STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING -CHENNAI – 06 TNCF – 2017 – DRAFT SYLLABUS –

MATHEMATICS

STANDARD 1 -10

GRADATION OF PRIMARY MATH CONTENT

TOPIC	CLASS 1	CLASS 2	CLASS 3	CLASS 4	CLASS 5
GEOMETRY	**Introduction to spatial orientation** • To build a sense of spatial orientation. • To understand spatial relationship. • To understand the meaning of and use appropriate spatial vocabulary *Eg. Top, Bottom, On, Under, Inside, Outside, Above, Below, Near, Far, Before, After, Front* *- Rear , More -Less, Thin - Fat and Big - Small* **Introduction to shapes in real objects and its attributes** • To correlate concrete things to their shapes • To Learn vocabulary related to nature of shapes *Eg. Shapes, round, corner, edge, surface, plain, long & short.* **Introduction to basic shapes (2D)** • To know basic names of shapes like square, circle, oval, rectangle, triangle • To observe and describe objects from the surroundings having different sizes and shapes like pebbles, boxes, balls, pipes, bottle caps, pencil and eraser.	**Introduction to spatial orientation- 3D dimensional** • To observe objects in the environment and gets an intuitive feel for their geometrical attributes **Identification of 2D shapes and 3D objects in everyday life** • To identify the basic 3D shapes such as cube, cuboid, cylinder, cylindrical, cone, conical, sphere and spherical by their names. **Introduction to properties of shapes** • To trace the 2-D outlines of 3-D objects. • To Observe and identify these 2-D shapes viz., rectangle, square, triangle, circle by their names with 3 D objects • To describe intuitively the properties of these 2-D shapes. • To identify objects by blind folded and to use the vocabulary such as curve, straight line, circle, cylinder, sphere, cone, square, rectangle, triangle, circle , corner etc. **Introduction to draw different kind of lines and figures of 2D and 3D.** • Identifies and makes straight lines by folding, straight edged objects,	**Creating 2 – D shapes** • To create shapes through paper folding, paper cutting • To identify 2-D shapes. • To describe the various 2-D shapes by counting their sides ,corners (vertices) and diagonals • To make shapes on the dot- grid using straight lines and curves. **Tangram** • Create shapes using tangram pieces • Matches the properties of 2D shapes by observing their sides and corners (Vertices) • To tile a given region using a tile of a given shape • Distinguishes between shapes that tile and that do not tile **constructing 3 – D objects** • To be able to draw 3-D objects. • Describe the various 3D shapes by counting their sides, corners and diagonals	**Properties of 2 – D shaped objects** • To learn names of shapes like triangle, square, rectangle, pentagon, circle etc., • To recognize these shapes in the objects around them. • Able to draw circles using objects like bangles , bottle caps etc., • Able to draw a 2D shapes free hand and with geometry tools. • To identify centre, radius and diameter of a circle. • To identify sides, diagonal, perimeter for a quadrilateral objects. • To measure and find out the differences among different quadrilateral objects • To understand the properties of 2D objects **Creating shapes by combining different 2 – D shapes** • Uses Tangram to create different shapes. • Able to fill space using tiles of geometrical shapes using one or two shapes • Able to choose a tile among a given number of tiles that can tile a given region both intuitively and experimentally. **Properties of 3 – D objects** • To create 3D objects using Clay and paper folding given nets • To compare and differentiate 2D and 3D objects	**Drawing 3–D shapes from 2–D Shapes** • To get the feel of perspective while observing drawings of 3-D objects in 2-D. • Able to explore intuitively rotations and reflections of familiar 2-D shapes. • Able to explore intuitively symmetry in familiar 3-D shapes like in alphabets. • Able to make the shapes of cubes, cylinders and cones using nets especially designed for this purpose **Introduction to angles** • To get the feel of an angle through observation of objects in their environment and paper folding. • To learn the names of angles like acute, obtuse and right angle. • Able to identify right angles in the environment. • Able to classify angles into right, acute and obtuse angles. • To represent right angle, acute angle and obtuse angle by drawing through tracing. **Area and perimeter (to be given in activities only)** • to determine area and perimeter of simple geometrical figures (such as tangle/square using standard units)

				Introduction to Symmetry	**Introduction to Fractals**
	•	stretched strings and draws free hand and with a ruler		• Able to explore intuitively the reflections through mirror, ink blots, paper cutting and paper folding.	• Observes and understands fractals
	• To draw the border of objects and represent in 2D	• To distinguish between straighten s curved lines		• Able to draw top view, front view and side view of simple objects.	Create model of fractals using clay, paper, glue and match sticks
	(Eg. Draw rectangle with border of eraser/pencil box)	• To identify objects by observing their shadows		• To observes from the surrounding and from day to day life situations and identifies symmetrical objects. Eg: Vertical dissection of human body (externally), butterfly, petals of flowers, design of a fabric, starfish etc.	
	Introduction to draw straight lines			• Collects/ records symmetrical objects whenever/ wherever they see	
	• To draw horizontal, vertical and slant lines (free hand)			• To draw such symmetrical objects and naming the same.	
	• To draw /represent straight lines in various orientations (vertical, horizontal, slant)			**Iterative patterns in shapes**	
	Differentiating, Sorting and classifying object based on shapes, locations and space			• Able to draw circles, spirals, ovals;	
	• To collect objects from the surroundings and differentiates, Sorts, classifies and describes those objects on the basis of shapes and other observable properties			• To differentiate and to compares the shapes drawn.	
	Eg .Sound produced by group of students within outside the class, same done by one child (within the class and outside the class).			• To explore visual examples of repeating patterns.	
	Observes and describes the way shapes affect movements like rolling and sliding.				
NUMBERS	**Numbers from 1 to 9**	**Numbers from 21 to 99**	**Numbers sequence up to 1000**	**Number Sequence up to 10000**	**Numbers beyond 10000**
	• To observe objects and make collection of objects	• To learn numbers by rote from 21 to 99.	• To read and write all 3-digit numbers.	• To read and write 4 – digit numbers (including odd and even numbers)	• to know numbers beyond 1000 being used in real life situation
	• To arrange the collection of objects in order by	Write numerals for Twenty-one to Ninety nine	• To expands a number with respect to place values	• To write numbers with respect to place value expansion.	**Place value and comparing numbers**
	– Matching and	**Counting**	Counts in different ways – starting from any number	**Comparing numbers**	• To find place value in numbers beyond 10000.
	– One to one correspondence	• *Group objec*ts in category.(eg: group the names based on alphabets)	**Compare Numbers**	• Able to sequence an arbitrary array of numbers in ascending and descending order.	
	• To count the number of real objects in a collection.(concrete)	• Count the objects in each category(eg: count the number of number of students name starting "A", number of students name starting "B"…)	• To identify odd and even numbers with respect to ones place upto 3 digit numbers	• Able to form greatest and smallest numbers using given digits	
	• To count the number of objects by representing them in the form of pictures(semi-concrete)		• To be able to forms greatest and smallest numbers using given digits.	**Addition and subtraction within 10,000**	
	–		To be able to sort an array of numbers into ascending and descending order	• To add and subtract up to four digit numbers by writing them vertically in the following two cases: without grouping, with grouping (sum should not exceed 10.000).	

