

LEARNING INDICATORS: MATHEMATICS upto Class V

Curricular Expectations:

- Develop a connection between the logical functioning of daily life to that of mathematical thinking
- Understands shapes and articulates their observable properties as similarities and differences among them
- Develop own methods of performing operations on numbers in daily life (addition, subtraction, multiplication and division)
- Develop language and symbolic notations with standard algorithms of performing number operations
- Estimate outcome of operation on two or more numbers and use it in daily life activities
- Learn to represent part of whole as a fraction and orders simple fractions
- Collects, represents and interpret simple data from her/his context and uses it in everyday life.
- Identify and extend simple patterns in shapes and numbers

Class IV

Conceptual Area	Pedagogical Processes	Learning Indicators
<p>SHAPES AND SPATIAL UNDERSTANDING</p> <ul style="list-style-type: none"> • Identifies centre, radius and diameter of a circle • Tiles geometrical shapes using one or two shapes • Explores intuitively the area and perimeter of simple shapes. • Make 4,5 or 6 faced 	<p>Utilising child’s experiences of drawing a circle by using a rope, with fixing one end and moving the other keeping the rope stretched. The children who do not have such experiences can be involved in groups with others and activities of drawing circular boundary can be performed in the play ground. Draw child’s attention to the cases when one end is not fixed and/or the rope is not kept stretched</p> <p>Taking empty chalk boxes and cutting</p>	<ul style="list-style-type: none"> • Shows understanding of terms related to circle like centre, radius, diameter and boundary of the circle. • Attempts to calculate perimeter and area of different shapes available in surroundings (farms, parks etc) for different purposes. • Makes different shapes with the help of easily available material e.g. match sticks, ice cream sticks etc.

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<p>cubes from a given net</p> <ul style="list-style-type: none"> • Explores intuitively the reflection through inkblots, paper cutting and paper folding • Draws intuitively the plan, elevation and side view of simple objects. 	<p>their one face, two faces etc. Now asking children to cut open the same to make a plan 2-D (flat)shapes . Let the children explore the flat shapes that can make a 6. 5 or 4 faced cubes. Later on the children should be encouraged to draw aa appropriate net on a paper sheet.</p> <p>Organizing activities in the classroom where children make different designs by using liquid colors or ink and paper sheets. The activities can also be conducted by getting a fine thread wet in a color and making beautiful designs by putting the thread on a paper and folding it.</p> <p>Asking children to look a solid shape from different positions and drawing the way it looks from the top, side, front etc.</p>	<ul style="list-style-type: none"> • Explores symmetry in figures formed by ink/color blots on a paper • Draws different views of an object as it looks from top, sides and front.
<p>Numbers and Operations</p> <ul style="list-style-type: none"> • Writes multiplication tables up to 10 and appreciates place, value role. • Multiplies two or three digit numbers • Divides a given number by another given number 	<p>Provide opportunities to children to write down addition facts of a numbers repeated given number of times like 2,3,4,5,6.. 10 each added five times will form multiplication table of five.</p> <p>Conduct activities with children to explore the multiplication facts through patterns and skip counting. Do not force children to rote memorize/cram multiplication tables</p> <p>Encourage child to develop her algorithms for multiplication of numbers and</p>	<ul style="list-style-type: none"> • Forms tables of multiplication facts up to 10X10 • Creatively draws tables of relatively higher number (say 7) using tables of smaller numbers (say 2 & 5) and also of two digit numbers by using the expanded form of the number • Explores different ways of multiplying two or three digit numbers (eg. using individual digits, place value concept for multiplier etc.) • Demonstrates understanding of division by dividing a given number by another number in

