LESSON PLAN 1

CLASS : 8 TEACHER'S NAME :

NAME OF THE UNIT	SUB-TOPICS	NO OF PERIODS REQUIRED			Time line for teaching	
		Teaching	Practice	TOTAL	From	To
RATIONAL NUMBERS	1.1　　INTRODUCTION 1.2　　PROPERTIES OF RATIONAL NUMBERS 1.2.1　CLOSURE 1.2.2　COMMUTATIVITY	1	7	8		
	1.2.3　ASSOCIATIVITY 1.2.4　THE ROLE OF ZERO 1.2.5　THE ROLE OF 1	1	7	8		
	1.2.6　DISTRIBUTIVITY OF MULTIPLICATION OVER ADDITION FOR RATIONAL NUMBERS	1	7	8		
	TOTAL	3	21	24		
PRE-REQUISITES	**KEY CONEPTS**			**KEY VOCABULARY**		
	Every Pupil is expected to have basic knowledge in # Natural Numbers, Whole Numbers and Integers and fractions # four basic operations like +,-,x and ÷ on fractions # Properties of Closure,Commutative, Associative,Identity, distribuitivity in the set of integers			# Integers # Natural Numbers # Whole Numbers # Rational NUmbers # Fractions	# closure # Commutativity # Associativity # Identity # Distributivity	

Learning Outcomes

After Completion of this lesson every student will be able to
 # identify the right property utilized in simiplifying Rational expressions
 # add, subtract, multiply and divide Rational numbers with ease.
 # utilize the right property in simplification of rational expressions under various operations
 # recognize the significance and appreciate the importance of Rational operations in real life situations.

Teaching Learning Process

MIND MAPPING	Experience & Reflection

VARIOUS PROPERTIES OF RATIONAL NUMBERS (Q)

OPERATION / PROPERTY	ADDITION	SUBTRACTION	MULTIPLICATION	DIVISION
CLOSURE	YES	YES	YES	NO (YES IF WE EXCLUDE 0)
COMMUTATIVITY	YES	NO	YES	NO
ASSOCIATIVITY	YES	NO	YES	NO
IDENTITY	YES – 0	NO	YES – 1	NO

DISTRIBUTIVITY OF MULTIPLICTION OVER ADDITION IS SATISFIED IN THE SET OF RATIONAL NUMBERS

Pupils will recollect their knowledge on Fractions and their usage that they were acquainted with in their previous class and will reflect the knowledge here in exploring the properties in Rational Numbers under various operations

