LESSON PLAN 5

CLASS : 8 TEACHER'S NAME :

NAME OF THE UNIT	SUB-TOPICS	NO OF PERIODS REQUIRED			Time line for teaching	
		Teaching	Practice	TOTAL	From	To
SQUARES AND SQUARE ROOTS	5.1 INTRODUCTION 5.2 PROPERTIES OF SQUARE NUMBERS 5.3 SOME MORE INTERESTING PATTERNS	1	1	2		
	5.4 FINDING THE SQUARE OF A NUMBER 5.4.1 OTHER PATTERNS IN SQUARES 5.4.2 PYTHAGOREAN TRIPLETS	1	1	2		
	5.5 SQUARE ROOTS 5.5.1 FINDING SQUARE ROOTS 5.5.2 FINDING SQUARE ROOT THROUGH REPEATED SUBTRACTION 5.5.3 FINDING SQUARE ROOT THROUGH PRIME FACTORISATION	1	2	3		
	5.5.4 FINDING SQUARE ROOT BY DIVISION METHOD 5.6 SQUARE ROOTS OF DECIMALS	1	2	3		
	TOTAL	4	6	10		

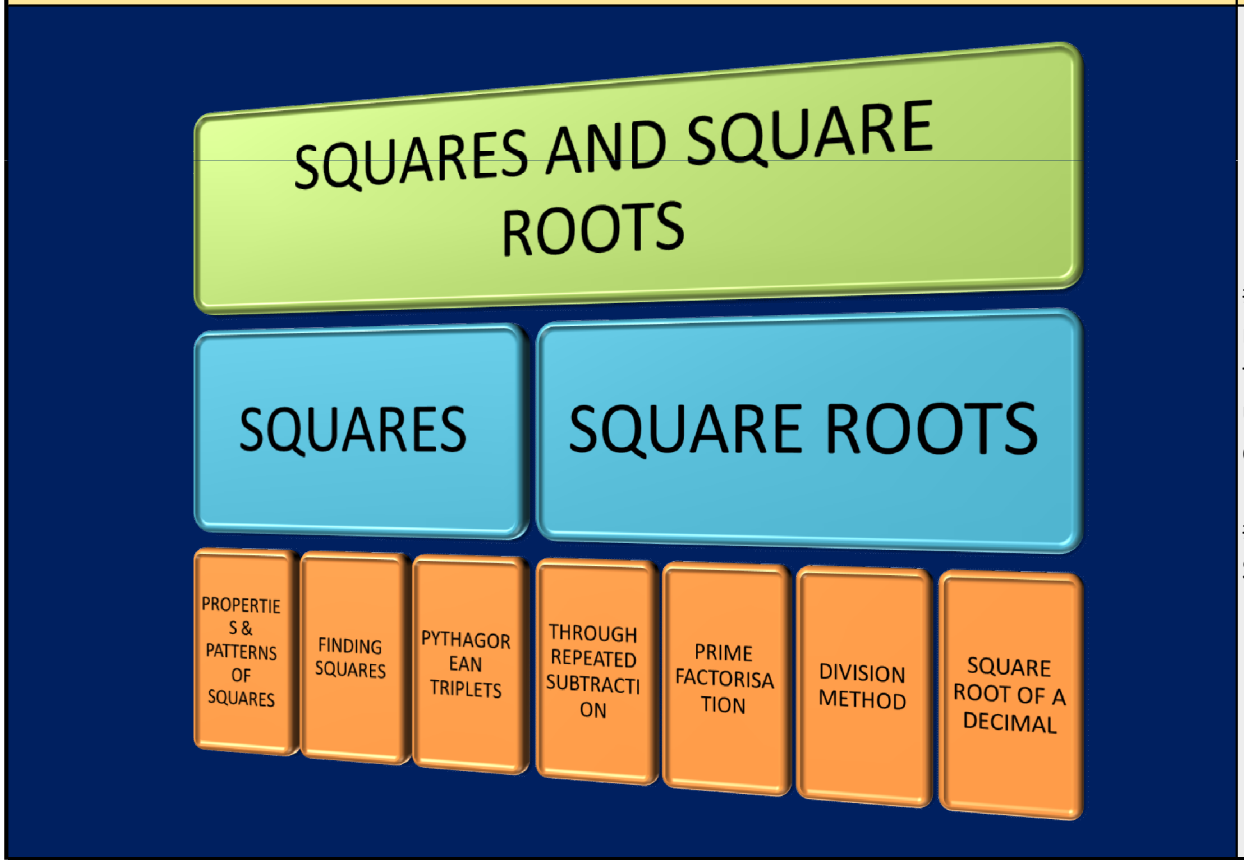
PRE-REQUISITES	KEY CONEPTS	KEY VOCABULARY	
	Every Pupil is expected to have basic knowledge in # identifying place values # knowing squares of numbers at least from 1 to 9 # different geometric shapes like triangles, squares etc., # writing factors of different numbers # performing four fundamental operations like +,-,x,÷	# Squares # Square numbers # Perfect squares # Patterns # Triangular Numbers	# Pythagorean triplets # Square roots # Prime Factorisation # Estimation