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<ul style="list-style-type: none"> • Frames word problems and solves using number operations • Applies four operations to daily life situations. 	<p>facilitate to decide her best algorithm</p> <p>Providing opportunities to children to try out different ways of multiplication, for example to multiply 257 by 34 some child may develop a strategy to first multiply hundreds by 34 and then tens and ones. Some other child may decide to first multiply ones 34 times and then tens and hundreds</p> <p>Extending the idea of division of numbers in variety of ways like using equal distribution, as inverse process of multiplication.</p> <p>Facilitating children to develop their own algorithms for dividing numbers and then to decide the best one. Activities for equal distribution of some amount of money formed by notes of Rs. 1000, 100, 10 and 1 to some number of persons will help in development of algorithms for division of numbers.</p> <p>Creating and exploring situations from child's daily life to apply number operations in solving problems.</p>	<p>a variety of ways, such as by grouping, repeated subtraction, using multiplication facts etc.</p> <ul style="list-style-type: none"> • Attempts to develop a word problem using her own experiences. And solving it by using various operations • Freely uses four fundamental operations (addition, subtraction, multiplication and division) in day to day activities.
<p style="text-align: center;">Money</p> <ul style="list-style-type: none"> • Converts rupees to paisa and vice versa • Adds and subtracts using 	<p>Providing opportunity to children to plan a shopping and to make estimates of money required in different denominations and the balance she will get.</p>	<ul style="list-style-type: none"> • Find rupees for given number of paisa and pais for given number of rupees • Shows understanding of finding total amount required or balance given in a transaction

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<p>column addition and subtraction</p> <ul style="list-style-type: none"> • Uses four fundamental operations in day to day transactions 	<p>The children playing shopkeepers have to get exact amount by using different operations and also will try out their own ways to provide a record of the shopping in the form of a bill.</p> <p>Let children have discussion with the shopkeepers/hawkers etc. to know how do they make quick calculations for transaction</p>	<ul style="list-style-type: none"> • Uses addition and subtraction mentally for making calculations of small day to day dealings like small purchase (vegetables, milk, etc.) from market • Attempts multiplication and division to find out total cost on the basis of unit cost and vice versa.
<p>4.1 Measurement: Length</p> <ul style="list-style-type: none"> • Converts meter into centimeter and vice versa • Solves problem involving length and distance. • Estimates lengths and distances in meters and centimeters 	<p>Conducting activities related to measuring lengths of different objects by using a meter scale or a tape.</p> <p>Involving learners in discussions for the need of writing bigger units into smaller (meter to cm) and smaller into bigger (cm to m) by using their understanding of decimal fractions</p>	<ul style="list-style-type: none"> • Relates commonly used larger and smaller units of length (meter, centimeter) and converts one to another. • Attempts to calculate length of particular objects (a rod, a piece of cloth etc) and finds total length of two or more objects • Estimates distance between two places (school to home, own home to friend's home
<p>4.2 Measurement: Weight/mass</p> <ul style="list-style-type: none"> • Weighs objects using balance and standard units • Determines sums and differences of weights 	<p>Initiating discussion on weights of different objects like weight of children in the class in order to explore various ways of measuring weight and having idea of its units.</p> <p>Using child's exposure of listening to standard unit of weight like kilogram and gram to relate them. Conduct activities related to observing empty pouches/boxes where weights in grams and kilograms are marked</p>	<ul style="list-style-type: none"> • Attempts to estimate weight of an object and then verifies it with balance and standard units of weight (grams, kilograms etc) • Tries to differentiate between the heavy and light weight objects and calculates the total weight of two different objects (addition) and difference in their weights (subtraction) where out of some given amount some amount is consumed, what left?

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	<p>Involving children in estimating weights of different objects and to reach to the conclusion that bigger objects are to measured in kilograms and smaller in grams.</p> <p>Conducting activities to obtain weight of two or more objects by adding the number of kilograms/grams in the objects</p> <p>Relating the understanding of weights with money and activities of selling and buying situations</p>	
<p>4.3 Measurement: Volume</p> <ul style="list-style-type: none"> • Measures volumes of liquids with the help of container marked with the standard units • Estimates volume of a solid object • Performs addition and subtraction of volumes. 	<p>Relating child's experience of units of measuring capacity like quantity of liquid in a water bottle, soft drink pack, oil etc. where child sees the units like liter and milliliter</p> <p>Conducting activities to fill a given container by using different shapes like cubes, cuboids, spheres, prisms etc. and encourage children to decide which shapes can completely a given space.</p> <p>Discussing with children why unit cube is taken as unit of measuring space/volume Involving children in measuring volume by counting the number of unit cubes that can completely fill a given space.</p> <p>Involving children in comparison of</p>	<ul style="list-style-type: none"> • Attempts to estimate volume of liquids and then verifies it using container marked with the standard units. • Makes one liter by adding several quantities expressed in milliliters • Devises her ways to differentiate between more and less volumes of liquids and calculates difference in volumes. • Applies her understanding of addition to find total weight of two or more objects • Estimates volume of a solid object by informal measurement intuitively.