Students will experience the usage of Rational Numbers in real life situations.
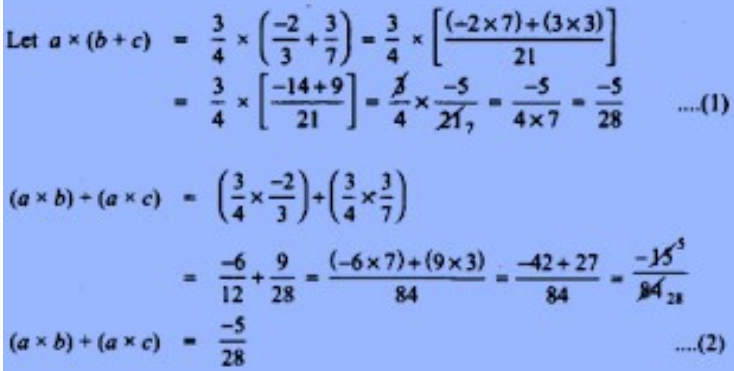
TEACHING PERIOD : 1	INTRODUCTION, PROPERTIES OF RATIONAL NUMBERS, CLOSURE, COMMUTATIVITY		
CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)
KEY WORDS & PRE REQUISITES	Brain storming session invoving children with pre-requisites vocabulary and concepts related to previous knowledge. Introduction of new vocabulary and key words associated with the concept # NATURAL NUMBERS # WHOLE NUMBERS # INTEGERS # FRACTIONS # RATIONAL NUMBERS # ADDITION # SUBTRACTION # SUBTRACTION # DIVISION # CLOSURE # COMMUTATIVITY	* Students read the pre-requisites and answer the questions to the teacher (whole class activity)	Every Pupil will read and write the key words in their note books
MIND MAPPING	Teacher writes the key word "RATIONAL NUMBERS" on the black board and will elict its other related words through questioning and will draw pupils' attention towards key concepts in the lesson	Hetrogeneous groups are created. One group will read the words and other will explain the meaning	Pupils individually read the keywords associated with Integers
CONCEPTUAL UNDERSTANDING	Teacher presents different properties of rationals under Addition,subtraction,multiplication & divisioins through recollecting their previous knowledge on these properties in case of whole numbers and integers.	Hetrogeneous groups are formed to participate in the activity and each group participates in the activity actively and learn the properties	Each student in the group participates in the activity and learns the properties on Rational numbers
LEARNING ACTIVITY	Teacher conducts and acitivity by dividing children into Hetrogeneous groups and will give different rational numbers to each group and asks children to operate them with +,-,x,÷ in different orders and check what were the results. Finally Teacher draws inferences from children themselves that Set of Rationals (Q) is Closed under Addition,subtraction,Multiplication and is closed under division if we exclude '0' from the set otherwise not closed. 		
SUMMARY	Teacher writes the summary of the concept in a tabular form and asks children to note and read	pupils will note down and read the summary in groups	every individual reads the summary and notes it down
ASSESSMENT	Teacher asks children to solve the sums of try these section of pg.no: 4,6	every group will do the sums by discussion among each other	every individual solves the sums on their own

PRACTICE PERIOD: 1 to 7	INTRODUCTION, PROPERTIES OF RATIONAL NUMBERS, CLOSURE, COMMUTATIVITY		
CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)
KEY WORDS READING	Teacher writes the key words from previous class's teaching period and asks children to read and write them in note books # NATURAL NUMBERS # WHOLE NUMBERS # INTEGERS # FRACTIONS # RATIONAL NUMBERS # ADDITION # SUBTRACTION # SUBTRACTION # DIVISION # CLOSURE # COMMUTATIVITY	Whole class activity : one child comes to the board and reads the key words loudly and the remaining class follows.	Every child comes to the board and reads the key words and notes them down in their note books
SIMILAR LINES READING	Teacher writes some expressions and writes the propery involved in those expressions and asks children to do some more $\frac{1}{8}+\frac{3}{5}= \frac{29}{40}$ closure property under addition $\frac{1}{8}\times\frac{3}{5} = \frac{3}{5}\times\frac{1}{8}$ commutative property under multiplication	Each group will read the similar lines and will frame some more by discussion	Every Individual prepares their own similar lines using the lines prepared by the teacher
SUMMARY/ SYNOPSIS	Teacheronce again writes important key words and tabulates different properties of Rationals under Various operations and asks children to read,note down and practice.	pupils will note down and read the summary in groups	every individual spells and reads the summary and notes it down
WRITING/ EDITING	Teacher guides children in doing sums of try these section on their own and checks their writings	One group will check the writings of the other and vice versa	Slow learners are focused and teacher will ascertain that every individual learns the concept in successive upcoming practice sessions

TEACHING PERIOD : 2	ASSOCIATIVITY, THE ROLE OF ZERO, THE ROLE OF 1		
CONCEPTS/STEPS	**TEACHER ACTIVITY (I DO)**	**GROUP ACTIVITY (WE DO)**	**INDIVIDUAL ACTIVITY (YOU DO)**
KEY WORDS	Brain storming session invoving children with key words * Associativity * Identity * Inverse	* Students read the keywords answer the questions to the teacher (whole class activity)	Every Pupil will read and write the key words in their note books
CONCEPTUAL UNDERSTANDING	Teacher demonstrates the concept of Associativity using previous techniques as it was done in the case of closure and commutativity and further introduces the role of '0' and '1' as identiteis in Rational Number set as they are familiar with those two numbers which worked as identites in case of whole numbers too under addition and multiplication respectively (table below)	puips are divided into hetrogenous groups and given different number tiplets to check associativity in Rationals under different operations (image below)	Each student in the group participates in the activity and learns the concept of associativity and role of 0 and 1
SUMMARY	Teacher once again writes important key words and tabulates the properties of Rationals and asks children to note down and adopt.	Pupils will note down and read the summary in groups	Every individual reads the summary and notes it down and adopts the procedure
ASSESSMENT	Teacher gives some questions from Try These sections of pg no: 9 and asks children to solve those sums	Every group will do the sums by discussion among	Every individual solves the sums on their own