Learning Outcomes

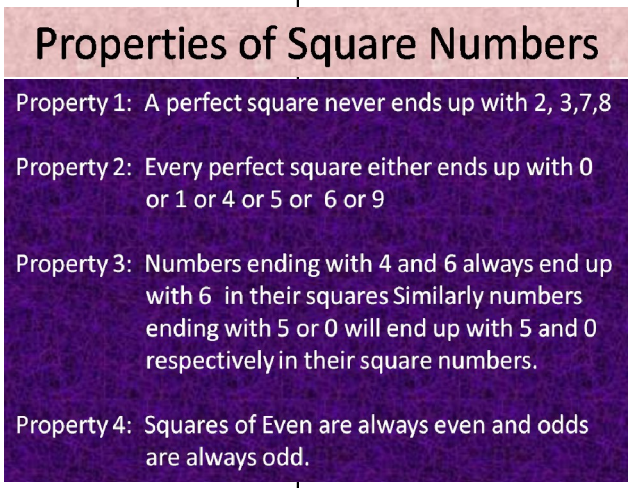
After Completion of this lesson every student will be able to

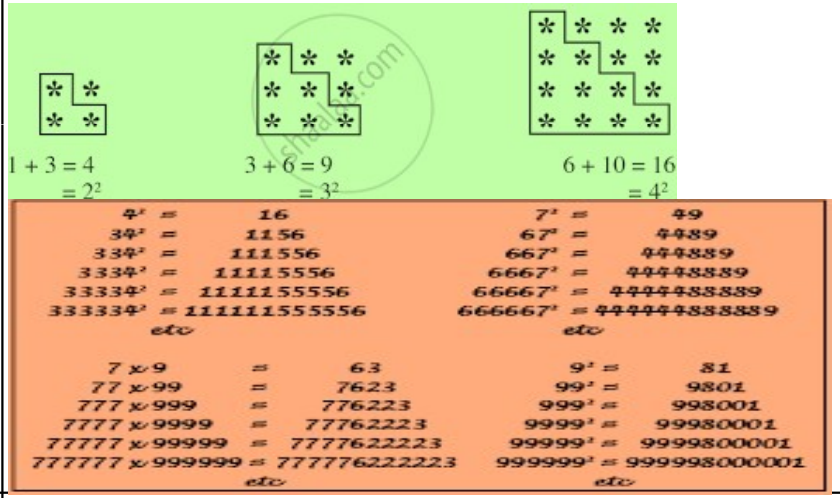
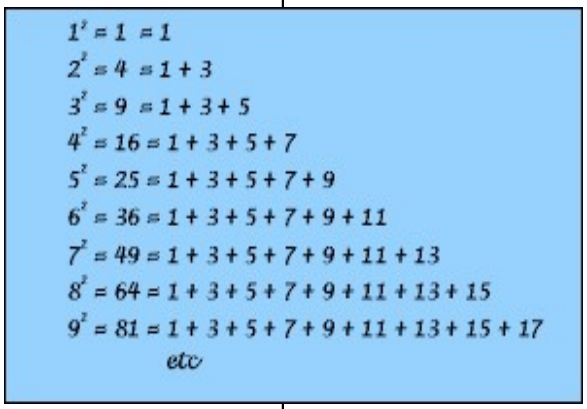
 # recognize different patterns among numbers
 # find the square of any given number
 # find the square root of given number by using appropriate methods like repeated subtraction or Prime factorisation or division method
 # find the square root of decimals and whole numbers both by division method as well as by estimation.
 # recognize the significance and appreciate the importance of the concept of squares and square roots in real life situations.

