LESSON PLAN - APPENDIX - 1

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
PROOFS IN MATHEMATICS	A1.1 INTRODUCTION	1	0	1		
	A1.2 MATHEMATICALLY ACCEPTABLE STAEMENTS	1	1	2		
	A1.3 DEDUCTIVE REASONING	1	1	2		
	A1.4 THEOREMS, CONJECTURES AND AXIOMS	1	1	2		
	A1.5 WHAT IS A MATHEMATICAL PROOF ?	1	2	3		
	TOTAL	5	5	10		
PRE-REQUISITES & SKILLS	Every Pupil is expected to have basic knowledge and skills in # terminology and mathematical nomenclature. # basic geometrical shapes and objects, especially euclidian geometry and its other related axioms and postulates and their meaning # logical thinking and proving, drawing inferences, arriving at conclusions etc # four basic operations like +,-,x and ÷					

Learning Outcomes

After Completion of this lesson every student will be able to

 # apprehend that statements, especially mathematical statements are needed to be proved through logical arguments

 # recognize the difference between a theorem, conjecture and an axiom

 # draw inferences basing on different statements and arrive at a valid conclusion.

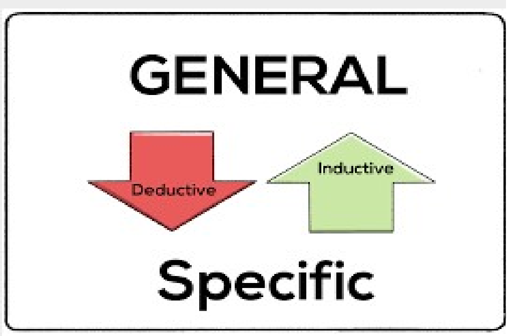
 # prove different mathematical statements and will try to prove or disprove open conjectures.

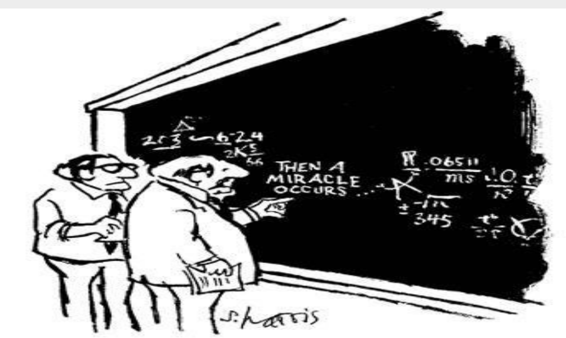
 # appriciate the approach and enjoys the beauty in proving various mathematical statements or conjectures logically.

Teaching Learning Process

INTRODUCTION /INDUCTION

Teacher introduces the concept of proofs in mathematics with the help of different real life examples and situations where it is needed a logical proof to prove the authenticity of a statement or a result to make all agree with the argument. Through this, teacher draws and reroutes the attention of children towards the necessity of proving mathematical statements and conjectures as well and proceeds into the depth of the chapter.



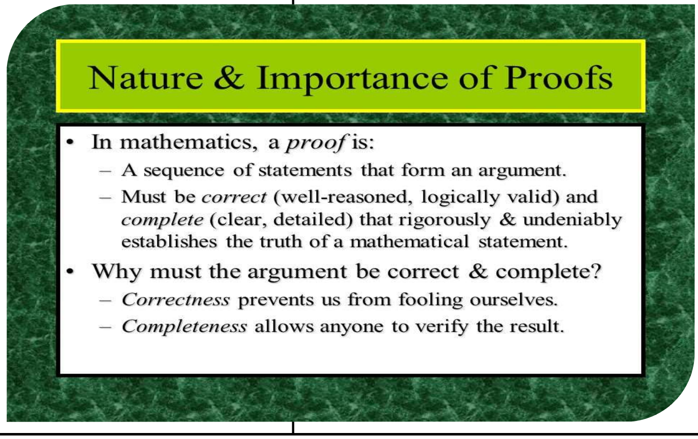


"I think you should be more explicit here in step two."