Conceptual Understanding table:

LHS	RHS	Result
$\left(\frac{1}{5}+\frac{2}{7}\right)+\frac{1}{3}=\frac{86}{105}$	$\frac{1}{5}+\left(\frac{2}{7}+\frac{1}{3}\right)=\frac{86}{105}$	The values are equal and they satisfy the condition.
$\left(\frac{4}{9}-\frac{3}{2}\right)-\frac{1}{3}=-\frac{93}{57}$	$\frac{4}{9}-\left(\frac{3}{2}-\frac{1}{3}\right)=-\frac{39}{54}$	The values differ and so subtraction is not associative for rational numbers.
$\frac{3}{8}\times\left(\frac{1}{9}\times\frac{5}{7}\right)=\frac{15}{504}$	$\left(\frac{3}{8}\times\frac{1}{9}\right)\times\frac{5}{7}=\frac{15}{504}$	Multiplication is associative for rational numbers.
$\frac{3}{5}\div\left(\frac{2}{5}\div\frac{2}{5}\right)=\frac{3}{5}$	$\left(\frac{3}{5}\div\frac{2}{5}\right)\div\frac{2}{5}=\frac{15}{4}$	Division is not associative for rational numbers.

Group activity image:

Additive Identity	Multiplicative Identity
Used for addition operation	Used for multiplication operation
Given by: $p+0=p=0+p$	Given by: $p\times 1=p=1\times p$
0 is the identity element	1 is the identity element
For example, $77+0=77$, $-77+0=-77$	For example, $77\times 1=77$, $-77\times 1=-77$

PRACTICE PERIODS: 8 to 14	MULTIPLICATION OF INTEGERS,MULTIPLICATION OF A POSITIVE AND A NEGATIVE INTEGER, MULTIPLICATION OF TWO NEGATIVE INTEGERS		
CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)
KEY WORDS READING	Teacher writes the key words from previous class's teaching period and asks children to read and write them in note books * Associativity * Identity * Inverse	Whole class activity : one child comes to the board and reads the key words loudly and the remaining class follows.	Every child comes to the board and reads the key words and notes them down in their note books
SIMILAR LINES READING	Teacher performs some operations on Rational Numbers and cites the name of the property involved in them and asks children to frame some more by watching similar lines $\left(\frac{2}{3}+\frac{1}{2}\right)+\frac{3}{4} \neq \frac{2}{3}+\left(\frac{1}{2}+\frac{3}{4}\right)$ ociativity is not satisfied in tionals $-\frac{15}{8}\times 1 = 1\times\frac{-15}{8}=\frac{-15}{8}$ 1 is the multiplicative identity in Rationals	Each group watches the similar lines and frames some more	Every individual frames some more statements by watching the similar lines
SUMMARY/ SYNOPSIS	Teacher once again writes important key words tabular form of properties of rationals and asks children to note down and adopt.	Pupil groups will read and adopt the procedure	Teacher focuses on every individual so that each one learns properties in successive upcoming practice sessions
WRITING/ EDITING	Teacher gives some questions from Try These sections of pg no: 9 and asks children to solve those sums and teacher checks the writings of children	One group will check the writings of the other and vice versa	