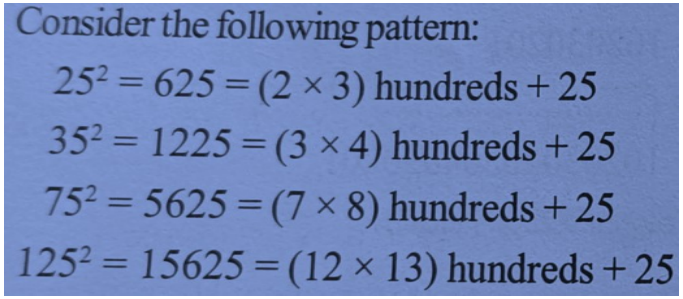
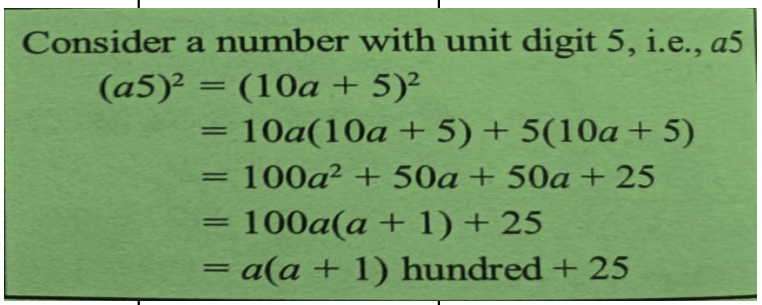
Teaching Learning Process

MIND MAPPING	Experience & Reflection
	# Pupils will recollect their knowledge on numbers multiplication and findind squares of numbers from 1 to 9 and different patterns and now will utilize the knowlede here and learn the new concept of Squares and Roots # Students will experience the knowledge on Squares and Square roots in real life situations.

TEACHING PERIOD : 1	INTRODUCTION, PROPERTIES OF SQUARE NUMBERS, SOME MORE INTERESTING PATTERNS		
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 # Squares # Squares of numbers # Patterns # perfect squares # Triangular Numbers	* 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 "SQUARES AND SQUARE ROOTS" 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 introduces the concept of properties of square numbers by recalling their multiplicative capabilites. Teacher draws the attention of children towards the Unit's Place of the squares from 1 to 20 and guides them to notice that unit's place of any perfect square will end up with either 0 or 1 or 4 or 5 or 6 or 9. Pupil groups are engaged to participate in an activity to guess the last digit of the square of any given number and are also aksed to guess the chances of a given number for being a perfect square Teacher conducts some more activities in groups to arrange numbers in triangular shape and asks children to observe and calculate the sum of no of dots of two consecutive triangular numbers will make a perfect square. Teacher draws a deduction out of several inductive statements depicting the number of non perfect square numbers existing between each pair of consecutive perfect squares as $(n+1)^2-n^2=2n+1$ Teacher guides children to observe the pattern of sum of consecutive odd numbers will yield into a perfect square of the number of odds taken. Teacher also draws attention of children towards remaining other different patterns and sees that every child is acquainted with these patterns of square numbers.	Hetrogeneous groups are formed and are engaged in different activities to ascertain learning of the concept	Each student in the group participates in the activity and learns the concept
LEARNING ACTIVITY			
SUMMARY	Teacher writes the summary of the concept and different properties of square numbers and asks children to note and read and adopt	pupils will note down and read the summary in	every individual reads the summary and notes it down
ASSESSMENT	Teacher asks children to solve the sums of try these sections and some sums of exercise 5.1	every group will do the sums by discussion among each other	every individual solves the sums on their own

