MATHEMATICS

Theme 1: Numbers

This theme aims at developing the abilities of children to learn three and four digit numbers. They will be through the use of materials be provided opportunities for observing patterns in two digit numbers and extending it to three digit numbers for everything that includes comparing, forming smallest and greatest numbers using given digits.

Learning Outcomes:

Children will be able to:

- work with four digit numbers:
  - read and write numbers up to 9999 using place value;
  - identify the greater and smaller number, of two given numbers, using place value;
  - form different numbers using given digits with and without repetition.

Numbers

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
▸ 4 digit numbers (up to 9999). ▸ Place value and expanded form of number. ▸ Count numbers in different ways-starting from any number. ▸ Comparison of numbers and arrange them in ascending and descending order. ▸ Greatest and smallest numbers that can be formed by using given digits (with or without repeating digits).	▸ Using place value cards (popularly known as arrow cards) to make 4 digit numbers, show their expanded form and place value and face value of digits. ▸ Discussing examples where numbers occur in thousand in real life contexts. ▸ Involving children in making rules based on patterns may be evolved for comparing numbers. ▸ Providing opportunities for sequencing of these numbers in ascending or descending orders. ▸ Providing two sets of number cards to groups of children to explore 4 digit numbers and finding out the greatest and the smallest numbers. ▸ Using games and activities to create 4-digit numbers with specific characteristic like numbers with 5 at hundredths place, numbers not having 2, 4, 6, 8 and 0 at ones and tens place etc.	▸ 36 Number cards 1 to 9, 10 to 90, 100 to 900, and 1000 to 9000 ▸ Videos and PPTs related to 4 digit numbers.

Theme 2: Number Operations

This theme aims at reinforcement of children's understanding about adding and subtracting two digit numbers and further establishing the algorithms to add three digit numbers may be undertaken. The development and strengthening of algorithm for multiplication is also necessary to clear concepts. A variety of ways for the construction and use of multiplication facts of single digit numbers will be developed in children. Division is introduced as inverse process of multiplication and children learn to divide numbers. Application of learning about four digit numbers and operations on them should form the basis in the teaching – learning process.

Learning Outcomes:

Children will be able to:

- solve simple daily life problems using addition and subtraction of three digit numbers with and without regrouping, sums not exceeding 999;
- construct and use the multiplication facts(tables) of 2, 3, 4, 5 and 10 in daily life situations;
- analyse and apply the appropriate number operation in their situation/ context;
- explain the meaning of division facts by equal grouping/sharing and find it by repeated subtraction;
- add and subtract small amounts of money with or without regrouping;
- make rate charts and simple bills.

Number Operations

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
▸ Addition and Subtraction of numbers (up to 3 digits). ▸ Place value to add and subtract numbers by using standard algorithm. ▸ Problem solving involving addition and subtraction operations in different real life contexts presented through visuals and stories. ▸ Multiplication tables of 2, 3, 4, 5, 7, 9, 10 using different strategies like repeated addition, skip counting, patterns etc. ▸ Multiplication of a two-digit number with a one-digit number using standard algorithm and other methods (lattice method).	▸ Encouraging estimation of addition and subtraction followed by verification. ▸ Creating real life context based problems involving addition and subtraction (by children) and exchanging among them to encourage visual illustration of the problem. ▸ Discussing what "3 times 4", "4 ×6" and so on means may take place result in introduction of sign of multiplication. Asking children to practice and then explain the same to one another in groups while the teacher monitors and provides feedback. ▸ Encouraging children to construct/develop multiplication tables using different strategies. Remembering tables through memory may be discouraged. ▸ Creating contexts from real life in which multiplication facts have to be	▸ Beads, attachable cubes (unifix cubes), spike abacus. ▸ Napier Strips. ▸ Videos and PPTs.

