LESSON PLAN 8

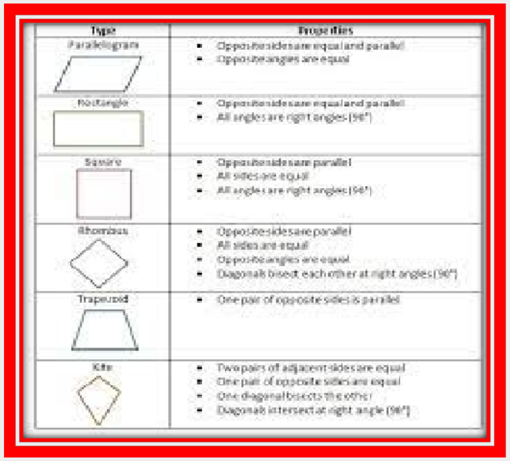
CLASS : 9 SUBJECT : MATHEMATICS **TEACHER'S NAME :**

NAME OF THE UNIT	SUB-TOPICS		NO OF PERIODS REQUIRED			Time line for teaching	
			Teaching	Practice	TOTAL	From	To
QUADRILATERALS	8.1	PROPERTIES OF A PARALLELOGRAM THEOREM 8.1 to 8.7	7	9	16		
	8.2	THE MID-POINT THEOREM THEOREM 8.8 & 8.9	2	2	4		
		TOTAL	9	11	20		
PRE-REQUISITES & SKILLS	Every Pupil is expected to have basic knowledge in # quadrilateral and its basic parts and properties # types of quadrilaterals and their basic properties. # parallelogram, its properties and some special parallelograms and their properties # methods of proving a mathematical statement or a theorem(learnt in appendix-I, proofs in mathematics chapter). # Usage of Mathematical instrument box						

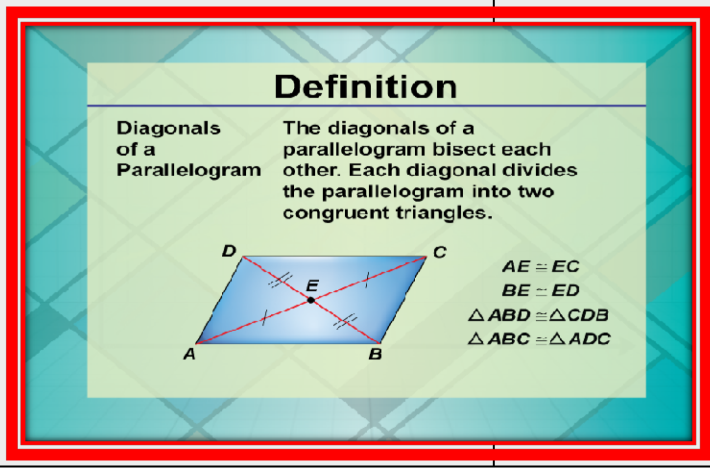
Learning Outcomes
After Completion of this lesson every student will be able to **# check different types of properties of quadrilaterals, especially parallelograms** **# state and prove different properties of parallelograms** **# apply the properties of parallelograms and solve sums related with these properties** **# appriciate the beauty and part of quadrilaterals, especially parallelograms in real life geometry.**

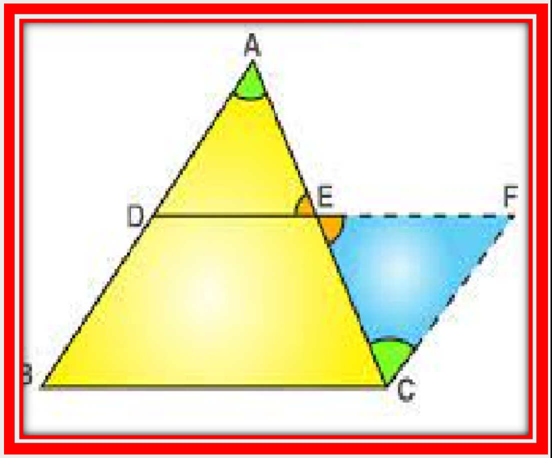
Teaching Learning Process

INTRODUCTION /INDUCTION	Experience & Reflection
Teacher introduces the chapter of Quadrilaterals by recalling their previous basic knowledge in it in their previous lesson of understanding quiadrilaterals and draws the attention of children towards the various properties of parallelograms which they have learnt but not proved. Now teacher creates enthusiasm in children by provoking them to try and prove various properties of parallelograms through the techniques they have learnt in the Appendix-I (Proofs in Mathematics) of semester-I.	# Pupils will recollect their knowledge on Quadrilateral and its properties and utilize that in exploring and learning new concepts of proving various properties of parallelograms # Students will experience the usage of the Properties of parallelograms and the way of proving them and appreciate their usage.