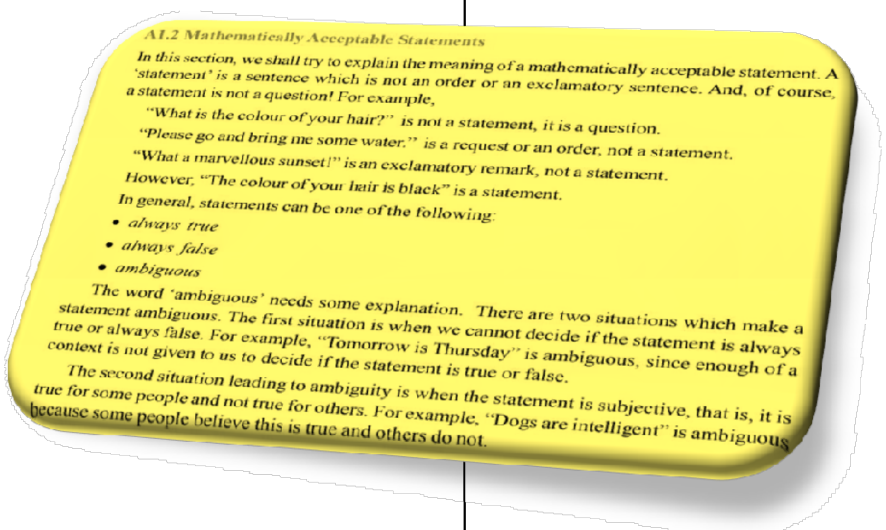
Experience & Reflection

Pupils will recollect their knowledge on various mathematical statements, conjectures, axioms they have made use of in their previous chapters and will recognize the desparate need of proving them logically.

Students will experience the beauty and importance of proofs in mathematics and appreciate their uniqueness.

EXPLICIT TEACHING/TEACHER MODELLING (I DO)	GROUP WORK (WE DO)	INDEPENDENT WORK (YOU DO)	NOTES
AI.1 INTRODUCTION Teacher introduces the concept of proofs in mathematics with the help of different real life examples and situations where it is needed a logical proof to prove the authenticity of a statement or a result to make all agree with the argument. Through this, teacher draws and reroutes the attention of children towards the necessity of proving mathematical statements and conjectures as well and proceeds into the depth of the chapter.	Pupils will work in groups and try to recall and recognize those situations where they really need to prove or disprove some real life statements & situations. For example we may need to disprove the claim of non payment of a bill from electricity department by producing the payment receipt. In the same fashion they will try to recall those mathematical statements which they made use of earlier without knowing their authenticity and will recognize the importance of proving them or knowing their proof now.	Every individual knows the importance and necessity of proving mathematical statements or conjectures logically.	

EXPLICIT TEACHING/TEACHER MODELLING (I DO)	GROUP WORK (WE DO)	INDEPENDENT WORK (YOU DO)	NOTES
A1.2 . MATHEMATICALLY ACCEPTABLE STATEMENTS Teacher first introduces what a statement is and which type of sentences are acceptable as statements and will explore different types of sentences which can be accepted as statements and which are not.	Teacher conducts a group activity involving children to sagregate the given set of sentences into statements and non-statements	Every pupil is focused to get a comprehensive idea about which type of sentences turn into statements and which are not.	



A1.2 Mathematically Acceptable Statements

In this section, we shall try to explain the meaning of a mathematically acceptable statement. A 'statement' is a sentence which is not an order or an exclamatory sentence. And, of course, a statement is not a question! For example,

"What is the colour of your hair?" is not a statement, it is a question.

"Please go and bring me some water." is a request or an order, not a statement.

"What a marvellous sunset!" is an exclamatory remark, not a statement.