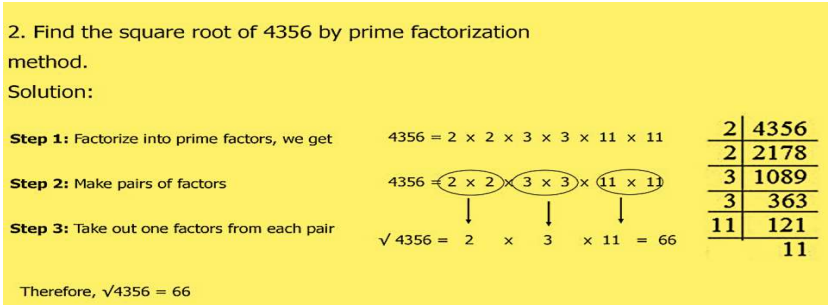
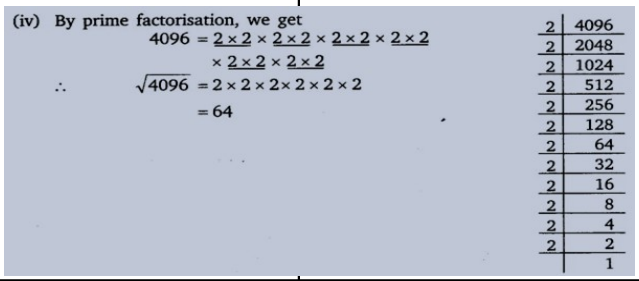


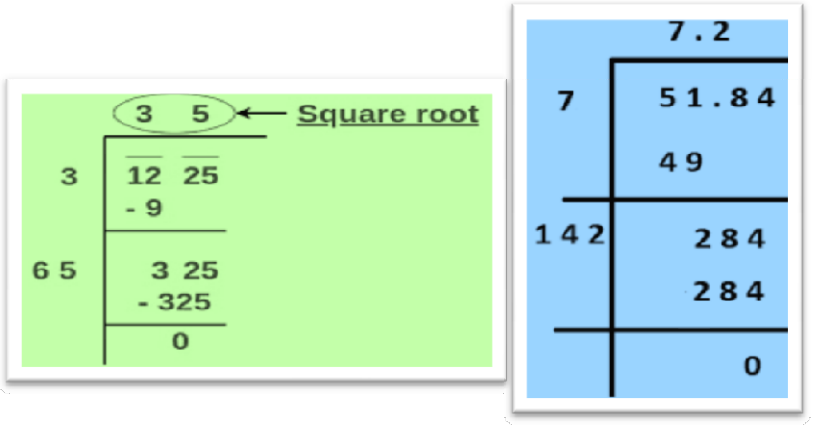
PRACTICE PERIOD: 1	INTRODUCTION, PROPERTIES OF SQUARE NUMBERS, SOME MORE INTERESTING PATTERNS		
CONCEPTS/STEPS	**TEACHER ACTIVITY (I DO)**	**GROUP ACTIVITY (WE DO)**	**INDIVIDUAL ACTIVITY (YOU DO)**
KEY WORDS READING	Teacher writes the key words from previous class's teaching period and asks children to read and write them in note books # Squares # Squares of numbers # Patterns # perfect squares # Triangular Numbers	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 interesting patterns invoving square numbers and asks children to write some more by watching similar lines 	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 procedure adopted in guessing squares 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 as well as examples and exercise sums of 5.1 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

