Mathematics — Ganita Manjari

Chapter 12 Test 9

Quadrilaterals

Class IX | 2026–27

Time Allowed: 45 Minutes | Maximum Marks: 25

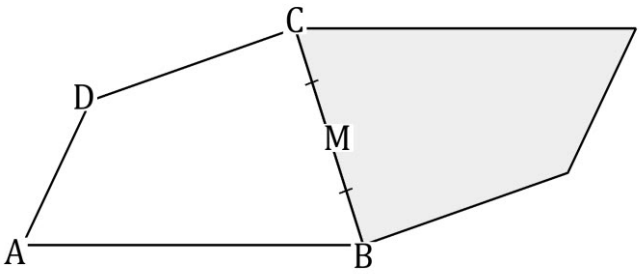
General Instructions

1. All 13 questions are compulsory. Choose one option in A; show working in B–D.
2. No calculators. Give exact answers unless an approximation is requested.
3. Figures are not necessarily to scale. Give reasons for geometrical conclusions.

SECTION A

(5 questions × 1 mark = 5 marks)

1. The second tile in figure is obtained by a half-turn about M, the midpoint of BC. Which original vertex moves onto B?



(A) A (B) B
(C) C (D) D

2. How many diagonals can be drawn from one vertex of a convex nine-sided polygon?

(A) 5 (B) 6
(C) 7 (D) 9

3. Which set can be the four side lengths of a quadrilateral?

(A) 1, 2, 3, 6 (B) 2, 3, 4, 8
(C) 2, 3, 4, 10 (D) 1, 1, 2, 4

4. A convex polygon's interior angles total 900°. How many sides does it have?

(A) 7 (B) 8
(C) 9 (D) 10

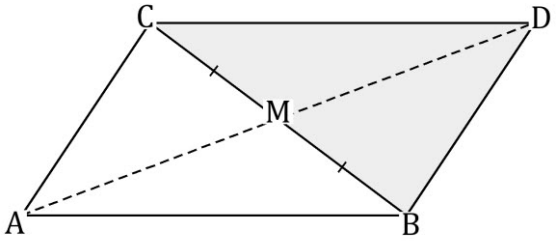
5. Four tiles fit around one vertex without an angular gap. What must still be checked to prove a plane tiling?

(A) Every tile is a rectangle (B) All corner angles are equal
(C) Every edge is vertical or horizontal (D) No gaps or overlaps anywhere

SECTION B

(4 questions × 2 marks = 8 marks)

6. In figure, $\triangle DCB$ is a half-turned copy of $\triangle ABC$ about midpoint M of BC. Explain why $ABDC$ is a parallelogram and how this gives a triangle tiling.



7. Derive the total number of diagonals of a convex n-gon. Explain why division by 2 is necessary.

8. A convex polygon has 20 diagonals. Find its number of sides.

9. Three sides of a quadrilateral are 2 cm, 5 cm and 11 cm. Find the possible range of its fourth side x. Is $x = 4$ allowed?

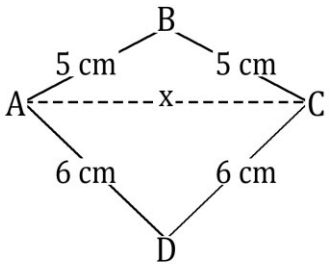
SECTION C

(3 questions × 3 marks = 9 marks)

10. Prove the interior-angle sum formula for a convex n-gon, then find n if each interior angle is 150°.

11. A vertex is inserted between adjacent vertices of a convex n-gon, forming a convex $(n + 1)$-gon. Explain geometrically how many new diagonals appear.

12. The side lengths of $ABCD$ are marked in figure. Find all possible lengths of diagonal AC and explain why the endpoints of your range are excluded.



SECTION D

(1 application question × 3 marks = 3 marks)

13. Two regular octagon corners meet at a point in an edge-to-edge tiling design. Find the angle and number of sides of a regular tile filling the remaining gap. Could a third octagon fill it?