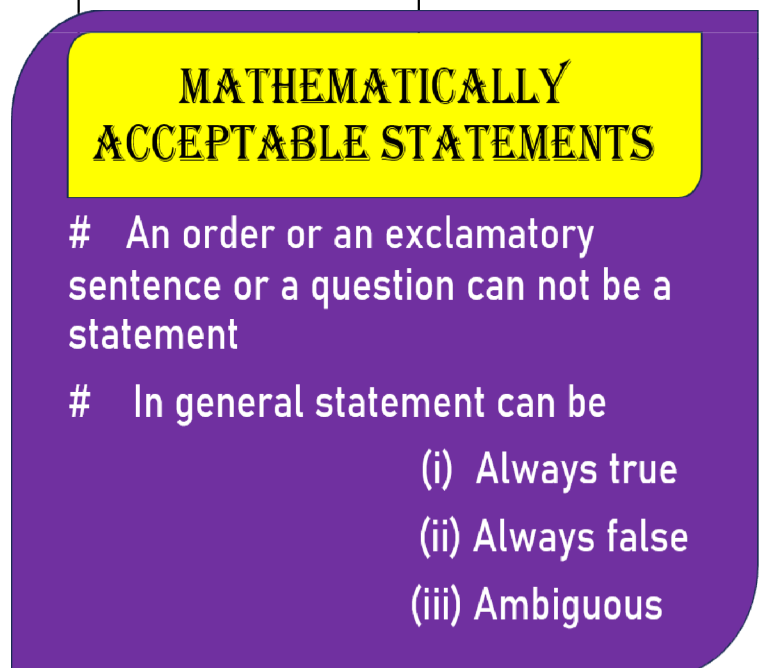
However, "The colour of your hair is black" is a statement.

In general, statements can be one of the following:

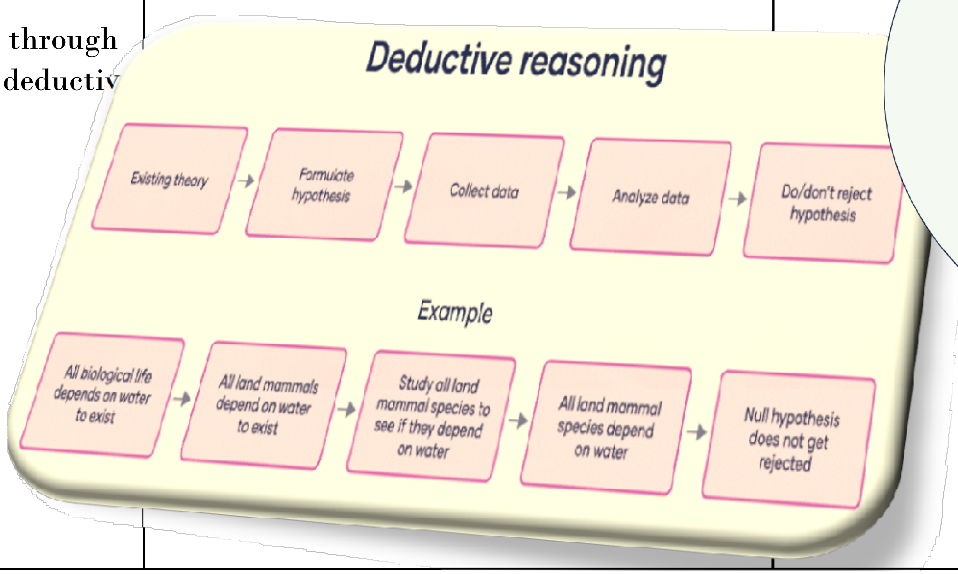
- *always true*
- *always false*
- *ambiguous*

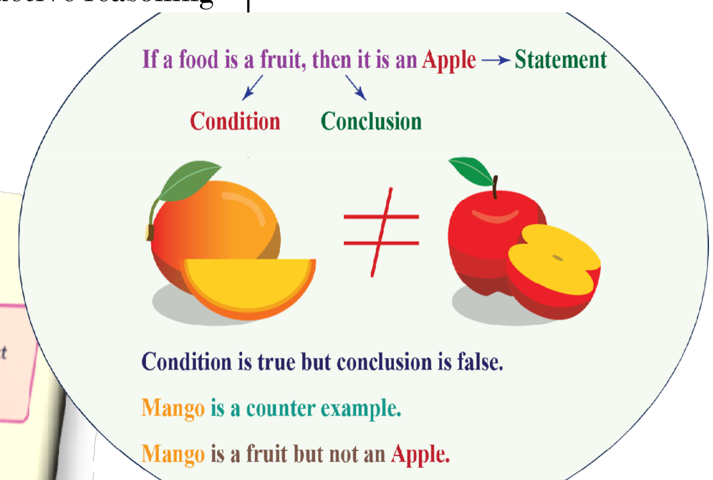
The word 'ambiguous' needs some explanation. There are two situations which make a statement ambiguous. The first situation is when we cannot decide if the statement is always true or always false. For example, "Tomorrow is Thursday" is ambiguous, since enough of a context is not given to us to decide if the statement is true or false.