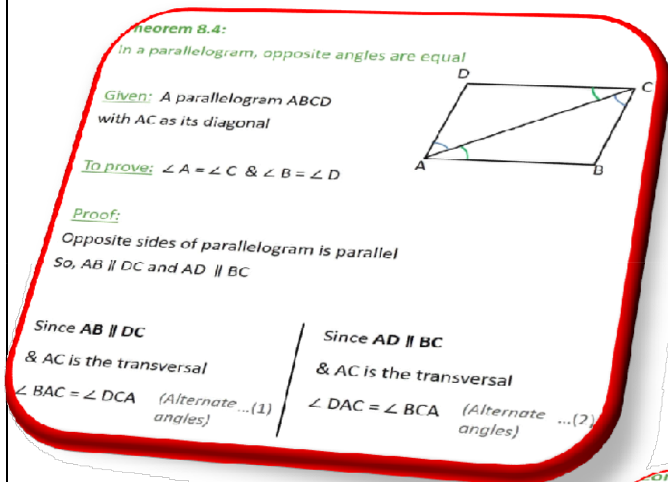


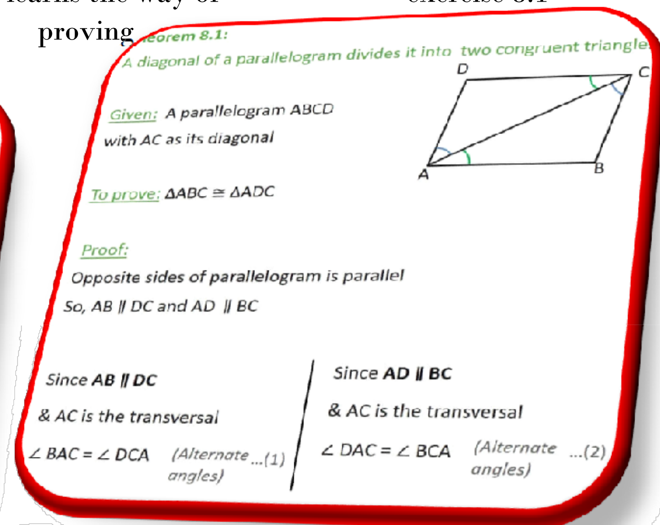
Type	Properties
Parallelogram	Opposite sides are equal and parallel; Opposite angles are equal
Rectangle	Opposite sides are equal and parallel; All angles are right angles (90°)
Square	Opposite sides are parallel; All sides are equal; All angles are right angles (90°)
Rhombus	Opposite sides are parallel; All sides are equal; Opposite angles are equal; Diagonals bisect each other at right angles (90°)
Trapezoid	One pair of opposite sides is parallel
Kite	Two pairs of adjacent sides are equal; One pair of opposite sides are equal; One diagonal bisects the other; Diagonals intersect at right angle (90°)