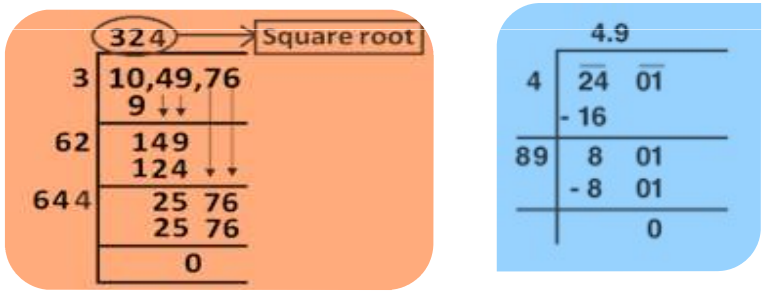
TEACHING PERIODS : 2	FINDING THE SQUARE OF A NUMBER, OTHER PATTERNS IN SQUARES, PYTHAGOREAN TRIPLETS		
CONCEPTS/STEPS	**TEACHER ACTIVITY (I DO)**	**GROUP ACTIVITY (WE DO)**	**INDIVIDUAL ACTIVITY (YOU DO)**
KEY WORDS	Brain storming session invoving children with key words # Patterns # perfect squares # Pythagorean triplets	* 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 introduces the concept of finding squares by using algebraic identities like $(a+b)^2$, $(a-b)^2$ and some more patterns by some illustrations and will guide children in an activity of framing pythagorean triplets and finally drawing a conclusion that pythagorean triplets will be of the form 2m, m^2-1, m^2+1 Teacher here introduces some interesting tricks / patterns while finding squares of numbers like 15^2 , 25^2, 35^2. Teacher also draws the attention of children towards this trick which works well in multiplying any pair of numbers (not necessarily be equal) having sum of the digits in one's place of both the numbers is 10 and the remaining part in all other places is same for both the numbers.   	pupils are divided into hetrogenous groups and are engaged in the activity	Each student in the group participates in the activity and learns the concept
SUMMARY	Teacher once again writes important key words and summary of the concept discussed 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, example sums,exercise sums of 5.2 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: 2	FINDING THE SQUARE OF A NUMBER, OTHER PATTERNS IN SQUARES, PYTHAGOREAN TRIPLETS		
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 # Patterns # perfect squares # Pythagorean triplets	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 finds the square of some numbers along with some examples of pythagorean triplets and asks children to write some more by watching similar lines. $(103)^2 = (100+3)^2$ $= (100)^2 + 3^2 + 2 \times 100 \times 3$ $= 10000 + 9 + 600$ $= 10609$ $(98)^2 = (100-2)^2$ $= (100)^2 + (2)^2 - 2 \times 100 \times 2$ $= 10000 + 4 - 400$ $= 9604$	Each group watches the similar lines and writes some more	Every individual solves some more statements by watching the similar lines
SUMMARY/ SYNOPSIS	Teacher once again writes important key words and summary 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 the concept in successive upcoming practice sessions
WRITING/ EDITING	Teacher gives some questions from Try These sections and exerise sums of 5.2 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	SQUARE ROOTS, FINDING SQUARE ROOTS, FINDING SQUARE ROOT THROUGH REPEATED SUBTRACTION, FINDING SQUARE ROOT THROUGH PRIME FACTORISATION		
CONCEPTS/STEPS	**TEACHER ACTIVITY (I DO)**	**GROUP ACTIVITY (WE DO)**	**INDIVIDUAL ACTIVITY (YOU DO)**
KEY WORDS	Brain storming session involving children with key words # Square roots # Prime factorisation # Estimation	* Students read the key words and answer the questions to the teacher	Every Pupil will read and write the key words in their note books
CONCEPTUAL UNDERSTANDING	Teacher introduces the concept of finding a square root for any perfect square number through the process of repeated subtraction of odd numbers beginning from 1 by some illustrations. Later teacher recalls the knowledge on prime factorisation with which pupils are already familiar with in class 6th and now introduces the process of finding square root through prime factorisation. Teacher engages children in an activity of finding square root through prime factorisation by dividing them into hetrogeneous groups.	Hetrogeneous groups are created and are engaged in the activity of finding square roots through prime factorisation.	Every child participates in the learning activity and understands the concept
LEARNING ACTIVITY	From 100, we subtract successive odd numbers starting from 1 as under: $100-1=99$, $99-3=96$, $96-5=91$ $91-7=84$, $84-9=75$, $75-11=64$ $64-13=51$, $51-15=36$, $36-17=19$ $19-19=0$ And obtain 0 at 10th step. $\therefore \sqrt{100}=10$ From 169, we subtract successive odd numbers starting from 1 as under: $169-1=168$, $168-3=165$, $165-5=160$ $160-7=153$, $153-9=144$, $144-11=133$ $133-13=120$, $120-15=105$, $105-17=88$ $88-19=69$, $69-21=48$, $48-23=25$ $25-25=0$ and obtain 0 at 13th step. $\therefore \sqrt{169}=13$	(i) By prime factorisation, we get $729 = 3\times3\times3\times3\times3\times3$ $\therefore \sqrt{729} = 3\times3\times3$ $= 27$ 3 | 729 3 | 243 3 | 81 3 | 27 3 | 9 3 | 3 1 (ii) By prime factorisation, we get $400 = 2\times2\times2\times2\times5\times5$ $\therefore \sqrt{400} = 2\times2\times5$ $= 20$ 2 | 400 2 | 200 2 | 100 2 | 50 5 | 25 5 | 5 1		
SUMMARY	Teacher writes the summary and step wise procedure adopted in finding the square root of a perfect square using repeated subtradtion and prime factorisiation 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 5.3 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: 3,4	SQUARE ROOTS, FINDING SQUARE ROOTS, FINDING SQUARE ROOT THROUGH REPEATED SUBTRACTION, FINDING SQUARE ROOT THROUGH PRIME FACTORISATION		
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 # Square roots # Prime factorisation # Estimation	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 finds the square root of some numbers through prime factorisation and asks children to find square roots of some more numbers similarly by observing the lines  2. Find the square root of 4356 by prime factorization method. Solution: **Step 1:** Factorize into prime factors, we get $4356 = 2 \times 2 \times 3 \times 3 \times 11 \times 11$ **Step 2:** Make pairs of factors $4356 = (2 \times 2) \times (3 \times 3) \times (11 \times 11)$ **Step 3:** Take out one factors from each pair $\sqrt{4356} = 2 \times 3 \times 11 = 66$ Therefore, $\sqrt{4356} = 66$ 2 | 4356 2 | 2178 3 | 1089 3 | 363 11 | 121 11	Each group will read the similar lines and will frame some more by discussion  (iv) By prime factorisation, we get $4096 = 2\times2 \times 2\times2 \times 2\times2 \times 2\times2 \times 2\times2 \times 2\times2$ $\therefore \sqrt{4096} = 2\times2\times2\times2\times2\times2$ $= 64$ 2 | 4096 2 | 2048 2 | 1024 2 | 512 2 | 256 2 | 128 2 | 64 2 | 32 2 | 16 2 | 8 2 | 4 2 | 2 1	Every Individual prepares their own similar lines using the lines prepared by the teacher
SUMMARY/ SYNOPSIS	Teacher once again writes important key words and procedure of finding square root and asks children to read ,note down and adopt.	Pupil groups will read the summary and procedure and utilize	Teacher focuses on every individual so that each one learns the concept in successive upcoming practice sessions
WRITING/ EDITING	Teacher asks children to solve the sums of exercise 5.3 on their own and teacher checks the writings of children	One group will check the writings of the other and vice versa	