• To make collection of objects corresponding to a specific number • To recognize and speak numbers from 1 to 9. • To use numbers from 1 to 9 in counting and comparison. (Real objects and repeated events like clapping/jumping to be used for counting) • To read and write numerals from 1 to 9. • To identify the ordinal • To match the ordinal numbers with objects in order of size **Concept of "Zero"** • To introduce the concept of "no objects" give the symbol zero to represent it. • To approach zero through real life situation (such as there are 5 papers lying on the floor, how many remaining? Or there are 5 waste papers lying on the floor, ask the child to put in the garbage bin one by one. Let the children count and say eg: 1 in the bin, 4 on the floor, ….finally nothing or zero on the floor, 5 in the bin) **Introduction to Number 10** To know and use the number 10	• To group objects into 'tens' and 'ones' • To draw representation for groups of tens and ones • To group a number into tens and ones • To identify the predecessor and successor up to 99. • To identify numbers" in between" Eg: 24, _ _, 26. • To skip count by twos forward to backward up to Ninety-nine. • To skip count by threes forward to backward up to Ninety-nine. • To introduce odd and even numbers **Ordering** • To arrange numbers till hundred in ascending and descending order • To able to form the greatest and the smallest 2-digit numbers with and without repetition of given digits. • To arrange things in sequential order. (eg: arrange names of the classmates, alphabetically).	**Ordering** • To arrange things in different orders for a given solution.(eg: finding out different ways to prove that 3 and 5 make 8, by arranging numbers in different orders) **Addition and Subtraction within 1000** • Able to add and subtract numbers by writing them vertically in the following two cases: (Sum should not exceed 1000) - Without regrouping. - With regrouping. To use the place space value in standard algorithm of addition and subtraction. • Able to solve addition and subtraction of simple problems in different daily life situations presented through pictures and stories. • To frame problems for addition and subtraction facts • To estimate the sum of, and difference between, of two given numbers	**Multiplication (up to 2 digit number by 2 digit number and 3 digit number by single digit number)** • Able to do elementary multiplication of 2-digit by2- digit and 3- digit by single digit numbers using lattice algorithm and the standard (column) algorithm • Able to reason out the results of operations down on specified numbers • Able to write tables up to 10× 10. **Division: up to 4 digit number by single digit number.** • To divide a given number by another number in various ways. • To apply the four operations to life situations. • To frame word problems. • To estimate sums, differences and products of simple two digit numbers to nearest tens or hundreds. •	• Able to sequence an arbitrary array of numbers up to five digits in ascending and descending orders. • To form the greatest and smallest numbers using four and five digits. **Numbers and operations** • To appreciate the role of place value in addition, subtraction and multiplication algorithms. • To multiply 3 digits by 2 digits • to use informal and standard division algorithm • To divide 4 digits by 2 digits **Introduction to square numbers** • to understand the term square numbers • to find out square numbers up to 100 **Factors and multiples.** • Understand the meaning of factors and multiples To identify least common multiple(LCM) **Mental Arithmetic** • Able to estimate sums, differences, products and quotients up to two digits numbers and verifies using approximation. **Systematic ordering:** Logically find out something based on the condition.(Eg: the child should be able to investigate and find the number of possible routes from one location to another on a map/maze; find out different words that can be made using five given letters; meaningful)

.Counting	Place value and comparing the numbers	Multiplication	Mental Arithmetic	
• To count the objects.(Eg: count the number of books in the bag; the child should be able to tell the total and ensures that the child has counted everything once) • To estimate, verify and justify the counted value. • To be able to count the objects, mentally & silently; • To be able to relate last number counted with the total number of objects **Numbers from 11 to 20** • To form number sequence from 11 to 20 • To count object using these numbers • To group objects into a group of 10s and single objects • To develop the vocabulary of group of tens and ones. • To show the group of tens and ones by drawing • To count the number of tens and ones in a given number. • To write the numerals for eleven to twenty. **Addition (of single digit numbers whose sum is less than 10) and Subtraction of numbers without conversion** • To write numerals for ten and twenty • To Compare numbers up to 20 • To get introduced to vocabulary like total, together, altogether etc.,to denote addition. • To introduce subtraction as "taking away" using real objects. • To understand subtraction as cancelling using pictures. To use vocabulary like difference, take away, less etc., to denote subtraction. • To add and subtract using real objects and pictures.	• To expand a number with respect to place values. • To count and regroup objects into tens and ones • To use the concept of place value to compare numbers **Ordinal and Cardinal numbers** • To indicate and identify the position of an object in a line To learn ordinal and cardinal numbers. **Writing numbers up to 99** • to read and write numbers upto 99 (eg. if number is said, the child should be able to write the number, not necessarily in words. i.e., if teacher said 69, the child be able to write 69 but not necessarily "sixty – nine" **Reading and writing numbers upto 99 in words** • To read and write numbers in words eg: for 69 the child should be able to write sixty nine **Addition & Subtractions up to 99** • To learn addition and subtraction • To add and subtract two digit numbers beginning from concrete representations to abstract • To add zero to a number and subtract zero from a number.	• Multiplies a given number by another number in various ways such as: -by drawing dots -by re-grouping -by repeated addition -by using multiplication facts • Explains the meaning of multiplication • Identifies • Able to construct the multiplication tables of 2, 3, 4, 5 and 10 • To use an appropriate number operation in the life situation of the child / in the child's context To multiply two digit numbers using standard algorithm and Lattice multiplication algorithm **Division** • Able to explain the meaning of division from the context of equal grouping and sharing. • To understand division as repeated subtraction • Able to relate division with multiplication. • Completes division facts: -by grouping -by using multiplication tables. **Mental Arithmetic** • Able to add and subtract single digit numbers and two digit numbers mentally. Able to double two digit numbers mentally (result not exceeding two digits).	• Able to add and subtract multiple of 10 and 100, mentally. Complete multiplication facts by adding partial products, mentally (e.g, 7x6 =5x6+2x6)	

	- To add and subtract the numbers using symbols '+' and '-'. **Addition and Subtraction (up to 20)** - To add and subtract numbers up to 20. -using concrete, tangible objects -using pictures -using numbers - To observe and understand the different orientation in addition and subtraction - To reason out the sum values **Familiarizing numbers up to 20** - To group objects into ones, twos, fives and tens (for numbers till 20). - To identify the predecessor and successor up to 20. - To identify numbers in between **Numbers from 21 to 49/99** - To learn numbers from 21 to 99. - Write numerals for Twenty - one to Ninety nine. - To group objects into 'tens' and 'ones' - To draw representation for groups of tens and ones To represent numbers tens and ones through pictures. - To group a number orally into tens and ones - To identify the predecessor and successor up to 99. - To identify numbers" in between" Eg: 24, _ _, 26. To skip count by twos forward to backward up to Ninety-nine. - To skip count by threes forward to backward up to Ninety-nine [Ensure that this part(Numbers from 21 to 49/99 is an optional, so as to consider the pace of the learner] **Mental Arithmetic** To add two single digits numbers up to sum of 10 mentally	- To understand properties of addition through patterns. To be able to write stories to describe situations that corresponds to the given addition and subtraction facts - To be able to write stories to describe situations that corresponds to the given addition and subtraction facts. - To estimate and check the reasonableness of answers to addition and subtraction problems through discussion. - To be able to write stories to describe situations that corresponds to the given addition and subtraction facts. - To estimate and check the reasonableness of answers to addition and subtraction problems through discussion. **Introduction to Multiplication and division** - To do discussion of situations involving repeated addition and situations involving equal sharing - To learn activities of making equal groups (activity only) **Mental Arithmetic** - To add and subtract single digit numbers mentally.			