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	<p>volume/capacity of two objects and finding the difference by subtraction and the total volume by addition</p>	
<p>4.4 Measurement: Time</p> <ul style="list-style-type: none"> • Computes number of weeks and days in a year, and correlates number of days in a year with number of days in each month. • Reads clock time in hours and minutes and expresses time in am and pm • finds the time intervals in simple cases by using forward counting and using addition and subtraction 	<p>Putting children in situation where they have to read a calander to find different days corresponding to dates</p> <p>Let children explore their own ways of finding number of days between two dates and to decide the methods of finding numbers of days in a month of a year.</p> <p>Utilizing child’s experiences gained outside class and with in class having exposure to read clock in hours and minutes. Let the child learn the ways of reading different types of clocks with the help of other children</p> <p>Providing exposure to find the time lapsed in two events by forward counting and by addition and subtraction. Let the child realize that operations on time are different than the operations on numbers being done by using place value system.</p>	<ul style="list-style-type: none"> • Attempts to showcase the concept of week, month and year on the basis of number of days and uses this understanding to compute number of weeks in a year • Shows interest in reading the clock time nearest to hours and minutes and expresses the time using the terms ‘a.m.’ and ‘p.m.’ • Explores ways (mental addition and subtraction) of finding time intervals between different familiar events and computes number of days between two dates.
<p>Data Handling</p> <ul style="list-style-type: none"> • Collects quantitative data on two variables and represents it through table and bar graph. • Draws inferences with the help of teacher 	<p>The collection of information and making out meaningful inferences, out of it, is a routine activity being done by every child in daily life. Utilising this experience, involve children in devising ways of presenting data in different pictorial forms.</p> <p>Involve children in reading data given in</p>	<ul style="list-style-type: none"> • Engages herself in organizing the two dimensional data in the form of tables, pictographs and/or bar graphs • Attempts to understand the key points emerging from the represented data

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	various pictures/diagrams from newspapers and magazines. Help them draw out meaningful inferences out of the data given.	
<p>Patterns</p> <ul style="list-style-type: none"> Identifies patterns in multiplication and division : multiples of 9 Multiplies and divides by 10, 100 etc by using the patterns Identifies geometrical patterns based on symmetry. 	<p>Providing opportunities to children to explore patterns in designs and geometrical shapes available in their vicinity and to find ways of extending them creatively</p> <p>Asking children to explore patterns in numbers and multiplication facts like in multiples of 9 the sum of digits is also multiple of nine, table is formed by writing 9, 8, 7, 6.....0 in ones place and 0, 1, 2,9 in tens place respectively</p> <p>Ask children to explore similar patterns in multiplication facts of other numbers.</p> <p>There are many such patterns in the mathematics which child has learnt up till now. Let children explore, extend and generalize these patterns</p>	<ul style="list-style-type: none"> Identifies patterns in multiples of 9 and extends them to find more facts Engages herself in understanding specific pattern of numbers in a series and extends it Evolves patterns on sarees, clothes and tiles and extends them.

CLASS V

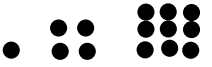

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<p>SHAPES AND SPATIAL UNDERSTANDING</p> <ul style="list-style-type: none"> Explores and represents angles and classifies into 	<p>Interacting with the children on their earlier understanding of angles and encouraging them to describe what an angle is. Let children compare angles with reference to angles made at the corners of</p>	<ul style="list-style-type: none"> Indicates understanding of making angles of different types using the things easily available to the child. Explores different types of angles existing in the