Number Operations

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
▸ Division of numbers in the context of equal grouping and equal sharing. ▸ Division facts using grouping and multiplication tables. ▸ Relation in multiplication with division of numbers. ▸ Mental computation of sum and difference of two digit numbers using different strategies but without using paper and pencil and crammed facts. ▸ Mental multiplication of two numbers without use of paper and pencil and rote memorized facts. ▸ Estimation of sum, difference and product of two numbers and verification by actually computing them.	used e.g. what is price of 4 note books if price of one note book is known. ▸ Explaining and demonstrating the multiplication of two numbers with one digit in expanded notation so as to create a mathematical understanding of standard algorithm. ▸ Providing and demonstrating concrete examples of equal sharing/ grouping which can be co-related with division and the sign of division may be introduced. ▸ Explaining and discussing with children the interrelationship of division with multiplication and multiplication facts / division facts may be taken up together. ▸ Providing opportunities to children in groups/individually to create real life contexts so as to add/subtract without paper pencil e.g. situation of shopping and finding the total cost amount left etc. For example- I have a hundred rupee note and bought two pencils and two note books, what amount will be left with me after paying the price of the two items? ▸ Creating contexts where double or thrice of a number is needed and encouraging children not to use paper pencil but do the calculation mentally. For example, six children planted one sapling each for three days, how many saplings have been planted by the children?	

Theme 3: Geometry

Children learn to complete the Level 0 (Visualization) of Van Heile hierarchical model of geometric thinking. They recognize and identify two-dimensional shapes and three dimensional figures by their appearance as a whole. Level 0 represents the geometric thinking of many children in the early primary grades. The naming of 2-D and 3-D shapes is also included and their recognition in children's vicinity.

Learning Outcomes:

Children will be able to:

- recognise 2D shapes like straight and curved lines;
- identify and make 2D-shapes by paper folding, paper cutting on the dot grid, using straight lines etc.;
- describe 2D shapes by counting their sides, corners and diagonals;
- fill a given region leaving no gaps using a tile of a given shape and forms various shapes using tangram pieces.

Geometry

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
▸ Make straight lines, curved lines and different shapes on a dot grid. ▸ Various shapes using tangram shapes. ▸ Compare two or more shapes to match their properties like sides and corners etc. ▸ Tessellation: Tiling a given region using the tile of a given/ particular shape. ▸ Identification of shapes that tile and that do not tile. ▸ Simple map reading (may not be to a scale). ▸ Line-drawings of 3D objects on paper or on flat surface.	▸ Conducting activities to use dot grids, straight lines, curved lines and shapes to create different sceneries. ▸ Promoting the use of tangram shapes to make shapes/objects. This will help children in creating an understanding about shape. ▸ Facilitating the creation of different shapes by children using broom-sticks, drinking straws etc. and their shapes maybe discussed with respect to their physical attributes like sides/corners. ▸ Conducting activities to use similar shapes (created / processed) for covering a particular flat surface (as a group work) without any gaps and over lapping in the shapes. ▸ Discussing in groups the shapes that can tile or that cannot tile. Questions like "Why it is so?" should also be discussed ▸ Assigning a task to each child to make a map (not to scale) related to their daily life experiences. For example, map of how to reach "home to school" and then exchange it with other children. Each child gets to read 2-3 maps. This can be followed by holding a discussion on "What makes a map easy to read?"	▸ Tangrams with 5 or 7 pieces. ▸ Broom sticks, drinking straws, ice cream sticks etc. ▸ Cardboard pieces. (*to make number of tiles of same shape and size.*) ▸ Clippings of different maps being published/ printed in various magazines and newspapers. ▸ Geoboard with rubber band. ▸ Maths kit

Integration: Arts Education

Life Skills: solving daily life problems

Theme 4: Measurement

Children learn to use a standard unit for measuring length. The comparison of weight is also to be done not only on the basis of the size but using a simple balance. The measures of capacity in terms of non uniform units like capacity of a bucket in terms of jugs/mugs, volume of cold drink in a bottle in terms of number glasses/cups etc. The measure of time using a calendar or a watch/clock is in child's daily life activities will also be emphasised.

Learning Outcomes:

Children will be able to:

- estimate and measure length and distance using standard units like centimetres or metres;
- weigh objects using simple balance;
- compare the capacity of different containers in terms of non uniform units;
- identify a particular day and date on a calendar;
- read the time correctly to the hour using a clock/watch.