PATTERNS	Patterns in Sounds	Patterns in Sounds	Patterns in shapes	Patterns in shapes	Patterns in shapes
	• To identify the patterns in sounds • To make pattern through sounds **Patterns in Colours** • To identify the patterns in colours. • To make pattern through colours. **Patterns in Shapes** To identify the patterns in shapes • To make pattern through shapes. **Patterns in Numbers** • To identify the patterns in numbers. (using elementary examples-single digit numbers) **Patterns in body movements** • To identify the patterns in body movements **Iterative patterns and processes** • To observe and collect similar objects from surroundings such as flowers, leaves; • To draw similar objects and to compare them	• To observe and extend patterns in sequence of sounds. Eg: Patterns of sounds can be extended by tapping benches, feet, clapping etc. • To create patterns by mixing sound and body movements **Patterns in Colours** To observe and extend patterns in sequence o colors. Eg: Patterns of colors can be extended by mixing different colours. **Patterns in shapes** • To create block patterns by stamping thumbprints, leaf prints, vegetable prints, etc. • To create patterns of shapes of a) Regular (eg: in grid) b) Irregular and c) Combinations of a and b **Patterns in numbers** • To observe patterns in different ways of splitting numbers or combining numbers. **Iterative patterns and processes** • Able to draw simple rangoli(eg:3 by 3 pulli Kolams)	• Creates patterns of regular irregular shapes by stamping (eg: by drawing leaves, ink blot diagrams) • Searches for patterns in different ways of combining colours sounds, 2D and 3D shapes • To recognize simple symmetries in shapes and patterns. To create patterns and designs from straight lines and other geometrical shapes **Patterns in numbers** • Able to identify patterns in the numerals for odd and even numbers and in adding odd and even numbers. • To identify patterns in multiplication with, and dividing by 10s. **Iterative patterns and processes** • Able to draw complex rangoli with condition.(eg:drawing more pullikolams, atleast one kolam which is a single curve.) • To explore number patterns obtained by adding different numbers. • To understand through patterns that multiplication is repeated addition, division as repeated subtraction.	• Observes shapes sequence from kaleidoscope • Identifies the patterns in a sequence of shapes • Creates Patterns using shapes sequence **Patterns in numbers** • Able to identify patterns in multiplication and division: multiples of 9. To cast out nines from a given number to check if it is a multiple of nine. Able to identify patterns in multiplication and division by 10s, 100s. **Patterns in Geometry** • Able to identify symmetry in geometrical patterns	• To create patterns using different colours and shapes **Patterns in numbers** • To identify patterns in square numbers and triangular numbers • To relate sequences of odd numbers between consecutive square numbers **Patterns in Geometry** Able to make border strip and tiling patterns. • To make patterns of shapes using different number of angles/ types of angles To get introduced to rotation of angles. To find patterns by rotating angles To make patterns using rotational angles **Iterative patterns** • Able to find patterns in a collection of words

MEASUREMENTS	Introduction to Length	Introduction to measuring (Length) through Standard units	Length (using standard units - cm., m.,)	Length (m., cm., addition, subtraction, conversion and estimation of distance)	Operations on Measured distance mass and capacity
	• **Comparison of Objects Using Length through Non Standard Units.** • To distinguish between near. far, thin, thick, longer/ taller , shorter , high, low, lighter, heavier, bulk • To seriate objects by comparing their length and mass. • To measure short lengths in terms of non- uniform units(in the context of 'games eg., 'Kittipil' 'goligundu', 'naadupudiaatam' or by leaping, jumping, etc.,) To estimate distance, measures length and verifies using non uniform units (e.g. hand span, cubit, etc.,)	• To estimate and measure lengths/distances using uniform non-standard units like a pen cap /pencil, eraser, feet etc • To appreciate the need for standard tool for measuring length, by finding differences in non-standard tools. • To Use a ruler to measure lengths of different objects **Introduction to standard tool for measuring (weight)** • Compare and identifies relationships between two or more objects by their weight. • Appreciates the need for a simple balance • Compares weights of given objects using simple balance **Introduction to volume (capacity)** compares and orders containers as per their capacities on the basis of perception & verifies by pouring out, etc.,	• Able to appreciate the need for a standard unit. • To measure length of objects in their environment using simple aids. • To express appropriate standard units of length by choosing between centimeters and meters. • To understand order of magnitude between cm. , m., and km. as units. • To estimate the length of given object in standard units and verifies by measuring. • To use a ruler to measure length of items used in daily life. • Able to relate centimeter and meter • Appreciate the need for standard tool for measuring length, by finding differences in non-standard tools **Weight (using non-standard)** • Able to weigh objects using non-standard Units. • To understand the concept of conservation of weight (in gm and kg) that applies in a simple balance	• To understand relationship between meter and centimeter; • Able to Convert meter into centimeters and vice versa. • To solve problems involving length and distances. Able to estimate length of an objects in their surrounding up to 1 meter and distance between two given locations in their environment up to 100 meters **Weight (Using standard units Kg., gm., addition subtraction)** • Weighs objects using a balance and standard units • Estimates the weight of an object and verifies using a balance **Volume (Using standard units L.,ml., addition subtraction)** • Able to measure volume of given liquid using containers marked with standard units	Able to apply the four operations in solving problems involving length, weight and volume. Able to relate commonly used larger and smaller units of length, weight and Volume and converts one to the other. To appreciate the volume of a solid body: qualitatively and also by informal measurement.

