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## NCERT Class 9 Solutions: Quadrilaterals (Chapter 8) Exercise 8.1 – Part 5

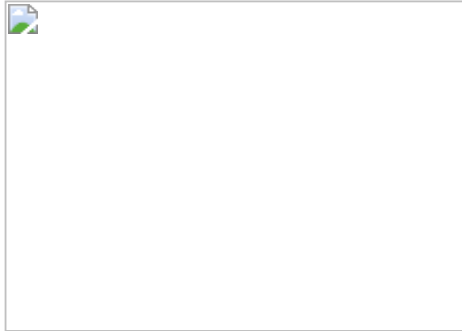
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### Quadrilateral Classification Chart

Shape	Characteristics	Name
	No parallel sides	Trapezium
	Exactly one pair of parallel sides	Trapezoid
	Two pairs of parallel sides	Parallelogram
	Parallelogram with congruent sides	Rhombus
	Parallelogram with right angles	Rectangle
	Rectangle with congruent sides	Square
Note that squares, rectangles, and rhombuses are types of parallelograms and that a square is a type of rectangle and a type of rhombus.		

Q-9 In parallelogram ABCD, two points P and Q are taken on diagonal BD such that  $DP = BQ$  (see Fig.) . Show that:

- 1.  $\triangle APD \cong \triangle CQB$
- 2.  $AP = CQ$
- 3.  $\triangle AQB \cong \triangle CPD$
- 4.  $AQ = CP$
- 5. APCQ is a parallelogram



Solution:

1. In  $\triangle APD$  and  $\triangle CQB$  ,
2.  $DP = BQ$  (Given)
3.  $\angle ADP = \angle CBQ$  (Alternate interior angles)
4.  $AD = BC$  (Opposite sides of a parallelogram)

Thus,  $\triangle APD \cong \triangle CQB$  by Side-Angle-Side congruence condition.

1.  $AP = CQ$  By Corresponding parts of congruent triangles as  $\triangle APD \cong \triangle CQB$  .
2. In  $\triangle AQB$  and  $\triangle CPD$  ,
3.  $BQ = DP$  (Given)
4.  $\angle ABQ = \angle CDP$  (Alternate interior angles)
5.  $AB = CD$  (Opposite sides of a parallelogram)

Thus,  $\triangle AQB \cong \triangle CPD$  by Side-Angle-Side congruence condition.

1.  $AQ = CP$  By Corresponding Parts of Congruent Triangles as  $\triangle AQB \cong \triangle CPD$  .
2. The diagonal of a parallelogram bisect each other.
3.  $OB + OD$
4.  $OB - BQ = OD - DP \mid BQ = DP$  Given
5.  $OQ = OP$  ... equation (1)

Also,  $OA = OC$  ... equation (2) (diagonal of a parallelogram bisect each other)

From equation (1) and (2) , APCQ is parallelogram

Q-10 ABCD is a parallelogram and AP and CQ are perpendiculars from vertices A and C on on diagonal BD (see Fig.) . Show that

$$1. \triangle APB \cong \triangle CQD$$

$$2. AP = CQ$$



Solution:

Given,

- ABCD is parallelogram
- AP and CQ are perpendiculars from A and C on diagonal BD

Solution (i)

In  $\triangle APB$  and  $\triangle CQD$ ,

- $AB = CD$  (Opposite side of parallelogram ABCD)
- $\angle ABP = \angle CDQ$  (Alternate interior angles)
- $\therefore AB \parallel DC$

Now,

- $\angle APB = \angle CQD$  (Equal to right angles as AP and CQ are perpendiculars)
- $AB = CD$  (ABCD is a parallelogram)
- Thus,  $\triangle APB \cong \triangle CQD$  by Angle-Angle-Side congruence condition.

Solution (ii)

$AP = CQ$  by Corresponding Parts of Congruent Triangles as  $\triangle APB \cong \triangle CQD$ .