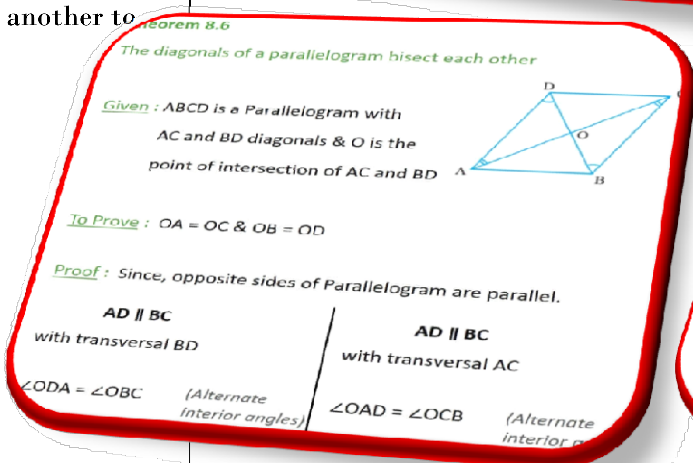


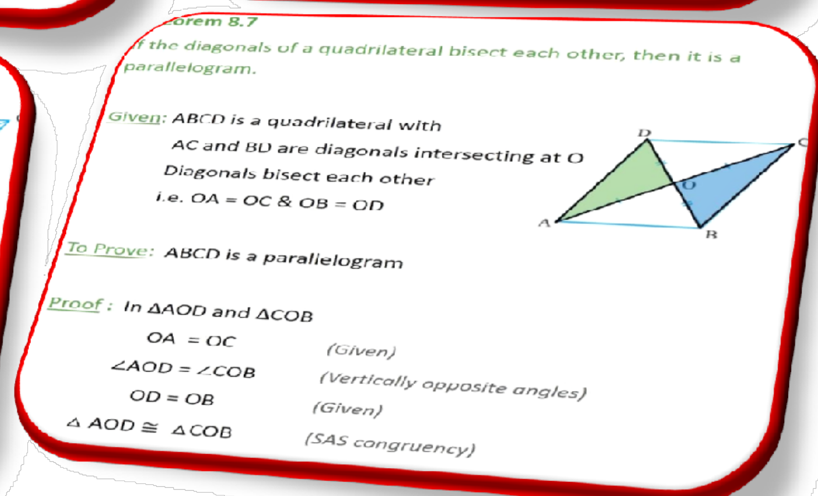


EXPLICIT TEACHING/TEACHER MODELLING (I DO)	GROUP WORK (WE DO)	INDEPENDENT WORK (YOU DO)	NOTES
8.1. PROPERTIES OF A PARALLELOGRAM THEOREM 8.1 TO 8.7 Teacher introduces the concept by recalling the properties of a Parallelogram which they were familiar with in the chapter of understanding quadrilaterals and demonstrates the proofs of various properties of a parallelogram by some activities while proving that a diagonal of a parallelogram divides it into two congruent triangles, a parallelogram shaped paper may be cut along its diagonal. Later those two triangles may be placed on one another to check their identity	Pupils will work in groups and try to recall their previous apprehensions on various properties of a parallelogram and will try to prove the authenticity	Every individual will participate in the activiy and learns the way of proving	Proofs of theorem 8.1 to 8.7 along with associated examples and exercise 8.1