			Volume (capacity - (using non-standard))	• Able to estimate the volume of a liquid contained in a vessel and verifies by measuring	
			• Able to measure and compare the capacity of different containers in terms of non- standard units.		
			• Appreciate the need for standard tool for measuring volume, by finding differences in non-standard tools		
MONEY	**Notes and coins** • To identify common currency notes and coins • To put together small amounts of money	**Notes and coins** • To add and subtract small amounts of money mentally. • To identify currency – notes and coins • Puts together amounts of money not exceeding Rs. 100/- • To transact an amount using three to four notes. • To compare the rate of same product but different prices. • To use the vocabulary as more amount, less amount, expensive, in-expensive	**Relating rupee and paise** • To understand the relationship between rupee and paise To add and subtract amounts involving rupees and paise amounts of multiples of 10 without re-grouping. **Making bills** • to collect bills for goods/items bought To make rate charts and simple bills	**Estimating cost** • Able to convert rupees to paise. To add and subtract simple amounts of money in denominations of rupees and paise which are multiples of ten using column addition and subtraction with regrouping. • To learn to use operations to find totals, change, multiple costs and unit cost. • Able to estimate roughly the total cost.	**Operations on money** • To apply four operations in solving problems involving money. **Comparing cost** • to collect bills of items bought and compare costs of same items • to find and reasons out for being expensive and inexpensive • to use the vocabulary such as expensive, costly, cheap, affordable, luxurious, inexpensive [Textbook writer has to note the usage of these words, such as when, where and why with examples of using these words in real life situations]
TIME	**Comparison of events based on time** • To Distinguish between events occurring in time using term- earlier and later, old, new, less time , more time, shorter period or longer period, fast, slow, morning, evening, day and night • To observe changes in the position of sun throughout the day with time intervals	**Days, seasons & months** • Able to draw time- Cyclic events(such as day – night; days of the week; events of the day starting from brushing the teeth to sleep) • To get familiar with the days of the week and months of	**Reading date and time (calendar, hours, minutes, am, pm)** • to read a particular day and date • to understand the manufacture and expiry date of different products • To read the time correct to the hour (both digital and analogue). • Tells morning, noon, afternoon, evening, night and midnight. • To sequence	**Time manipulation** • Understands days by week • to use knowledge of days of a week finds the day in previous or upcoming week • Computes the number of weeks in a year • Able to correlate the number of days in a year with the number of days in each month. • To read clock	**Time manipulation** • To use addition and subtraction in finding time intervals in simple cases

	Organizes events based on time • Narrates the sequence of events in a day	the year. • To get a feel for sequence of seasons. • To be able to sequence the events occurring over longer periods in terms of dates/days. **Calculating time** • By using different containers to measure volume observes and calculates time, by using the terms like quick/fast and slow. • To apply the knowledge learnt in money and understands that different modes of transports can be used based on time and money	the events chronologically. **Iterative patterns and processes–Time based** To draw time-Cyclic events of a year(Months, seasons, festivals)	time to the nearest hours and minutes. • Able to express time, using the terms, 'a.m.' and 'p.m.' **[Ensure that the children learn the meaning of prime meridian and ante- meridian from geography/earth science]** • Relates to 24 hour clock with respect to 12 hour clock • Able to estimate the duration of familiar events. • Able to compute the number of days between two given dates. • Use Calendar (interlinking with patterns)	
INTER CON CEPTS	-	-	-	-	**Integrating distance, money and time** • Able to reason out in solving problems by comparing time, money and distance • Able to create problems integrating time, money and distance • To use fractions in the context of units of length, time and money.

FRACTION	-	-	-	**Introduction to natural fractions** • Able to observe items being a part or parts of a whole • Able to find the fractional part of a collection. To identify the notation of fractions • Use the vocabulary as half, quarter, three-fourths, semi, partial and whole • Able to Define Fractions • To compare natural fractions and identifies greater and smaller **Symbolic representation of simple fractions** • Relating parts to whole eg: Filling up water in a measured bottle partially / fixing up puzzles circularly/ vertically/ horizontally in places and completes the whole. • Identifies half, one fourth and three- fourths of a whole. • Identifies the symbols, ¼ , ½, ¾ • Explains the meaning of ¼ , ½, ¾ to appreciate equivalence of 2/4 and ½ and of 2/2, 3/3, 4/4 and 1	**Compare fractions** • Finds a number corresponding to part of a collection in the form of fractions To Compare different simple fraction (½, ¼, ¾ etc) • To identify the terms like numerator and denominator. • To know types of fractions : Proper , Improper, mixed , like, unlike, equivalent **Equivalent fractions** • Able to compare like fractions with denominators up to 20. • Able to estimate the degree of closeness of a fraction to known fractions (½ , ¼, ¾ etc) **Operations of fractions** • Able to do addition and subtraction of like fraction • Able to do multiplication of fractions by single digit numbers **Relationship between Fractions and Decimals** • To introduce the concept of decimal Able to express a given fraction in decimal notation and vice versa
INFORMATION PROCESSING	**1.Systematic Listing** • To collect simple data such as Mode of transport to School, Favorite TV program, favourite food items, Numbers of brothers and sisters etc.,	**1.Systematic Listing** • Listing down all possible things for a given category. (eg: listing down all possible ways of dressing oneself; listing down any pairs of numbers that sums to 20)	**1.Systematic Listing** Listing down all possible things for a given category, with multiple conditions.(eg: listing down all possible ways of dressing	**1.Systematic Listing** • Listing down all possible things for a given category, satisfying for multiple conditions that has conditions for exclusions.	**1.Systematic Listing** • Logically place numbers in a given condition. (eg:the child should be able to solve 4 by 4 Sudoku)

2. Organizing simple data (shape and numbers) • To represents and interprets Simple data sets(eg: in Venndiagram) **3.Modelling** **Puzzles:** • To visualize and arrange parts in order.(Eg: Picture of a dog torn into pieces like head, legs, tail, body. The child has to arrange neatly and form a complete picture of dog, by placing everything intact.) **Making Connections:** • To form a shape, by connecting the numbers in sequence/colors. (eg: Lot of colored dots could be given such that 7 red dots for one shape, 8 blue dots for another shape. Now, the child has to connect similar colored dots to form shape) **4.Following and Devising Algorithms** To enable them to follow simple and different types of procedure[example: simple treasure hunt games]	• Listing down all possible things for a given sub-categories (Eg: finding out all the possible ways of dressing using two shorts and three shirts; Listing down combination of two numbers whose sum is equal to 20) • To collect data through measurement. **Reasoning** • To compare, verify and justify the lists prepared and ensures that the list is complete. (eg: the child should be able to answer, how do you know that you have counted all the possible ways and ensures that it is counted without repetition?) **2.Drawing inference** • Represents data followed by discussions (eg. heights of children, months in which birthdays of the children in the class)	• using 2 half-pants, 1 half-shirt and 2 full-shirts, if full-shirts are not to be worn with half- pants; listing down the number of different four-block-high towers that can be built using blue and red blocks(with the condition that one color for each block); listing down all possible 3-5 lettered meaning full words that starts with letter 'R') **2. Drawing simple apt graphs** • To collect data and represent it in terms of pictograph • Choosing appropriate scale and unit for display through pictographs **3.Drawing conclusion from the represented data** • To draw conclusions from the data by discussing with the teacher **4. Modelling Map making:** • Able to make map of known-areas.(Not necessarily scaled).Eg: Making map of	• (eg: finding out all the possible ways of dressing using 4 shorts and four shirts, one each of colours red, blue, white and black, such that the colour of shorts and shirt is not the same, building towers with blocks of multiple colors; with many different restrictions on how they cannot be arranged; listing down all possible 3-5 lettered meaningful words that starts with letter 'R' and shouldn't end with 'M' and 'T') **2. Drawing inferences from the represented data:** • To collect and represent data in the form of bar graphs and pie-charts • Draws Inferences by discussing with the teacher **3. Modelling Route map:** • Able to locate short and long paths; • Able to find out and check for connectivity between places	**2. Graphical representation of data** • To collect two-dimensional quantitative data • To represent the data in the form of a table To draw a bar graphs and to represent a data and interprets it **3. Modelling** • Marking art using cutouts of circles, rectangles and triangles of different sizes • Create artistic chains with different coloured beads **4. Following and Devising Algorithms** • To enable them to find out easy and difficult ways to solve tasks and justify with reasons the better way (eg. Arranging 50 books Ordered by number on them in 5 rows.)

