR ∥ AC and SR = ½AC.

So PQ = SR and PQ ∥ SR.

Hence PQRS is a parallelogram.

MCQs with Answers

1. A convex quadrilateral has all angles(a) < 180° (b) > 180° (c) = 90° (d) = 180°Answer: (a) < 180°

2. Diagonals of a parallelogram(a) are equal (b) bisect each other (c) are perpendicular always (d) do not meetAnswer: (b) bisect each other

3. Midpoint segment of a triangle is(a) equal to third side (b) half the third side (c) double (d) unrelatedAnswer: (b) half the third side

4. Centroid divides a median in ratio(a) 1 : 1 (b) 2 : 1 (c) 3 : 1 (d) 1 : 2 from vertexAnswer: (b) 2 : 1

6. Midpoints of any quadrilateral form a(a) square (b) rectangle (c) parallelogram (d) trapeziumAnswer: (c) parallelogram

7. If ∠A = 65° in parallelogram ABCD, ∠B =(a) 65° (b) 115° (c) 25° (d) 90°Answer: (b) 115°

8. Medians of a triangle are(a) parallel (b) concurrent (c) perpendicular (d) equalAnswer: (b) concurrent

9. DE joins midpoints of AB, AC; BC = 18 cm; DE =(a) 9 cm (b) 18 cm (c) 36 cm (d) 6 cmAnswer: (a) 9 cm

10. A quadrilateral with one angle > 180° is(a) convex (b) concave (c) parallelogram (d) rectangleAnswer: (b) concave

Quick Revision Points

- Quadrilateral definition; convex vs concave.
- Parallelogram properties and four converse tests.
- Midpoint Theorem and converse.
- Medians concurrent at centroid; 2 : 1.
- Midpoint parallelogram (sides ∥ diagonals, half length).
- Any quadrilateral tiles the plane.

Chapter Summary

A quadrilateral has four vertices joined by non-crossing sides; it is convex when all angles are below 180°. Parallelograms have equal opposite sides and angles and diagonals that bisect each other, and each of these conditions alone guarantees a parallelogram.

The Midpoint Theorem states that the segment joining midpoints of two sides of a triangle is parallel to and half the third side. It shows that medians meet at the centroid in a 2 : 1 ratio, that the midpoints of any quadrilateral form a parallelogram, and helps explain why any quadrilateral can tile the plane.

Exam Tips and PYQ Pattern

- Learn each parallelogram property with its converse.
- Draw the construction (extend to F) for the Midpoint Theorem proof.
- Use 2 : 1 directly in centroid numericals.
- Name congruence criteria (SAS, ASA, SSS) in proofs.
- Practise drawing midpoint parallelograms.

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 II), prescribed for the 2026-27 session.

Can I download these notes as a PDF?

What is the Midpoint Theorem?

The line joining the midpoints of two sides of a triangle is parallel to the third side and half its length.

How can you prove a quadrilateral is a parallelogram?

Show opposite sides equal, or opposite angles equal, or diagonals bisect each other, or one pair of opposite sides equal and parallel.

Conclusion

Quadrilaterals connects parallelograms, the Midpoint Theorem and the centroid. Learn the property table, practise the proofs here and save the free PDF for revision.

More Notes: Class 9 Maths Chapter 11: The World of Algorithms notes | Class 9 Maths Chapter 13: Two Variables, One Line 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.