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# SOLUTIONS: CHAPTER TEST - QUADRILATERALS

Mathematics | Class IX (2026/QUAD/09/NCERT/001)

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## Section A: Multiple Choice Questions

1. **Answer: (c)  $360^\circ$**

By the angle sum property of a quadrilateral, the sum of all four interior angles is  $360^\circ$ .

2. **Answer: (b) Parallelogram**

A quadrilateral with both pairs of opposite sides parallel is a parallelogram.

3. **Answer: (c)  $90^\circ$**

A key property of a rhombus is that its diagonals bisect each other at right angles ( $90^\circ$ ).

4. **Answer: (c) Square**

If diagonals are equal (Rectangle property) and bisect at  $90^\circ$  (Rhombus property), the quadrilateral is a square.

5. **Answer: (b)  $105^\circ$**

In a parallelogram, adjacent angles are supplementary.  $\angle B = 180^\circ - \angle A = 180^\circ - 75^\circ = 105^\circ$ .

## Section B: Short Answer Questions

6. Let the angles be  $3x$ ,  $5x$ ,  $9x$ , and  $13x$ .

By angle sum property:  $3x + 5x + 9x + 13x = 360^\circ \implies 30x = 360^\circ \implies x = 12^\circ$ .

The angles are:  **$36^\circ$ ,  $60^\circ$ ,  $108^\circ$ ,  $156^\circ$** .

7. A rectangle is a parallelogram with one angle  $90^\circ$ . Let  $\angle A = 90^\circ$ .

Since  $AB \parallel DC$ ,  $\angle A + \angle D = 180^\circ \implies 90^\circ + \angle D = 180^\circ \implies \angle D = 90^\circ$ .

Similarly, since opposite angles are equal,  $\angle C = \angle A = 90^\circ$  and  $\angle B = \angle D = 90^\circ$ .

8. In parallelogram  $ABCD$ , adjacent angles sum to  $180^\circ$ :

$$(2x + 10) + (3x - 40) = 180 \implies 5x - 30 = 180 \implies 5x = 210 \implies x = 42^\circ.$$

$$\angle B = 3(42) - 40 = 126 - 40 = 86^\circ.$$

Since opposite angles are equal,  $\angle D = \angle B = 86^\circ$ .

9. **Mid-point Theorem:** The line segment joining the mid-points of two sides of a triangle is parallel to the third side and is equal to half of it.

## Section C: Long Answer Questions

10. **Proof:** Let  $ABCD$  be a parallelogram and  $AC$  be the diagonal.

In  $\triangle ABC$  and  $\triangle CDA$ :

1.  $AB = CD$  (Opposite sides of parallelogram)

2.  $BC = DA$  (Opposite sides of parallelogram)

3.  $AC = AC$  (Common side)

By **SSS congruence rule**,  $\triangle ABC \cong \triangle CDA$ .

11. **Proof:** Let  $ABCD$  be a rhombus where diagonals intersect at  $O$ .  
 In  $\triangle AOB$  and  $\triangle COB$ :
1.  $OA = OC$  (Diagonals of parallelogram bisect each other)
  2.  $AB = CB$  (All sides of a rhombus are equal)
  3.  $OB = OB$  (Common)
- By SSS rule,  $\triangle AOB \cong \triangle COB$ . Thus,  $\angle AOB = \angle COB$  (CPCT).  
 Since  $\angle AOB + \angle COB = 180^\circ$  (Linear pair),  $2\angle AOB = 180^\circ \implies \angle AOB = 90^\circ$ .
12. **Proof:** In  $\triangle ABC$ ,  $P$  and  $Q$  are mid-points of  $AB$  and  $BC$ .  
 By mid-point theorem,  $PQ \parallel AC$  and  $PQ = \frac{1}{2}AC$  —(i)  
 In  $\triangle ADC$ ,  $S$  and  $R$  are mid-points of  $AD$  and  $CD$ .  
 By mid-point theorem,  $SR \parallel AC$  and  $SR = \frac{1}{2}AC$  —(ii)  
 From (i) and (ii),  $PQ \parallel SR$  and  $PQ = SR$ .  
 Since one pair of opposite sides is equal and parallel,  $PQRS$  is a **parallelogram**.
13. **Proof:** Draw  $DE \perp AB$  and  $CF \perp AB$ .  
 In right  $\triangle DEA$  and  $\triangle CFB$ :
1.  $DE = CF$  (Distance between parallel lines  $AB$  and  $CD$ )
  2.  $AD = BC$  (Given)
  3.  $\angle DEA = \angle CFB = 90^\circ$
- By **RHS congruence rule**,  $\triangle DEA \cong \triangle CFB$ .  
 Thus,  $\angle A = \angle B$  by CPCT.

## Section D: Objective Checklist

1. A parallelogram with all sides equal is called a **Rhombus**.
2. The line segment joining the mid-points of two sides of a triangle is **Parallel** to the third side.
3. In a parallelogram, opposite angles are **Equal**.
4. A square is a rectangle and also a **Rhombus**.