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<p>right, acute and obtuse angles</p> <ul style="list-style-type: none"> • Explores reflection and rotational symmetry in familiar 2-D and 3-D shapes • Makes the shapes of cubes, cuboids, cylinders and cones by their respective cones 	<p>a book, note book etc.</p> <p>Ask children to explore angles they see in their vicinity and to describe whether the angle is smaller/bigger/equal than the angle at a corner of a book or note book</p> <p>Symmetry lies in many shapes. Children may be asked to fold a sheet of paper and cut a shape on its fold. On opening we find a shape which is symmetric about the line drawn along the fold.</p> <p>Providing opportunities to children to reach to the conclusion that a line is said to line of symmetry of a shape when</p> <ol style="list-style-type: none"> 1. On folding the shape along that line one part completely overlaps/congruent to the other part 2. On placing a mirror on the line the image and the visible part of the shape make the complete shape <p>Playing with shapes so that children can hypothesize that on rotation some shapes look the same like a circle, a rectangle, an equilateral triangle etc. and some shapes look the same only after a complete rotation.</p>	<p>environment around the child.</p> <ul style="list-style-type: none"> • Demonstrates to differentiate between angles of different types, acute, obtuse and right angles. • Makes different shapes with the help of their nets • Explores symmetry in various objects having 3-D shapes. • Creatively explores reflection and rotational symmetry in 2-D shapes.
<p>Numbers and Operations</p> <ul style="list-style-type: none"> • Finds place value in numbers beyond 1000 	<p>Extending the idea of division of numbers in variety of ways like using equal distribution, as inverse process of multiplication.</p>	<ul style="list-style-type: none"> • Demonstrates understanding of division by dividing a given number by another number in a variety of ways, such as by grouping, repeated subtraction, using multiplication facts etc. • Attempts to develop a word problem on

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<ul style="list-style-type: none"> • Appreciates the role of place value in algorithms for four fundamental operations • Divides a given number by another given number using standard division algorithms • Explains concept of factors and multiples • Estimates sum, difference, product and quotients and verifies using approximation 	<p>Encourage child to develop her algorithms for division of numbers and facilitate to decide her best algorithm</p> <p>Creating the idea of multiples of number through its multiplication facts, skip counting using number grid and number line</p> <p>Providing the concept of factors through division of numbers and multiples.</p> <p>Creating and exploring situations from child's daily life to apply number operations in solving problems.</p>	<p>multiplication and division of numbers using her own experiences.</p> <ul style="list-style-type: none"> • Participates actively in activities organised in the class for explaining concepts of <i>multiples and factors</i> • Freely uses four fundamental operations (addition, subtraction, multiplication and division) in day to day activities.
<p style="text-align: center;">Fractions</p> <ul style="list-style-type: none"> • Represents part of a whole as a fraction • Realizes fraction as a number • Adds and subtracts like fractions 	<p>Involving children in activities related to dividing a whole in equal parts by using paper folding, dividing a given shape like square, rectangle, circle etc</p> <p>Using child's understanding of half, one third etc. to develop her ways of representing other parts of whole.</p> <p>Providing opportunities to represent a given fraction by shading/colouring parts of whole</p> <p>Conducting activities targeting to counting the shaded parts corresponding to given fractions to add them and to recognize and generalize a pattern.</p>	<ul style="list-style-type: none"> • Demonstrates understanding of the concept of half and one fourth by completing the incomplete figures or by filling colours etc. • Attempts to write part of a whole as a number called fraction • Appreciates that a part of a whole can be re[presented by more than one fraction called equivalent fractions • Adds and subtract two like fractions by colouring/shading corresponding parts of whole • Generalises the patterns of adding and subtracting fractions and develops her

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	<p>Conducting activities targeting to cutting removing parts of a whole corresponding to the fraction to be subtracted and counting the parts remained in order to subtract fractions and to recognize and generalize a pattern.</p>	<p>algorithms.</p>
<p>Money</p> <ul style="list-style-type: none"> • Uses four fundamental operations to solve problems in day to day life activities 	<p>Providing opportunity to children to plan a shopping and to make estimates of money required in different denominations and the balance she will get.</p> <p>The children playing shopkeepers have to get exact amount by using different operations and also will try out their own ways to provide a record of the shopping in the form of a bill.</p>	<ul style="list-style-type: none"> • Shows understanding about addition and subtraction using columns eg. rupees and paisa through its application in daily life • Uses addition and subtraction mentally for making calculations of small day to day dealings like small purchase (vegetables, milk, etc.) from market • Attempts multiplication and division to find out total cost on the basis of unit cost and vice versa.
<p>4.1 Measurement: Length</p> <ul style="list-style-type: none"> • Converts meter into centimeter and vice versa • Solves problem involving length and distance. • Converts larger fractional units into smaller units 	<p>Conducting activities related to measuring lengths of different objects by using a meter scale or a tape. Then involve children in finding total length, length of the piece remained after cutting a piece from a given rope, thread/cloth etc.</p> <p>Involving learners in discussions for the need of writing bigger units into smaller (meter to cm) and smaller into bigger (cm to m) by using their understanding of decimal fractions</p>	<ul style="list-style-type: none"> • Relates commonly used larger and smaller units of length (meter, centimeter) and converts one to another. • Estimates distance between two places (school to home, own home to friend's home) • Attempts to use four operations to solve daily life problems related to measurement of length/distance