		• To record data using tally marks • Draws inferences from the data at the appropriate level eg. modes of transport chosen based on time and money can be drawn as a graph **3. Modelling Relations:older, younger** • Understands relationship and expresses it orally (Eg: If Shalini daughter of Saravanan then Saravanan father of Selvi. Then the child should be able to tell what is the relationship between selvi and shalini.) **Relations: Shapes and nature of objects** • **Correlates nature of objects with shapes of containers (**eg: for a given pair of objects, the child should be able to tell which container holds what (through pictures) **4.Following and Devising Algorithms** **Framing and executing instructions** • To equip them to make list of instructions; To enable them to carryout instruction and toensure thatit is carried out correctly • To enable them to carryout a task in different ways(eg.dividing a pile of biscuits amongst students)	school, home, park, or any place • Able to mark routes for the given locations. **5.Following and Devising Algorithms** • Able to devise instructions for going from one location to another on a map • Able to find the quick way of finding 10 more than an less than a given number • Able to find the quick way of adding and, subtracting a number. • Able to explore many tricks to quickly add and subtract.	**4. Following and Devising Algorithms** • Able to break down a bigtask to a list of small tasks (eg. A table to be moved to another room) • To equip them to write down a sequence of instructions; (eg: One group is to write down the sequence of task, one group is to carryout instruction; another group is to ensure that it is carried out correctly	• Able to split bigger tasks into smaller, known tasks(eg. Multiplying two three-digit numbers)

UPPER PRIMARY DRAFT SYLLABUS

TOPIC	CLASS VI	CLASS VII	CLASS VIII
NUMBER SYSTEM – I	**Numbers and operations**. • Understand the concepts of numbers (up to 8 digits), number names and numerals • Understands Indian and international representation of large numbers • Understands estimation as an important tool for large numbers (5 digits and beyond) • Identify smaller/larger numbers, compare using <, >, = symbols, arrange in ascending/ descending order. • Perform the four fundamental operations (answers not to exceed six digits) and applies the right operation in word problems. • Perform operations in the right order using BODMAS rule **Whole numbers** • Understand extension of natural numbers to whole numbers • To represent whole numbers on number line. • Understand the four properties of numbers with emphasizing terminology (closure, commutative, associative, distributive properties over addition and multiplication identity of a numbers). • Identify and appreciate number patterns-ex: triangular numbers and square numbers. **Test of divisibility** • Recall the concepts of factors and multiples with the aid of multiplication tables up to 10. • Understand the rules of divisibility test and apply it to numbers 2, 3, 4, 5 and 10.	**Arithmetic of Integers** • Understand addition and subtraction of integers using number line. • Able to add and subtract integers using real life situation. • Able to multiply and divide integers by whole numbers. • Understand that division by zero is meaningless. • Able to multiply and divide integers by integers. • Solve word problems using the four fundamental operations on integers and applies appropriate operations in word problems. **Properties of Integers** • Understand closure, commutative, associative, distributive properties (multiplication over addition), additive and multiplicative identities, applied to integers. • Understand which properties hold for which operations, and illustrate difference from whole numbers (example: closure property for subtraction) **Decimal Numbers** • Recall the notion of decimal point. • Understand place value in decimals. • Learn the concept of decimals as fractions with denominators of tens and its multiples. • Represent decimal Numbers on Number line. **Arithmetic of Decimals** • Add and subtract decimal numbers. • Able to apply the appropriate operation in word problems-addition and subtraction of decimals. • Multiply and divide decimal numbers. • Able to solve word problems based on decimal numbers (all operations).	**Rational Numbers** Rational Numbers • Understand the necessity for extending fractions to rational numbers. • To represent rational number on number line. • Understand that between any two rational numbers there lies another rational number **Arithmetic of Rational Numbers** • To learn to perform all four operations on rational numbers. • Able to solve word problems on all operations. . **Properties of Rational numbers** • Understand the four properties of rational numbers, additive identity and multiplicative identity. **Simplify Expression with three brackets** • Able to simplify expressions with utmost three brackets. **Powers** • To express numbers in exponential form with integers as exponents. • Understand the laws of exponents with integral powers. • Able to calculate square and square roots of integers. - Square roots using factor method and division method for numbers containing o not more than 4 digits o not more than 2 decimal places (in case of imperfect squares) To recognize cubes and cube roots (only factor method for numbers containing at most 3 digits). • To learn to estimate square roots and cube roots (Learning the process of moving nearer to the required number). • Able to calculate in easy ways and estimate the answer using all four fundamental operations • Able to approximate numbers up to three digits.

	Prime numbers • Recall the classification of even and odd numbers. • Understand the concept of Prime and composite numbers **Factorization** • To factorize 2-digit numbers. • To learn prime factorization of a given number		**PATTERNS AND RELATIONS** Playing with numbers • Understand patterns in Numbers $\sum n, \sum n^2$ etc. Magic Squares
NUMBER SYSTEM-II	**LCM & HCF** • Understand the concepts of HCF and LCM • Understand the concept of co-prime numbers. • Calculate HCF and LCM by prime factorization method and division method. • Deduce the relationship between LCM and HCF and the product of two numbers. • Able to solve word problems with HCF and LCM **Introduction of Integers** • Understand the necessity for extension of whole numbers to negative integers. • Understand that the collection of positive integers, negative integers and zero forms integers. • Represent integers on the number line. • Compare integers and arrange them in ascending / descending order. **Arithmetic of Fractions** • Revise notion of fractions and fraction addition/subtraction • Understand mixed and improper fractions and convert from one to the other • Able to multiply and divide fractions by other fractions • To find the reciprocal of a fraction. • Able to solve word problems that involve fractions (with all four • operations)		