The second situation leading to ambiguity is when the statement is subjective, that is, it is true for some people and not true for others. For example, "Dogs are intelligent" is ambiguous because some people believe this is true and others do not.

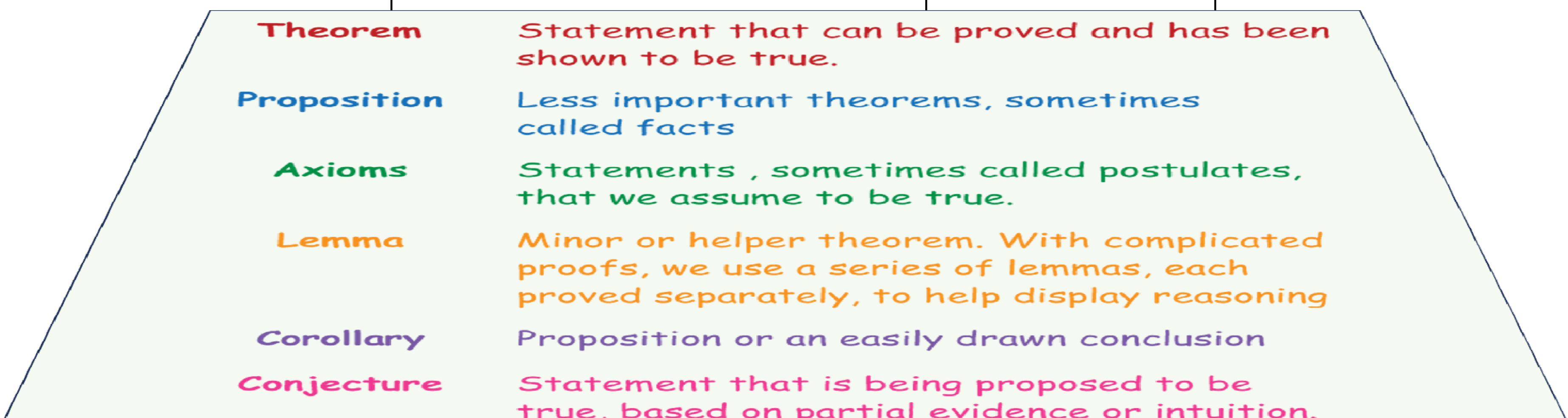


EXPLICIT TEACHING/TEACHER MODELLING (I DO)	GROUP WORK (WE DO)	INDEPENDENT WORK (YOU DO)	NOTES
A1.3. DEDUCTIVE REASONING Teacher describes children how an unambiguous statement can be proved through different logical arguments and analysis and concludes that the process of proving the truth of an unambiguous statement through logical analysis is called deductiv reasoning	Pupils groups are made familiar with the deductive reasoning and how the truth of a statement.	Every individual is made familiar with deductive reasoning	