TEACHING PERIOD : 4	FINDING SQUARE ROOT BY DIVISION METHOD, SQUARE ROOTS OF DECIMALS		
CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE	INDIVIDUAL ACTIVITY (YOU
KEY WORDS	Brain storming session involving children with key words # Square roots # continuous division # Estimation # Quotient # Decimal Numbers	* Students read the key words and answer the questions to the teacher	Every Pupil will read and write the key words in their note books
CONCEPTUAL UNDERSTANDING LEARNING ACTIVITY	Teacher illustrates the process of finding square root for given number by using division method through some examples and engages children in an activity of finding square root of the given numbers by division. Laer teacher illustrates the process of finding square root of decimal numbers by division method and conducts similiar activity as they participated in the case of finding square root of whole numbers.  	Hetrogeneous groups are created and are engaged in the activity of finding square roots through division method.	Every child participates in the learning activity and understands the concept
SUMMARY	Teacher writes the summary as well as the step wise procedure adopted in finding the square root of any given number whether it is a whole or a decimal 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 5.4 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: 5,6	FINDING SQUARE ROOT BY DIVISION METHOD, SQUARE ROOTS OF DECIMALS		
CONCEPTS/STEPS	**TEACHER ACTIVITY (I DO)**	**GROUP ACTIVITY (WE**	**INDIVIDUAL ACTIVITY (YOU**
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 # Square roots # continuous division # Estimation # Quotient # Decimal Numbers	Whole class activity : one child comes to the board and reads the key words loudly and the remaining	Every child comes to the board and reads the key words and notes them down in their note books
SIMILAR LINES READING	Teacher finds the square roots of some whole and decimal numbers through division method and asks children to do some more by observing similar lines  	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 step wise procedure adopted in finding square root of whole numbers/ decimals and asks children to read ,note down and adopt.	Pupil groups will read the summary and procedure and utilize	Teacher focuses on every individual so that each one learns the concept in successive upcoming practice sessions
WRITING/ EDITING	Teacher asks children to solve the sums of exercise 5.4 on their own and teacher checks the writings of children	One group will check the writings of the other and vice versa	