II.Measurements	**Metric Measures** • Recall the conversion of units of length, weight and volume restricting to the units mentioned below. (km, m, cm, mm and similarly units that are in common use in weight and volume). • Able to understand the use of decimal point to convert smaller to larger units • Able to add and subtract quantities with different unit with appropriate conversion **Measures of Time** • Able to read time on a clock (Eg.1:15 min. as quarter pass one) • Use both 12-hour and 24-hour formats to read time and convert from one to another. • Able to find the duration between 2 time instances. • Able to convert from one unit of time to the other – seconds to minutes and hours and vice – versa, days to weeks, years, leap year and vice – versa. **Area and Perimeter** • Understand the concept of area and perimeter of plane figures. • To learn to find the area and perimeter of square, rectangle, right triangle and combined shapes. **Conversion of Square units** • To Convert Square units (Eg. cm^2 to m^2)	**Area and Perimeter** • To revise the concepts of Perimeter and Area of Square, Rectangle, Right triangle and combined shapes. • To determine the area of Parallelogram, Rhombus, and Trapezium and regular hexagon **Circle** • To determine the area and circumference of Circles and its parts. **Area of Pathway** • To calculate the area of Pathway inside and outside the given rectangles and circles applying the concept of area of rectangle and circle respectively.	**Circle** • To introduce the concept of segment and chord. • To find the length of arc, area of sector. **Area and Perimeter of combined Plane Figures.** • Recall the concepts of area & perimeter for various quadrilaterals • Calculate the area of simple combined figures (Not more than three figures placed in juxtaposition) **3-Dimensional Shapes** • Understand representation of 3-dimensional shapes in 2D • Understand representation of 3D objects with Cubes.
III. ALGEBRA	**Introduction to Algebra** • Introduction to variable through patterns and through appropriate word problems and generalizations. • To generate such patterns with more examples. • To solve unknowns through examples with simple contexts (single operations).	**Algebraic Expressions** • Identify constants and variables in a given term of an algebraic expression and coefficients of the terms. • Identify like and unlike terms. • To learn to write the degree of expressions like x^2y etc. • Able to add and subtract algebraic expressions, with integer coefficients • Able to form simple expressions with two variables.	**Revision** • To recall addition and subtraction of expressions. **Algebraic Expressions** • Able to multiply algebraic expressions with integer coefficients • Able to divide algebraic expressions by monomial • Able to understand and avoid some common errors (e.g. 2xx□x,7xxy=7xy)

		Solving simple linear equations • To solve simple linear equations (in contextual problems) (avoid complicated coefficients). **Graphical representation of inequalities in a single variable.** • To represent inequalities of a single variable graphically. **Exponents** • Understand the laws of Exponents (through observing patterns and arrives at generalization.) • $a^m a^n = a^{m+n}$ where m,n $\in$ N • $(a^m)^n = a^{mn}$ where m,n $\in$ N • — $^{-n}$ where m,n $\in$ N, m>n. • To find units digits of large numbers represented by exponents (ex: 23^{50}) by observing patterns **Algebraic identities** • To deduce identities with geometrical proofs, numerical examples and apply it in sums $(a+b)^2 = a^2 + 2ab + b^2$, $(a-b)^2 = a^2 - 2ab + b^2 = a^2 - b^2 = (a + b)(a-b)$. Able to recognize (simple cases only) expressions that are factorizable of the following types $a(x + y)$, $(x \pm y)^2$, $a^2 - b^2$	**Identities** • To recall the identities for $(a + b)^2$, $(a - b)^2$, $a^2 - b^2$ • Able to apply identities in problems • Deduce identities with geometrical proofs, numerical examples and applies it in sums **Factorizations** • Able to recognize (simple cases only) expressions that are factorizable of following types $(a+b)^3$, $(a-b)^3$, $(x+a)(x+b)(x+c)$ **Solving linear equations** • Able to solve word problems that involve linear equations (with simple coefficients) **Graphs:** • Able to plot graphs of simple linear functions (ex: y=5x)
IV. MODELLING	**Ratio and Proportion** • Understand the concept of Ratio • Understand that Proportion is same as the ratio of two. • Able to calculate the needed quantity using unitary method (with only direct variation implied). **Shopping** • Able to prepare a bill. • To verify the bill amount. **Profit and loss** • Able to calculate cost price, Selling Price and Profit/Loss.	**Recall: Ratio and Proportion** • To recall the concept of ratio and proportion. **Indirect and Direct variation** • Understand the concept of indirect variation • Able to differentiate direct and indirect variation and calculate the needed quantity using direct and indirect variation. **Fraction and decimal into percentage** • Understand percentage as a fraction with denominator 100. • Able to convert fractions and decimals into percentages and vice-versa • To solve word problems based on percentage. **Simple Interest** • Able to calculate simple interest.	**Revision** • Profit, Loss and simple interest. **Application of percentage, profit & loss, overhead expenses, Discount, tax.** • To solve slightly advanced problems involving applications of Percentages, Profit & Loss, overhead expenses, Discount, tax. **Compound Interest** • Able to find compound interest through patterns and use it in simple problems. (Compounded yearly up to 3 years or half-yearly up to 3 steps only). • Able to differentiate between simple and compound interest (The numbers used for calculation purpose should be easy - otherwise, calculator can be used.) **Compound variation** • To do problems on compound variation • To solve Time and Work problems– Simple and direct word problems.

V.GEOMETRY	**Introduction to point , line, ray , segment and planes**	**Properties of Parallel lines**	**Properties of Triangles**
	• Understand fundamental geometrical terms -points, lines, rays, segments and planes. • Understand collinear points and concurrent lines, point of concurrency • Understand parallel and perpendicular lines. **Angles and their types** • Understand the concept of angles. • Identify vertex, arms and measure angles. • Understand right, acute, obtuse and straight angles. • Understand complementary & supplementary angles and find complementary and supplementary angles for the given angles. **Types of Triangles** • Able to recognize different kinds of triangles based on (a) length of sides (b) measures of angles. **Symmetry** • Able to find symmetrical objects in Surrounding. • To learn types of symmetry **PRACTICAL GEOMETRY** • To identify Geometrical instruments. • Able to measure and draw line segment. • Able to construct parallel and perpendicular lines using set square. • Able to draw given angles using protractor	• Understand the properties of angles in intersecting lines, adjacent angles, adjacent angles on a straight line, parallel lines and transversal lines. **Properties of Triangles** • Able to apply angle sum property of a triangle. **Congruence triangles properties** • To know the concept of congruency and similarity of triangles. • To know the criteria for similarity of triangles. (SSS, SAS, ASA, RHS). **PATTERNS AND RELATIONS-Symmetry through transformation** • To recall the types of Symmetry through diagram • To learn Symmetry through transformations (Translation, reflection, rotation and their combination) **PRACTICAL GEOMETRY-** **Construction using scale and compass.** • To construct the perpendicular bisector of the given line segment. • To construct the angle bisector of the given angle. • To construct special angles without protractor - 90°, 60°, 30°, 120°. • Construction of triangles: given SSS, SAS, ASA. • To construct circles and concentric circles.	• To recall the properties of triangles. • Understand theorems based on properties of triangles and apply them to appropriate problems. • Understand Pythagoras theorem and solve problems using it. **Concurrent Points of a triangle with definition** • Understand the concurrency of medians, altitudes, angle bisectors and perpendicular bisectors in a triangle. **PATTERNS AND RELATIONS** Playing with numbers • Logical reasoning diagrams **PRACTICAL GEOMETRY-** Circles • Able to draw the parts of a circle and identify and compare the relationship between radius and diameter. **Construction of Quadrilaterals: trapezium, parallelogram, rhombus, rectangle and square** • Able to construct quadrilaterals: trapezium, parallelogram, rhombus, rectangle and square.
VI.STATISTICS	**Introduction** • Understand the necessity to collect data. • Organize collected discrete data using tally marks and a table. **Pictograph** • Able to interpret a pictograph and understand the need for scaling. **Bar graph** • Able to interpret data from bar graphs. • Able to construct bar graphs from the given data.	**Collection and organization of continuous data** • To collect and organize continuous data. • Able to form a frequency table. **Mean, Median, Mode** • To calculate Mean, Median, Mode of ungrouped data and understand what they represent	**Formation of frequency table** • To recall formation of frequency table. **Representation** • To draw Histogram, frequency polygon for grouped data • To construct simple Pie- charts for the given data. **Measures of central tendency** • Able to calculate mean, median and mode for discrete data.