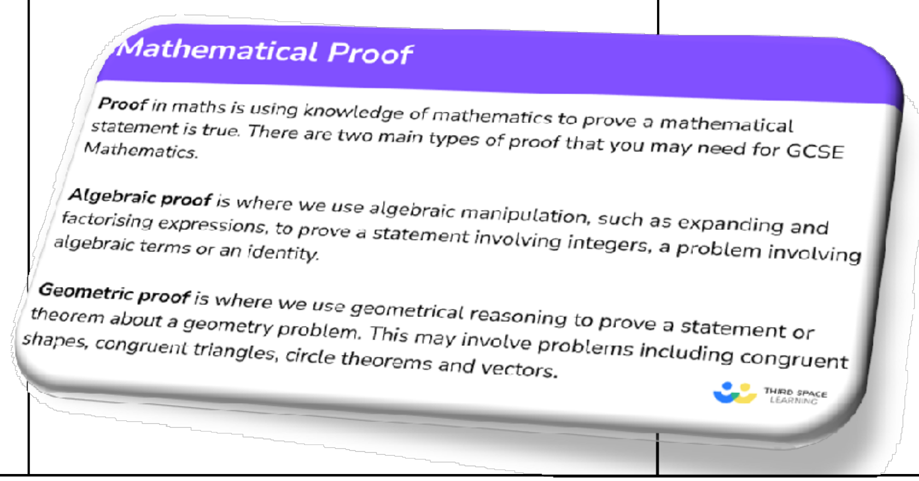


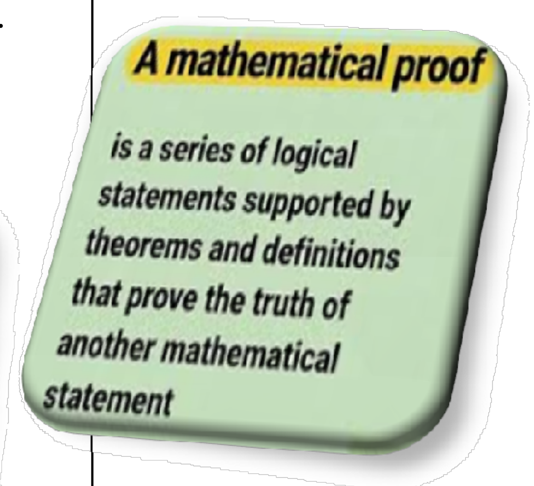


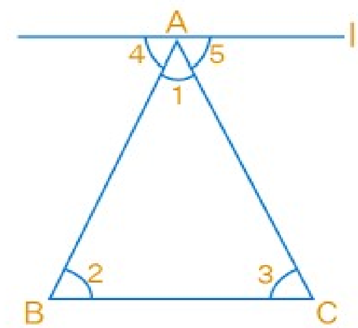
EXPLICIT TEACHING/TEACHER MODELLING (I DO)	GROUP WORK (WE DO)	INDEPENDENT WORK (YOU DO)	NOTES
A1.4. THEOREMS, CONJECTURES AND AXIOMS teacher explains the classification of statements into Theorems, Conjectures and Axioms basing on their provablity	Pupils groups will be engaged in an activity of identifying some statements into Theorems, Conjectures and Axioms basing on their provability with the help of their previous knowledge in Euclidian Geometry where they were made familiar with Axioms and postulates and Conejctures like Goldbach Conjecture etc.,	Every individual is focussed so that each one understands and are able to distinguish among Theorem, Conjecture and Axiom	Some example sums along with exercise sums



EXPLICIT TEACHING/TEACHER MODELLING (I DO)	GROUP WORK (WE DO)	INDEPENDENT WORK (YOU DO)	NOTES
A1.5 WHAT IS A MATHEMATICAL PROOF Teacher draws the attention of pupils towards how we prove a statement mathematically and at this juncture teacher makes children familiar with different types of mathematical proofs like 1) Proving by contradiction 2) Proving Directly 3) Proving by construction 4) proving by exhaustion etc.,	Pupils groups will be made familiar with different types of mathematical proofs and are engaged in proving some mathematical statements by selecting appropriate method of proving.	Teacher focuses on each individual and also throws some special attention towards the brilliants by stating some open conjectures and asks them to try to prove them.	different proofs of theorems.





CHECK FOR UNDERSTANDING QUESTIONS	
1. Factual	1) What are the differences between axiom, conjecture and theorem? 2) Define a Statement?
2. Open Ended/Critical Thinking	1. What type of method will you select in proving an irrational number as irrational? 2. What has been tried to prove in the adjacent diagram? 
3.Student Practice questions & Activities	1. Prove that the product of two even natural numbers is even. 2) Prove that infinitely many points lie on the line y=2x
4. Assessment	Exercise sums and worksheet on Lines and Angles