

# *MATHEMATICS*

## Theme 1: Numbers

"Numbers' enable children to classify, recite, count, compare and recognize numbers from 1 to 20. They learn to write numerals and number names from 1 to 99. Pre-number concepts like classification, seriation and one to one correspondence play an important role in their learning numbers, numeration and making numbers a part of their daily life activities. Children acquire an understanding about these at home too. However, reciting number names in an order and recognizing some numerals are the only tasks that some children can do with varying competence when they enter formal schooling. Thus, the Class I curriculum focuses on developing number sense through the contexts that children are in. The basics for addition and subtraction of single digit numbers are part of daily life experiences.

### Learning Outcomes:

Children will be able to:

- ✎ work with numbers from 1 to 20;
  - ✎ classify objects into groups based on some physical attributes like shape, size and other observable properties including rolling and sliding;
  - ✎ recite number names and count objects up to 20, concretely, pictorially and symbolically;
  - ✎ count objects using numbers 1 to 9;
- ✎ compare numbers up to 20. recognize numbers up to 99 and write numerals;
- ✎ develop the concept of zero.

Number		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> <li>➤ Numbers and numerals from 1 to 20.</li> <li>➤ Introduction to Zero through a subtraction pattern.</li> <li>➤ Counting objects from 1 to 99 by making groups leading to tens and ones.</li> <li>➤ Representing a number in groups of tens and ones.</li> <li>➤ Numeral and numbers names up to 99.</li> <li>➤ Comparison of numbers up to 99.</li> <li>➤ Forming two digit numbers using the given digits (with or without repetition).</li> <li>➤ Sequences of numbers up to 99 in an increasing or decreasing order.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Providing experiences of counting objects/things from 1 to 20 in different contexts.</li> <li>➤ Involving children in creating subtraction pattern for developing an understanding of zero taken up interactively in each step and asking questions like "How many (say toffees) are left now?"</li> <li>➤ Enacting stories like "Seven Tailed Mouse" in which seven tails are being reduced to zero in the class.</li> <li>➤ Using concrete materials like -ice cream sticks, tooth picks, play money etc. to make bundles of tens and loose "ones" to represent numbers more than ten.</li> <li>➤ Involving children in the use of objects like sticks and counting them by making bundles of tens and ones to recognise tens and ones in numbers.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Songs, poems, number lines, number charts and collection of different objects. <i>(This will contribute to the development of numbers and numerals.)</i></li> <li>➤ Different materials like straws, sticks, Unifix cubes, Cuisenaire rods, currency notes and coins of ₹10. <i>(These will help children in developing the idea of place value. For example, in 27 the digits 2 and 7 have specific meanings that can be represented by the above material).</i></li> <li>➤ Number cards up to 99. <i>(These be used to create</i></li> </ul>

## Number

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p>➤ Before, after and in between numbers.</p>	<p>➤ Conducting drills in different contexts e.g. shopping, buying tickets etc. to make children comfortable in the use of numbers up to 99.</p> <p>➤ Encouraging children to observe the patterns in number names-twenty, twenty-one, twenty-two and so on and use it for reciting number names up to 99.</p> <p>➤ Using number cards from 0 to 9 to let the children explore and make different two digit numbers.</p> <p>➤ Encouraging children by observing patterns, to compare 2-digit nos.</p>	<p><i>an increasing and decreasing order sequence).</i></p> <p>Sets of number cards from 0 to 9 (<i>This may be used to make two digit numbers</i>).</p>

## Theme 2: Number Operations

'Number Operations' as a theme enables children to learn the basic operations of addition and subtraction of numbers up to 99. Materials, pictures and stories of daily life contextual problems establish meaning in problem-solving situations. With these experiences children will develop their strategies to add/subtract double digit numbers using the place value (idea of tens and ones).

### Learning Outcomes:

Children will be able to:

- apply addition and subtraction of numbers from 1 to 20 in their daily lives;
- construct addition facts up to 9 by using concrete objects;
- subtract numbers using 1 to 9;
- solve day to day problems related to addition and subtraction of numbers up to 9.

