



Class	Subject	Time slot	Lesson	Topic
IX	Mathematics	35 + 35 Mins 2 Pd	Quadrilaterals	P2 and P3 Proofs of various properties of parallelogram Ex 8.1

Expected Learning Outcome: Learners will be able to

- 1) Use properties of quadrilaterals to prove theorems by using different congruency criteria of triangles
- 2) Apply the properties of parallelogram in problem solving;
- 3) Relate the properties of the parallelogram to the real world

Expected skill development:

- 1) Thinking skills while proving different statements
- 2) Reasoning + proofs
- 3) Numeracy and calculation skills while finding angles
- 4) Communicating using mathematical terminology
- 5) Developing connections between different properties of quadrilaterals, theorems and their application
- 6) Justifying and Proving
- 7) Problem Solving

FLOW OF LESSON WITH RESPECT TO TIME (Introduction/warm-up, Content, Think Line, Closure)

<u>Pedagogy</u>	<u>Content</u>
<u>(5 mins) Warm Up</u> Recap using Question and Answer Method Thinkline: What are the minimum requirements for a quadrilateral to be a parallelogram?	The facilitator and learners will recall the properties of Parallelogram
<u>(20 mins) Demonstration by Facilitator on Board</u> Facilitators discusses the proofs	The minimum conditions for a quadrilateral to be parallelogram are: Theorem 8.3: <i>If each pair of opposite sides of a quadrilateral are equal then it is a parallelogram.</i> Theorem 8.5 : <i>If in a quadrilateral, each pair of opposite angles is equal, then it is a parallelogram.</i> Theorem 8.7: <i>If the diagonals of a quadrilateral bisect each other, then it is a parallelogram.</i> Theorem 8.8 : <i>A quadrilateral is a parallelogram if a pair of opposite sides is equal and parallel.</i>

<u>(10 mins) Inclass Exercise: Closure</u> Question and Answer Method followed by Discussion	The Facilitator closes with Q1 of the Exercise no. 8.1. The angles of quadrilateral are in the ratio 3 : 5 : 9 : 13. Find all the angles of the quadrilateral.
---	---

Proposed Questions (must include the questions asked in the classroom <u>and</u> the ones given as class-work in the notebook) THINKLINE: Example 5: Show that the bisectors of angles of a parallelogram form a rectangle.	
Evaluation/Assessment Group discussion, individual work, observation and explanation by the Facilitator.	
Learners on the way 1) Which of the following is not true for a parallelogram? (A) opposite sides are equal (B) opposite angles are equal (C) opposite angles are bisected by the diagonals (D) Diagonals bisect each other. 2) Show that the bisectors of angles of a parallelogram form a rectangle. Draw the figure of the question	Advanced Learner 1. Show that the bisectors of angles of a parallelogram form a rectangle.
Materials needed/Resources:- Chalk, blackboard, duster, NCERT text book, NCERT Exemplar.	
Common Misconceptions: 1. One pair of opposite sides is equal then it is a parallelogram. 2. One pair of opposite sides are parallel then it is a parallelogram	Addressing the misconceptions: 1. The facilitator will explain that for the quadrilateral to be a parallelogram, it is needed that: i. One pair of opposite sides is equal and parallel. ii. Or, both pair of opposite sides is parallel. iii. Or, both pair of opposite sides is equal.

Home Assignments:
Attempt Q 2,3,4,5 of Ex 8.1 of NCERT textbook Class 9

LESSON PLAN CLASS 9



DLF Public School

THE LEARNING ACADEMY
Managed By Darbari Lal Foundation

Class	Subject	Time Slot	Lesson	Topic P4 and P5
IX	Maths	35 Mins + 35 mins 2 Pd	Quadrilaterals	Proves based on properties of Parallelogram

Expected Learning Outcome :The learners will be able to :

- Apply the properties of different quadrilaterals in solving problems.
- Apply knowledge in real life situations.

Expected skill development:

- Thinking skills while proving different statements.
- Numeracy and calculation skills while finding angles.
- Communicating using mathematical terminology.
- Developing connections between different properties of quadrilaterals, theorems and their application
- Justifying and proving
- Problem solving.

FLOW OF LESSON WITH RESPECT TO TIME (Introduction/warm-up, Content, Think Line, Closure)

<u>Pedagog</u> <u>y</u>	<u>Content</u>
<u>(5 mins) Warm Up</u> Interactive Method Students will be giving their responses (Oral) and facilitator will combine all the responses.	What are the different conditions for a quadrilateral to be a Parallelogram?
<u>(50 mins) Demonstration by Facilitator on Board</u> Learning by doing method followed by discussion and black board work.	The facilitator takes up few questions of Ex – 8.1, discusses and explain. Learners will complete it in the notebook. Turn – wise, some learners will be asked to come and solve questions on the board, while others do it in the notebook. Facilitator will take rounds and intervene, if required. 6. Diagonal AC of a parallelogram ABCD bisects $\angle A$ (see Fig. 8.19). Show that (i) it bisects $\angle C$ also, (ii) ABCD is a rhombus.

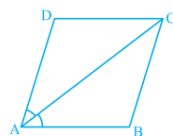


Fig. 8.19

7. ABCD is a rhombus. Show that diagonal AC bisects $\angle A$ as well as $\angle C$ and diagonal BD bisects $\angle B$ as well as $\angle D$.

Q – 9

In parallelogram ABCD, two points P and Q are taken on diagonal BD such that $DP = BQ$ (see Fig. 8.20). Show that:

- $\triangle APD \cong \triangle CQB$
- $AP = CQ$
- $\triangle AQB \cong \triangle CPD$
- $AQ = CP$
- APCQ is a parallelogram

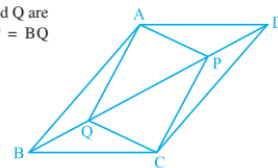


Fig. 8.20

10. ABCD is a parallelogram and AP and CQ are perpendiculars from vertices A and C on diagonal BD (see Fig. 8.21). Show that

- $\triangle APB \cong \triangle CQD$
- $AP = CQ$

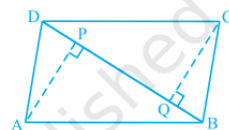


Fig. 8.21

(5 mins) in class Exercise: Closure

Students will be giving their responses (Oral) and facilitator will combine all the responses.

Q- All the angles of a quadrilateral are equal. What special name is given to the quadrilateral?

- Proposed Questions (must include the questions asked in the classroom and the ones given as class-work in the notebook)
All the angles of a quadrilateral are equal. What special name is given to the quadrilateral?

Evaluation/Assessment

Group discussion, individual work, observation and explanation by the Facilitator.

Learners on the way

Show that if the diagonals of a quadrilateral are equal and bisect each other at right angle, then it is a Square.

Advanced Learner

10. ABCD is a parallelogram and AP and CQ are perpendiculars from vertices A and C on diagonal BD (see Fig. 8.21). Show that

- $\triangle APB \cong \triangle CQD$
- $AP = CQ$

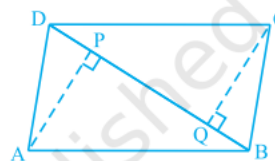


Fig. 8.21

Materials needed/Resources:- Chalk, blackboard, duster, NCERT text book, NCERT Exemplar.	
Common Misconceptions:	Addressing the misconceptions:

Home Assignment: Do Q – 11 and 12 of ex – 8.1 of NCERT Text Book Class - 9