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<p>4.2 Measurement: Weight/mass</p> <ul style="list-style-type: none"> Applies sum, difference, product and quotient of weights in solving daily life problems 	<p>Conducting activities to obtain weight of two or more objects by adding the number of kilograms/grams in the objects</p> <p>Relating the understanding of weights with money and activities of selling and buying situations encourage children to find the required amount by using operations on weight and money</p>	<ul style="list-style-type: none"> Relates larger and smaller units of weight and converts one to other
<p>4.3 Measurement: Volume</p> <ul style="list-style-type: none"> Estimates volume of a solid object Performs addition and subtraction of volumes. 	<p>Relating child's experience of units of measuring capacity like quantity of liquid in a water bottle, soft drink pack, oil etc. where child sees the units like liter and mili liter</p> <p>Conducting activities to fill a given space by using different shapes like cubes, cuboids, spheres, prisms etc. and encourage children to decide which shapes can completely a given space.</p> <p>Discussing with children why unit cube is taken as unit of measuring space/volume Involving children in measuring volume by counting the number of unit cubes that can completely fill a given space.</p> <p>Activities targeting to exploration by child to derive their formulas to find volume of a cuboid Involving children in comparison of volume/capacity of two objects and finding the difference by subtraction</p>	<ul style="list-style-type: none"> Attempts to estimate volume of liquids and then verifies it using container marked with the standard units. Tries to differentiate between more and less volumes of liquids and calculates difference in volumes. Estimates volume of a solid object by informal measurement intuitively. Appreciates volume of a solid body: intuitively and also by informal measurement.

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<p>Measurement: Time</p> <ul style="list-style-type: none"> • Uses addition and subtraction in finding the time intervals in simple cases. 	<p>Providing exposure to find the time lapsed in two events by addition and subtraction. Let the child realize that operations on time are different than the operations on numbers being done by using place value system. For example when sum of months become 12 or more it is converted into years, when sum of minutes become 60 more it is converted into hours etc.</p>	<ul style="list-style-type: none"> • Explores ways (mental addition and subtraction) of finding time intervals between different familiar events and computes number of days between two dates., number of minute and hours between two times etc.
<p>Data Handling</p> <ul style="list-style-type: none"> • Collects quantitative data on two variables and represents it through table and bar graph. 	<p>The collection of information and making out meaningful inferences, out of it, is a routine activity being done by every child in daily life. Utilising this experience, involve children in devising ways of presenting data in different pictorial forms.</p> <p>Involve children in reading data given in various pictures/diagrams from newspapers and magazines.</p>	<ul style="list-style-type: none"> • Engages herself in organizing the two dimensional data in the form of tables, pictographs and/or bar graphs • Attempts to understand the key points emerging from the represented data
<p>Patterns</p> <ul style="list-style-type: none"> • Identifies patterns in square numbers, triangular numbers • Relates sequence of odd numbers between consecutive square numbers • Makes border strips and tiling patterns. 	<p>Asking children to explore patterns in numbers while doing various operations and to generalize them like patterns in square numbers</p>  <p>Triangular numbers like</p>  <p>Ask children to explore similar patterns</p>	<ul style="list-style-type: none"> • Observes patterns printed on dress material, tiles on floor and wall or other objects available in surroundings. • Identifies patterns in square and triangular numbers • Attempts to creatively develop patterns for border strips and Tiling by using stamps made by wood, vegetables, bottle caps etc.

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