VIII. INFORMATION PROCESSING	Systematic Listing, Counting, Reasoning	Systematic Listing, Counting, Reasoning	Systematic Listing, Counting, Reasoning
	• Sudoku; solving sudoku. • Triangles with numbers on them adding to given sum; • Explore how many; how do you know you have counted all.	• Tetraminoes: make all the shapes. How many up to rotations and flips.	• Determine the number of possible orderings of an arbitrary number of objects, describe procedures for listing and counting all such orderings.
	Modelling • Tree diagrams for numerical expressions; what regrouping does to the shape of the tree. • Representing carrom board and "strikes".	**Modelling** • Simple road map of town; roads carry costs; cost of routes; minimal cost paths. • Games like Sprouts and puzzles like 3-cup problem (Ref: Wikipedia)	**Modelling** • Games like SETS: https://en.wikipedia.org/wiki/Set_game • Map colouring using examples. • Making time tables. • Modelling 100 metre dash, long jump, high jump, javelin throw.
	Iterative patterns and processes • Euclid's algorithm, Euclid's game: (Ref:https://en.wikipedia.org/wiki/ Euclidean_algorithm)	**Iterative patterns and processes** • Given table, find the function. • Pascal's triangle and Fibonacci sequences.	**Iterative patterns and processes** • Given description of simple physical/biological system, predict future behaviour. • Model of solar and lunar eclipse (imprecise but correct). • Devising and breaking simple codes.
	Following and Devising Algorithms • Sorting given information on different attributes. • Disordering given ordered information.	**Following and Devising Algorithms** • Making "best" schedules, time-tables, deciding order of tasks under given set of constraints. • Creating and using flowcharts.	**Following and Devising Algorithms** • Use of queues (e.g. at water taps, bus stops) • Best ways of packing objects into a bag / box. • Shopping to a budget, with constraints on money, weight, volume.

SECONDARY DRAFT SYLLABUS

CLASS IX	CLASS X
Topic :Set Language	**Topic : Relations and Functions**
1. **Describing and representing sets** Able to describe a set in Descriptive, Set- builder and roster forms and through Venn diagram. Use symbols like$\in, \notin, \varnothing$, etc.	1. **Defining Relations and Functions** Able to define and perform Cartesian product of two sets. To define a relation as a subset of product of two sets. To define function as a special relation and cite examples.
2. **Types of sets** Able to identify different kinds of sets. (Empty set, Finite set, Infinite set, Equal set, Subset, Power set, and Universal set, cardinality of sets)	2. **Representation of functions.** Identifying a function through an Arrow diagram, a Table, a Rule or a graph. (Simple examples) The domain and Range. Vertical Line test.
3. **Set Operations.** Describes and illustrates – union, intersection, difference, symmetric difference and complementation. Understands the commutative, associative and distributive properties of set operations-(restricted to three sets)	3. **Types of functions.** Classifying functions as one-one, many-one, onto, into and bijection); (simple examples)
	4. **Composition of functions (two and three)** Applying the results of one function on another. Examples for Commutative and associative nature of combining functions.
4. **Formula for set operations**. Formula for $n(A \cup B)$ and $n(A \cup B \cup C)$; statement and verification of De Morgan law using Venn diagram.	5. **Identification of some special functions** Identifying the graphs of Linear, Quadratic, Cubic and Reciprocal functions.

5. **Application**:

Solving simple word problems.

(Minimum number of problems illustrating the use of each concept in conformity with the number of periods allotted)

Topic : 2. Real Number System

1. **Revision: Natural numbers, Whole numbers, Integers and Rational numbers.**

   To recall the representation of natural numbers, whole numbers, integers, and rational numbers on the number line.

2. **Rational numbers.**

   Able to classify rational numbers as recurring / terminating decimals.

   To represent terminating / non terminating recurring decimals, on the number line through successive magnification.

3. **Irrational numbers**

   To identify non terminating, non-recurring decimals leading to the existence and representation of irrational numbers such as $\sqrt{2}$, $\sqrt{3}$ and $\sqrt{5}$ on the number line. To do elementary basic operations on irrational numbers.

   Able to rationalize given irrational numbers of the type $1/(a+b\sqrt{x})$ and $1/(\sqrt{x}+\sqrt{y})$, where x,y are natural numbers and a, b are integers.

4. **Real numbers**

   To identify a one–one correspondence between the real numbers and the points of a directed straight line. (The ratio of the examples for each concept to that of the exercise problems is 1:1)

Scientific notation

- To understand the meaning of Scientific Notation.

- To understand the importance and convenience of expressing numbers in scientific notation.

- Able to convert larger/smaller numbers to scientific notation and vice – versa.

Topic : 2. Numbers and Sequences.

1. **Euclid's division algorithm**

   Able to write Euclid's division lemma for a division sum

   To find LCM and HCF using Euclid's division algorithm

2. **Fundamental theorem of arithmetic**

   Able to understand the fundamental theorem of arithmetic

3. **Modular arithmetic**

   To understand congruence modulo 'n', addition modulo 'n', and multiplication modulo 'n'

4. **Sequences**

   To define sequence and to visualize a sequence as a function

5. **Progressions**

   To define an Arithmetic Progression and a Geometric Progression. (A.P. and G.P)

   Able to find the nth term of an A.P and its sum to n terms.

   Able to find the nth term of a G.P. and its sum to n terms.

6. **Series**

   To determine the sum of some finite series such as $\Sigma n, \Sigma n^2, \Sigma n^3$

Topic : 3. Algebra

1. **Polynomials**

   To define a polynomial in one variable.

   Classification as monomial, binomial, etc.

   To Identify the terms, the coefficients and the exponents of a polynomial and its degree.

   Classification of polynomials as linear, quadratic, cubic etc.

   Evaluate a polynomial for given values of the variable. Identifies zeros of a polynomial.

   Learns to Add, subtract, and multiply polynomials.

   Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication.

Topic : 3. Algebra

1. **Simultaneous linear equations**

   To recall solving a pair of linear equations in two unknowns.

   To solve a pair of linear equations in three variables by method of elimination only.

2. **Synthetic division**

   To determine the remainder and the quotient of the given polynomial using Synthetic Division.

   To use Synthetic division in the process of factorising a polynomial.

3. **Rational expressions**

   Able to simplify algebraic rational expressions (Simple Problems),

2. Remainder theorem

To understand the remainder theorem via examples and analogy to integers and use it to find the remainder.

3. Identities

To recall/understand the algebraic identities for $(a + b)^2$, $(a − b)^2$, $a^2 − b^2$, $(x + a)(x + b)$, $(a + b + c)^2$, $(a + b)^3$ and $(a − b)^3$. *(to be supplemented by visual illustration wherever possible)*

Able to verify identities of the type, *(x + a) (x + b) (x+ c) and* $x^3 + y^3 + z^3 − 3xyz$

and use them in problem solving.