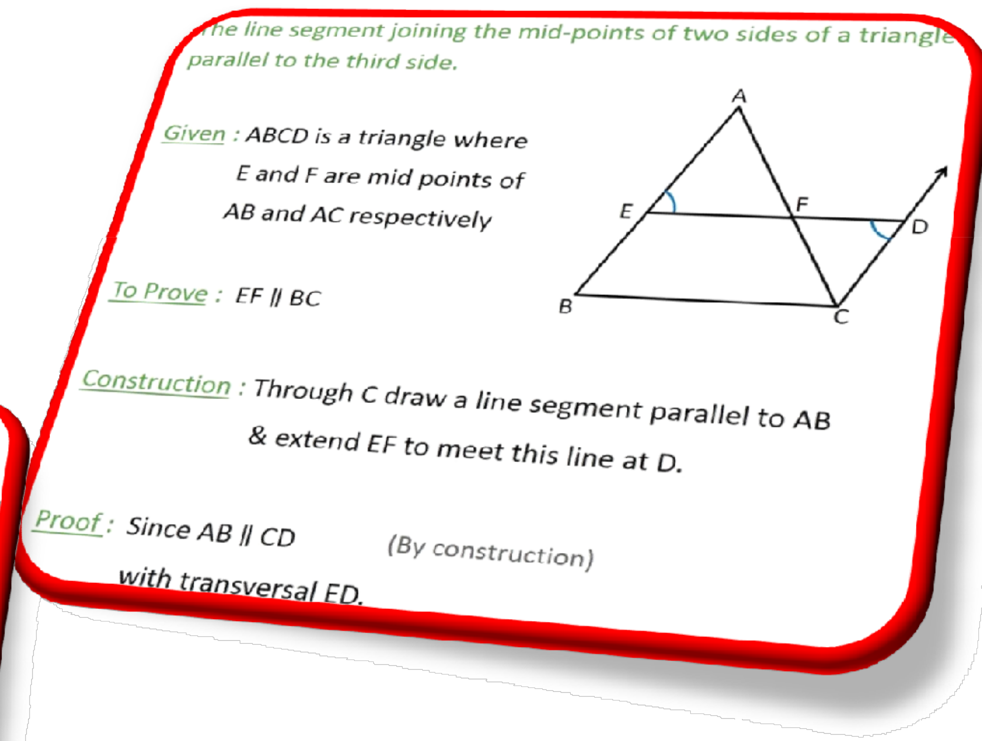


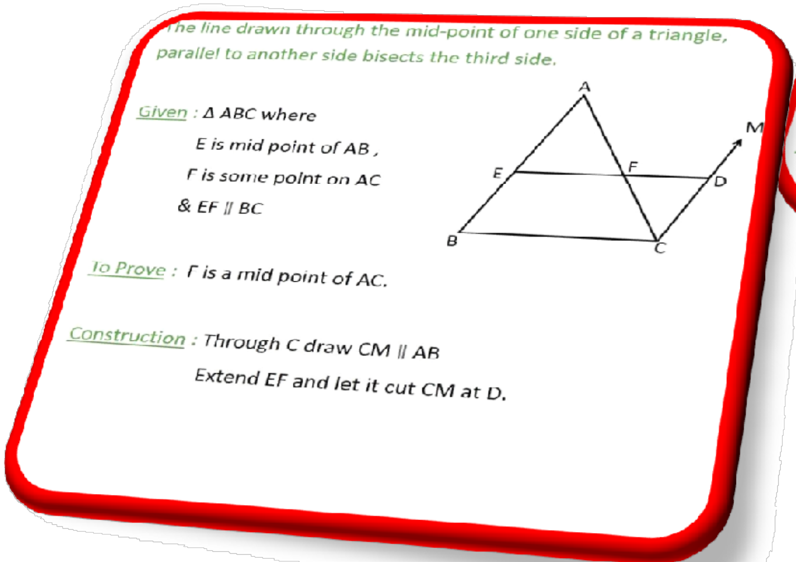


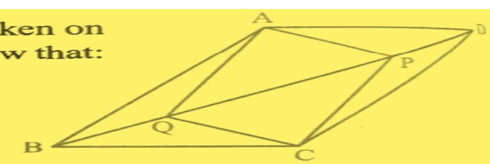




EXPLICIT TEACHING/TEACHER MODELLING (I DO)	GROUP WORK (WE DO)	INDEPENDENT WORK (YOU DO)	NOTES
8.2 . THE MID-POINT THEOREM (THEOREM 8.8 & 8.9) Teacher elicits responses by questioning on different ways of proving the Mid point theorem " The line segmen t joining the mid points of two sides of a triangle is parallel to the third side" and finally demonstrates the way of proving it by completing a parallelogram by extending the line segment. Later teacher provokes children to prove the converse of this theorem.	Teacher conducts a group activity involving children to elicit responses from them about the ways of proving midpoint theorem and makes children indulge in the activity and learn the proof.	Every pupil is focused to learn the concept by indulging them in doing its applicative sums	Proofs of theorem 8.8 & 8.9 along with examples and exercise sums of 8.2





CHECK FOR UNDERSTANDING QUESTIONS	
1. Factual	1) Prove that If in a quadrilateral, each pair of opposite angles is equal, then it is a parallelogram 2) State and Prove the Mid-point theorem.
2. Open Ended/Critical Thinking	1) Can you guess what type of quadrilateral emerge out of the angular bisectors of a rectangle. Is it a square? If so prove it. 2) If in the context of mid point theorem, instead of the line segment joining the midpoints if we consider the line segment joins in such a way that it passes through both the sides in a ratio say 2:3, still will the line segment passes parallel to the third side? If so justify your answer
3.Student Practice questions & Activities	In parallelogram ABCD, two points P and Q are taken on diagonal BD such that $DP = BQ$ (see Fig. 8.12). Show that: (i) $\Delta APD \cong \Delta CQB$ (ii) $AP = CQ$ (iii) $\Delta AQB \cong \Delta CPD$ (iv) $AQ = CP$ (v) APCQ is a parallelogram  Fig. 8.12 ABC is a triangle right angled at C. A line through the mid-point M of hypotenuse AB and parallel to BC intersects AC at D. Show that (i) D is the mid-point of AC (ii) $MD \perp AC$ (iii) $CM = MA = \frac{1}{2}AB$
4. Assessment	Exercise sums and worksheet on Quadrilaterals