Number Operations		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> <li>▶ Addition and subtraction up to 20 (in steps-first up to 9 / less than 10 and then up to 20).</li> <li>▶ Addition and subtraction of numbers within 99 without regrouping.</li> <li>▶ Solving problems presented through pictures and verbal descriptions by addition and subtraction of numbers.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Taking up addition facts up to 9 first and up to 20 later.</li> <li>▶ Involving children in exploration of addition facts through concrete materials like connecting cubes, number strips etc.</li> <li>▶ Encouraging children to come up with a number story which involves a given addition fact and tell the story verbally and vice versa.</li> <li>▶ Using picture cards involving numbers i.e. objects in numbers to let children solve problems. Smaller numbers may be used initially so that children are able to solve the problem mentally and communicate verbally.</li> <li>▶ A number line created in the play area will provide both a numerical and kinaesthetic experience to develop readiness for addition and subtraction.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Concrete materials that are available in a child's vicinity. <i>(These should be an integral part of her/his work to develop intuitive understanding of addition and subtraction).</i></li> <li>▶ Geoboard and rubber bands. <i>(Can be used for demonstration of addition and subtraction).</i></li> <li>▶ Dominoes. <i>(These are a good source of learning addition facts. For example, through 1-5, 2-4, 3-3 dominoes a child will form addition facts that all add up to 6 and more over will learn to see partitions of the number 6)</i></li> <li>▶ Currency notes and coins of Rs.10 and ₹1 <i>(These may be used to learn addition and subtraction in a shopping context with and without regrouping).</i></li> <li>▶ Spike Abacus. <i>(Is an important and joyful manipulative tool/aid to explore various ways of addition and subtraction of numbers).</i></li> </ul>

## Theme 3: Geometry

'Geometry' focusses on the physical features of shapes in 2D and 3D. It enables children to classify, sort and describe various shapes on the basis of their observable features. The shapes that are in children's daily life form a strong basis for acquiring visualization skills.

### Learning Outcomes:

Children will be able to:

- ✎ describe the physical features of various solids/shapes in her own language;
- ✎ describe names, and interpret relative positions in space and apply ideas about relative position;
- ✎ understand connection of geometrical concepts with daily life.

Geometry		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> <li>➤ Sorting, classification and description of shapes on the basis of their observable properties like corners, vertices, edges, surfaces etc.</li> <li>➤ Basic 3D shapes like cuboid, cylinder, cone, sphere by their observable properties and names.</li> <li>➤ 2-D shapes as outlines of the surfaces of 3-D shapes on paper/or flat surface.</li> <li>➤ 2D shapes - rectangle, square, triangle, circle, line etc.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Providing concrete materials in the form of different shapes like triangle, rectangle, circle etc. so that children can classify the shapes based on a single property like colour, shape, size etc. The criteria for classification may be discussed in the class.</li> <li>➤ Creating collection of empty boxes with different 3D-shapes. The children may be encouraged to use their sense of touch to describe and name the 3D shapes.</li> <li>➤ Using above mentioned collection to encourage children in the exploration of tracing all the surfaces of 3D-shapes on paper.</li> <li>➤ Asking children to observe their surroundings and identify objects/things which have shapes like 2D shapes namely triangle, rectangle, square and circles.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Various shapes that are available to children that are in close proximity i.e. at home, in school, in playground etc. <i>(These can be used to provide them the opportunity to verbalize and generalize their observable properties).</i></li> <li>➤ A collection of empty boxes that are used for packaging like sweet boxes, cold drink cans, clown's cap.</li> <li>➤ Clay or play dough. <i>(To make different solid shapes and discuss about their creation).</i></li> <li>➤ A straight edge can be used by children to cut the three dimensional shape made by clay and to investigate the cross section to relate 3-D with 2-D.</li> <li>➤ Geoboard. <i>(This can be used for demonstrating various shapes).</i></li> </ul>

**Integration:** Arts Education

**Skills:** relating geometrical shapes with real life situations

## Theme 4: Measurement

Concepts of 'Measurement' begin with a general comparison: bigger cake, taller building, heavier bag, slower bicycle, longer room or cooler day. However, these characteristics of length, volume, speed and heat cannot be counted directly. They are continuous properties that can take on any value which must be measured. Children have a basic idea and understanding of this comparison when they enroll in class I. Initially classes must be devoted to further strengthen these ideas and a need to measure them.

### Learning Outcomes:

Children will be able to:

- ✎ estimate and measure short lengths using non uniform units like a finger, hand span, length of a forearm, footsteps;
- ✎ compare mass/weight using a scale;
- ✎ order various containers in terms of their capacity and volume;
- ✎ arrange events happening in short/longer span of time.