TEACHING PERIOD : 3	DISTRIBUTIVITY OF MULTIPLICATION OVER ADDITION FOR RATIONAL NUMBERS		
CONCEPTS/STEPS	**TEACHER ACTIVITY (I DO)**	**GROUP ACTIVITY (WE DO)**	**INDIVIDUAL ACTIVITY (YOU DO)**
KEY WORDS	Brain storming session involving children with key words * Distributivity of multiplication over addition	* Students read the key words and answer the	Every Pupil will read and write the key words in their note
CONCEPTUAL UNDERSTANDING	Teacher demonstrates the concept of distributivity of multiplication over addition using some illustrations and induces the distributivity law from the inferences if a,b,c are any three rational numbers then $a \times (b+c) = (a \times b) + (a \times c)$ $$\text{Let } a \times (b+c) = \frac{3}{4} \times \left(\frac{-2}{3}+\frac{3}{7}\right) = \frac{3}{4} \times \left[\frac{(-2\times7)+(3\times3)}{21}\right]$$ $$= \frac{3}{4} \times \left[\frac{-14+9}{21}\right] = \frac{3}{4} \times \frac{-5}{21} = \frac{-5}{4\times7} = \frac{-5}{28} \quad ....(1)$$ $$(a \times b)+(a \times c) = \left(\frac{3}{4}\times\frac{-2}{3}\right)+\left(\frac{3}{4}\times\frac{3}{7}\right)$$ $$= \frac{-6}{12}+\frac{9}{28} = \frac{(-6\times7)+(9\times3)}{84} = \frac{-42+27}{84} = \frac{-15}{84}$$ $$(a \times b)+(a \times c) = \frac{-5}{28} \quad ....(2)$$	Hetrogeneous groups are created and different numbers are given and were asked to check the distributivity with them in rational numbers	Every child participates in the learning activity and understands the concept of distributivity
SUMMARY	Teacher writes the summary showing how to prove distributivity in ratioinals on the black board and asks children to read write and note down	pupils will note down and read the summary in groups	every individual reads the summary and notes it down and adopts the procedure
ASSESSMENT	Teacher gives some questions from exercise 1.1 and asks children to solve those sums	every group will do the sums by discussion among each other	every individual solves the sums on their own

PRACTICE PERIODS: 15 to 21	DISTRIBUTIVITY OF MULTIPLICATION OVER ADDITION FOR RATIONAL NUMBERS		
CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)
KEY WORDS READING	Teacher writes the key words from previous class's teaching period and asks children to read and write them in note books * Distributivity of multiplication over addition	Whole class activity : one child comes to the board and reads the key words loudly and the remaining class follows.	Every child comes to the board and reads the key words and notes them down in their note books
SIMILAR LINES READING	Teacher verifies the distributivity of rationals in a set of numbers and asks children to verify in some more different numbers watching these similar lines $a \times (b + c) = \frac{-1}{2} \times \left(\frac{2}{3} + \left(\frac{-5}{6} \right) \right) = \frac{-1}{2} \times \left(\frac{(2 \times 2) + (-5 \times 1)}{6} \right)$ $= \frac{-1}{2} \times \left(\frac{4 + (-5)}{6} \right) = \frac{-1}{2} \times \left(\frac{-1}{6} \right)$ $a \times (b + c) = \frac{1}{12}$ ......(1) $(a \times b) + (a \times c) = \left(\frac{-1}{2} \times \frac{2}{3} \right) + \left(\frac{-1}{2} \times \left(\frac{-5}{6} \right) \right)$ $= \frac{-2}{6} + \frac{5}{12} = \frac{(-2 \times 2) + 5 \times 1}{12} = \frac{-4 + 5}{12}$ $(a \times b) + (a \times c) = \frac{1}{12}$ ....(2)	Each group will read the similar lines and will frame some more by discussion	Every Individual prepares their own similar lines using the lines prepared by the teacher
SUMMARY/ SYNOPSIS	Teacher once again writes important key words and table of properties and asks children to read ,note down and adopt.	Pupil groups will read the table of properties and utilize	Teacher focuses on every individual so that each one knows and adopts the different properties in successive upcoming practice sessions
WRITING/ EDITING	Teacher asks children to solve the sums of exercise 1.1 on their own and teacher checks the writings of children	One group will check the writings of the other and vice versa	