Measurement

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
(a) Length ▸ Need for standard units for measuring length. ▸ Measurement of lengths & distances using appropriate units like centimeter and meter. ▸ Use of measuring tools like scale or measuring tape. ▸ Estimation of the length of various objects and distances in near vicinity and verification by actual measurement. ▸ The relationship between metre and centimeter (b) Mass/ Weight ▸ Non-standard units to weigh different objects in the environment. (c) Capacity/Volume ▸ Measurement and comparison of the capacity of different containers using	▸ Encouraging children (in groups) to make a meter long paper strip using 10cm/20cm long paper strips. Then use this paper strip (metre) to estimate and measure various objects in the environment small objects in cm and longer objects / distances in metres. ▸ Providing opportunities to discover relationships between metre and centimetre. ▸ Using simple balances (made by children) for weighing objects in the environment using a stone or non-standard weight / objects thus establish the need for a standard uniform measure. ▸ Using different small containers to measure the capacities of different	▸ Papers, glue sticks. ▸ Markers of different colours. ▸ Thick strings, plastic plates, wooden sticks for making balance. ▸ Different sized spoons, containers like bowls, glasses etc. water containers. ▸ Toy clock constructed by children to read time. ▸ Calendar of the current year. ▸ Geoboard with rubber band. ▸ Maths kit. ▸ Videos/PPTs.

Measurement		
Key Concepts	**Suggested Transactional Processes**	**Suggested Learning Resources**
non-standard units. ▸ Conservation of volume. (d) Time ▸ A calendar to find a particular day and date. ▸ Read and write time am/pm and 12 hr and 24 hr clock time. ▸ Conversion of 12 hr clock time into 24 hr clock time and vice versa. ▸ Conversion of days to hours and hours to minutes.	containers. For example, capacity of a big-glass may be measured by a small spoon/big spoon/small bowl. ▸ Organizing discussion in class to draw an inference about conservation of volume. ▸ Involving children to read a clock and a calendar and to tell time and day corresponding to a date. ▸ Conducting activities of reading a railway/bus time table in which time is given in 24-hour clock.	

Integration: Science (Forms of Matter)
Social Studies (Understanding Changes)

Life Skills: solving daily life problems

Theme 5: Data Handling

This theme will focus on children developing skills to collect information for a purpose, present it so that it is easily understandable and finally draw out relevant conclusions from it is part of daily life. The level and quantum of information collected, its ways of representation and level of inferences drawn from it change progressively.

Learning Outcomes:

Children will be able to:

- acquire understanding about data handling;
- record data using tally marks, represent it pictorially and draw conclusions.

Data Handling

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
▸ Data collection and its representation in form of pictograph and tables. ▸ Classification and comparison of data. ▸ Recording data using tally marks, representing it pictorially and drawing conclusions.	▸ Encouraging children to collect data and represent it by paper strips, string lengths, pictures etc. and making a pictograph or a bar chart. ▸ Questions about the graphical representation may be discussed in the class in groups or with the whole class.	▸ Coloured papers, markers, stickers of different objects. ▸ Videos and PPTs.

Integration: Arts Education
Life Skills: Interpretation and analysis, presentation skills

Theme 6: Patterns

As number concepts and skills increase in complexity, children find patterns and relationship between numbers. Thus patterns go side by side with learning of all aspects of Mathematics like, numbers, number operations and geometrical ideas. Patterns in multiplication facts help children in multiplying two-digit numbers and apply the algorithm for addition and subtraction to three or more digit numbers. Children will also be able to see the beauty in patterns around them and create their own patterns.

Learning Outcomes:

Children will be able to:

- observe and identify patterns with a "unit of repeat";
- extend patterns using "unit of repeat";
- create patterns having a "unit of repeat".

Patterns

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
▸ Patterns with unit of repeat. ▸ Extension of pattern using some rule.	▸ Conducting activities to find answers to questions like "what is being repeated in a given pattern like  ..... Or A, B, A, B, ... 2, 4, 2, 2, ... ▸ Providing opportunities to children to create their own patterns using vegetable cut outs like ladyfinger, potatoes etc. with ink of water colours on a flat surface/paper.	▸ Shapes, materials, colours, stamp pads. ▸ Sharp edge to get section of vegetables and to carve designs on surface of potatoes etc. to use it as a stamp for creating patterns. ▸ Geoboard with rubber band.

Integration: Arts Education