4. Factor theorem

To learn the statement and proof of the factor theorem and use it to find the factors of a given polynomial, in

particular (i) trinomials of the type $a x^2 + b x + c$, $\alpha \neq 0$ where a, b, c are *real* numbers and (ii) cubic polynomials.

Learn to obtain the GCD and LCM of (at most three)

algebraic expressions by factor method only.

5. Linear equations in two variables

to recall linear equations in one variable

to identify and solve linear equations in two variables by

(a) Substitution (ii) elimination, (iii) Cross multiplication and (iv)Graphical methods to explore the possibilities for (i) unique, (ii) infinite or

(iii) no solutions.

Apply linear equations in two variables to solve problems from life situation.

6. Linear Graphs

Able to draw straight lines, intersecting and non-intersecting straight lines.

Solving linear equations using their graphs.

4. Square root

To understand and compute the square root of a polynomial.

Able to correlate relationship between discriminant and nature of roots.

5. Quadratic Equations

Able to form a quadratic equation in the standard form $a x^2 + b x + c = 0, (a \neq 0)$, when the roots are given.

To solve quadratic equations (only real root) – by

(i) factorization, (ii) completing the square and (iii) using formula.

Able to write and solve a quadratic equation, when given a word problem (related to day-to-day activities).

To comprehend the relationship between zeros and coefficients of a quadratic expression.

6. Quadratic graphs

Able to solve quadratic equations through graphs.

Able to determine the relationship between the nature of the solutions and the graph of a quadratic function.

7. Graphs of variations

To solve graphically equations

$y \propto x, y \propto \dfrac{1}{x}, xy = k$, $\forall\ x, y > 0.x$

8. Matrices

1. Types of matrices

To introduce matrices through examples

To identifythe order and formation of matrices To recognize different types of matrices

2. Matrix operations

Able to add and subtract the given matrices.

To multiply a matrix by a scalar, and to find the transpose of a matrix.

To multiply 2×2; 2×3; 3×2 Matrices.

To evaluate the determinant of a 2×2 matrix and find the inverse of the matrix.

3. Matrix equation

To solve the equations of two variables - using matrix method.

Topic : 4. Geometry

1. Properties of parallelograms (Theorems without proof)

To recall the theorems on linear pair, vertically opposite angles, angle - sum property of a triangle (interior and exterior) and congruent triangles.

To classify quadrilaterals and parallelograms (through hands-on activities) and list their properties to use them in problem solving.

2. Circle theorems
To understand that there is only one circle that passes through 3 non-collinear points.

Topic : 4. Geometry

1. Proportionality theorems

To discover geometrical facts given by

i basic proportionality theorem∗ for a triangle and its converse
ii. angle bisector theorem and its converse

To apply them to solve numerical problems only.

2. Similar triangles

To discover properties of similar triangles by practical work. (theorems without proof)

Pythagoras theorem∗

To learn about equal chords in a circle, the perpendicular from the centre to any chord, and congruent arcs.

To discover the relationships between the angles at the centre of a circle, angles in Cyclic quadrilaterals, and angles at the circumference in the same segment.

(All the above through practical work and not by theoretical proofs)

Simple problems based on the above concepts.

3. Practical Geometry
Able to identify and understand through practical work, the centroid, orthocentre, circumcentre and incentre of a triangle.

3. Circles and Tangents

To understand the facts (without formal proof) on lengths of tangents to a circle, angle between tangent and radius through the point of contact and alternate segment theorem.

4. Concurrency theorems

States Ceva's theorem and Menelau's theorem (without proof).

5. Practical Geometry

To construct tangents to circles.
To construct triangle, given its base, vertical angle at the opposite vertex and (a) median or (b) altitude or (c) bisector.
Able to construct a cyclic quadrilateral.

Topic : 5. Coordinate Geometry

1. Plotting Points on a plane

To understand the concept of Cartesian plane with its axes. Able to plot the points on the plane and write the co – ordinates of a given point,

2. Distance between two points

Able to find the distance between two given points and make use of it in problems.

3. Section formula

To determine the point of division using section formula (internal division only)
To find and use midpoint formula
To find the centroid of a triangle by formula.

4. Graph of a linear equation
To examine linear equations of the type $ax+by+c=0$, writing it as $y = mx + c$ and linking with the chapter on linear in two variables.

Topic : 5. Coordinate Geometry

1. Area of a triangle

To recall formulae for distance between two points, and the midpoint of two given points and
the point of internal division (using section formula) .
To calculate the area of a triangle using formula.
To find area of a quadrilateral given its vertices.
To determine the slope of a line (i) when two of its points are given, (ii) its equation is given.

2. Forms of Straight line

Able to find the equation of a straight line in:
    i. slope-intercept form,
    ii. point -slope form,
    iii. two -point form,
    iv. intercept form.

Topic : 6. Trigonometry

1. Trigonometric ratios

To understand the concept of trigonometric ratios using the relationship between the sides and the angles of the right angled triangle.
To recognize the values of sine, cosine, tangent and their reciprocals for specific angles $0°, 30°, 45°, 60°, 90°$. To do simple problems based on these ratios.

2. Complementary angles
To use the concept of complementary angles in simple problems

3. Trigonometric tables
To understand the usage of trigonometric tables.

Topic : 6. Trigonometry

1. Identities

Able to identify the Trigonometric identities and apply them in simple problems.

2. Heights and distances

To apply trigonometric ratios to calculate heights and distances. (Not more than two right triangles; (Angles of elevation or depression should be 30°, 45° or 60°.)

Topic : 7.Measurement and Mensuration **1. Area of a triangle** Able to use Heron's formula (no proof) to find the area of a triangle. To apply the same idea to find the area of a quadrilateral. **2. Surface Area and Volume of Cube and Cuboids** To recall the 3 D shapes To find LSA , TSA and Volumes of cubes and cuboids.	**Topic : 7.Measurement and Mensuration** **Surface Area and Volume of Solids** To determine volume and surface area of cylinder, cone, sphere, hemisphere and frustum (hollow solids to be omitted). To compute Volume and surface area of (not more than two different) combined solids) Problems involving conversion of solids from one shape to another with no change in volume.
Topic : 8. Statistics & Probability **Statistics:** **1. Histograms.** To recall the collection of data, presentation of data in tabular form - ungrouped and grouped data. To recall histogram and frequency polygon To construct histograms (with varying base lengths). **2. Measures of central tendency.** To recall Mean, median, Mode of ungrouped data. Able to calculate the Mean, Median and Mode for grouped data. **3. Probability** **Probability: an experimental approach** To study probability through empirical approach by considering experiments to be drawn from real-life situations. Able to calculate the probability of events like tossing coins and throwing dice.	**Topic : 8. Statistics & Probability** **Statistics** **1. Measures of central tendency** To recall Mean for ungrouped and grouped data. **2. Measures of dispersion** To understand the concept of Dispersion. To understand and compute Range, Standard Deviation, Variance and coefficient of variation **3. Probability:** **Probability-theoretical approach** To understand Random experiments, Sample space and use of a tree diagram. To define and describe Events – Mutually Exclusive, Complementary, certain and impossible events. To understand addition Theorem on probability and apply it in solving some simple problems.