<b>Measurement</b>		
<b>Key Concepts</b>	<b>Suggested Transactional Processes</b>	<b>Suggested Learning Resources</b>
<p><b>(a) Length</b></p> <ul style="list-style-type: none"> <li>➤ Introduction to Vocabulary like near, far, thin, thick, longer/taller, shorter, high, low etc.</li> <li>➤ compare lengths of objects and arrange in order</li> <li>➤ Measure short lengths using non-standard units (e.g. hand span)</li> <li>➤ Estimation of short distances and lengths and their verification using non-uniform units</li> </ul> <p><b>(b) Weight</b></p> <ul style="list-style-type: none"> <li>➤ Compare heavy and light objects.</li> </ul> <p><b>(c) Volume (Capacity)</b></p> <ul style="list-style-type: none"> <li>➤ Order different containers in terms of their capacity.</li> </ul> <p><b>(d) Time</b></p> <ul style="list-style-type: none"> <li>➤ Distinguish between events occurring in time by using vocabulary like - earlier -</li> </ul>	<ul style="list-style-type: none"> <li>➤ Using concrete materials to bring home the vocabulary like thick - thin, longer-taller etc. Questions like "Why do you think it is thick / thin? This may be discussed in the class using classroom objects.</li> <li>➤ Creating activities/games around the vocabulary near - far, high-low to give children an idea that the vocabulary works with a frame of reference.</li> <li>➤ Providing concrete materials of different lengths to children to arrange them in ascending/descending order of length.</li> <li>➤ Conducting activities with children involving various materials:                             <ul style="list-style-type: none"> <li>☛ to measure their length using nonstandard measure.</li> <li>☛ to compare their weights.</li> <li>☛ to compare their capacities.</li> </ul> </li> <li>➤ Creating a collection of different containers in the class by children. Children may be encouraged to</li> </ul>	<ul style="list-style-type: none"> <li>➤ Material available in a child's vicinity. <i>(These can be used to bring home the idea of measurement and to appreciate the need for measuring quantities like length, mass, area, volume, capacity, money, temperature and time).</i></li> <li>➤ A toy clock, buckets and mugs, cold drink cans/bottles, chalk and pencil boxes and a toy weighing balance.</li> <li>➤ Graph paper/grid sheets. <i>(Use of these will help children to get idea of area as number of squares inside the region).</i></li> <li>➤ Different containers that are available in a child's vicinity like glasses, spoon, jugs, mugs, buckets etc.</li> </ul>

## Measurement

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p>later etc.</p> <ul style="list-style-type: none"><li>▶ Differentiate between events of short and long duration.</li><li>▶ Verbal description of the sequence of events happening in a day.</li></ul>	<p>work in groups to find out the capacity of containers. e.g. How many cups / spoons are full / empty?</p> <ul style="list-style-type: none"><li>▶ Organizing discussions with children to find out the day's various events by using words like – what happened earlier? Which happened later? What was the sequence? Which of the events of the day were of a short duration? "Which were of a longer duration? etc.</li></ul>	


**Integration:** Languages, EVS

## Theme 5: Data Handling

In Class I, data handling will focus on being exploratory in nature and centered around children's first hand observations. Many childhood activities provide data that children can organize such as- information about birthdays, shirt/dress sizes, colour and types, favourite sweets and television shows, etc.

### Learning Outcomes:

Children will be able to:

-  collect, record (using pictures/ numerals) and interpret simple information by looking at visuals.

<b>Data Handling</b>		
<b>Key Concepts</b>	<b>Suggested Transactional Processes</b>	<b>Suggested Learning Resources</b>
<ul style="list-style-type: none"> <li>➤ Collection, representation and interpretation of simple information presented in a visual or by actual measurement (like measuring arm length).</li> </ul>	<ul style="list-style-type: none"> <li>➤ Conducting activities around data handling may be created by showing the children visuals in which different information can be visually seen and noted by children like animals, vegetables, fruits etc.</li> <li>➤ Conducting group activities woven around children exploring their own bodies by measuring different body parts using paper strips or threads and collecting information about their length.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Newspaper clippings having tables and graphs.</li> <li>➤ Wrappers of different things that children eat like biscuits, wafers, chocolates etc. (These <i>have lot of information that can be used to provide them the opportunity to organize and interpret</i>).</li> </ul>

**Integration:** Arts Education



## Theme 6: Patterns

The theme 'Patterns' aims at familiarizing children with different types of patterns in their surroundings. They will also learn to extend patterns of numbers and shapes through observation. This will help them in acquiring the skill of generalization in higher classes.

### Learning Outcomes:

Children will be able to:

observe, extend and create patterns of shapes and numbers. For example, arrangement of shapes/ objects/numbers, etc. like

1, 3, 5,.....,      2, 4, 6,.....      

Patterns		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> <li>▶ Simple patterns in shapes and numbers in the surroundings: their observation and extension.</li> <li>▶ Patterns from daily life experiences.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Encouraging children to firstly observe and then verbally describe the patterns seen around them.</li> <li>▶ Extending and completing a sequence in patterns, should be interspersed with questions like "Why do think it should be completed/extended like this.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Designs on Clothes, <i>Rangoli</i>, Tiles on pavements walls and floors. (These items that are arranged in order form the basis for looking into patterns).</li> <li>▶ Patterns in numbers and shapes.</li> </ul>

**Integration:** Arts Education, EVS