

Theme 1: Numbers

The basis of understanding multi digit numbers lies in the understanding of the place value system. Thus, it is important to start with the concept of place value through manipulatives like place value cards, spike abacus, unifix cubes and expanded and short form of numbers in class. International system of numeration is different than the one used in India. Children will understand that the difference lies in the process of grouping the digits called periods. They should be able to relate to various types of numbers learnt earlier i.e. counting numbers, common fractions and decimal fractions. A clear understanding about the relationship among these numbers will help them in further using these for problem solving strategies. Providing opportunities of using these in different contexts (familiar and unfamiliar) are important to develop strategies to deal with them.

Learning Outcomes:

Children will be able to:

- ✎ acquire understanding of 6 digit numbers and their use in daily life;
 - ☛ read and write numbers up to 6 digits (lac) using Indian system of writing large numbers;
 - ☛ use place value to write a number in expanded form and vice versa;
 - ☛ compare numbers using place value and arranges them in ascending and descending order
 - ☛ use the given 6 digits to form the greatest and smallest number;
 - ☛ represent numbers (up to 39) by Roman Numerals:
- ✎ work with fractions:
 - ☛ identify half, one-fourth, three-fourths in a given picture (by paper folding) and also in a collection of objects.
 - ☛ represent fractions as half, one-fourth and three-fourths by using symbols $\frac{1}{2}$, $\frac{1}{3}$, $\frac{3}{4}$ respectively.
 - ☛ show the equivalence of $\frac{1}{2}$ and $\frac{2}{4}$ and other fractions.

Numbers

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ 6 digits numbers (up to lac) using the Indian system of numeration. ➤ Place value and face values. ➤ Ascending and descending order of numbers. ➤ Greatest and smallest numbers from given digits. ➤ Roman Numerals using symbols I, V and X. ➤ Fractions as part of a whole and their representation as 	<ul style="list-style-type: none"> ➤ Providing opportunities to children to collect and discuss real-life context in which numbers up to a lac are used e.g. making large payments, huge crowd, etc. ➤ Building on previous learning by providing opportunities for application of place value learnt in previous classes by expanding it based on patterns. 	<ul style="list-style-type: none"> ➤ 5-6 sets of number cards from 0-9 to make 6 digit numbers. ➤ Cuttings from newspaper/magazines about large numbers.

Numbers		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p>number.</p> <p>➤ Types of fractions: Like, unlike, unit, equivalent.</p> <p>➤ Visual idea of equivalent fractions like $\frac{1}{2}, \frac{2}{4}, \frac{3}{6}, \dots$</p> <p>➤ Addition of subtraction of like fractions.</p>	<p>➤ Conducting activities so that children compare numbers using place value based and creating number sequence in ascending and descending order.</p> <p>➤ Creating games/activities using number cards (0-9) to form 6 digit numbers (e.g. A number which has 8 at thousandth place & so on).</p> <p>➤ Forming questions on the greatest and smallest numbers should be discussed with the strategy to do so.</p> <p>➤ Introducing numerals from other Indian languages along with Roman numerals.</p>	

Theme 2: Number Operations

This theme aims at children gaining a broader and deeper understanding of the standard algorithms by having many and varied opportunities to use concrete materials such as place-value charts, unifix cubes and base ten blocks in problem-solving situations. The use of these tools will greatly enhance children' exploration of addition, subtraction, and multiplication involving regrouping, and multi digit division. Teaching the standard algorithms through problem solving using manipulatives will help children develop their conceptual understanding of the standard algorithms. Once children have a thorough understanding of the standard algorithms, it will enable them to work flexibly with algorithms and determine when their use is appropriate.

Learning Outcomes:

Children will be able to:

- ✎ apply operations of numbers in daily life;
- ✎ add and subtract numbers (up to 4 digits) with or without regrouping;
- ✎ solve problems involving addition and subtraction in different real life contexts presented through visuals and stories;
- ✎ construct and write multiplication table up to 10;
- ✎ multiply two and three digit numbers using standard algorithm and lattice algorithm;
- ✎ divide a given number by another number (single digit) by drawing dots and grouping, using multiplication facts and by repeated subtraction;
- ✎ apply four operations-addition, subtraction, multiplication and division in solving real life situations;
- ✎ frame word problems based on a mathematical statement;
- ✎ estimate sum differences and products of two or more given numbers without using paper/pen;
- ✎ multiply 2 and 3 digit numbers;
- ✎ divide a number by another number using different methods such as:
 - ✎ pictorially (by drawing dots)
 - ✎ equal grouping
 - ✎ repeated subtraction
 - ✎ establishing an inter-relationship between division and multiplication
- ✎ create and solve simple real life situations/ problems related to money, length, mass and capacity by using the four operations.

Number Operations		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Addition and subtraction of numbers (up to 4 digits) with or without regrouping. ➤ Construct of multiplication table up to 10. 	<ul style="list-style-type: none"> ➤ Creating real life contexts involving addition/subtraction of 4 digit numbers Text based stories such may be used to practice solving such problems. ➤ Encouraging and facilitating children to develop multiplication tables 	<ul style="list-style-type: none"> ➤ Wooden sticks to demonstrate multiplication table. ➤ Napier sticks for multiplication. ➤ Geoboard and rubber band. (to demonstrate

Number Operations		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Multiplication of two and three digit numbers using standard algorithm and lattice algorithm. ➤ Division in single digit another numbers. ➤ Application of four operations-in solving real life situations. ➤ Word problems based on a mathematical statement. ➤ Estimation of sum, differences and products of two or more given numbers and mental verification. 	<p>rather than learning by rote.</p> <ul style="list-style-type: none"> ➤ Introducing standard algorithm initially with one number in expanded form so that better understanding of standard algorithm is developed e.g. $23 \times 3 = (20+3) \times 3 = 20 \times 3 + 3 \times 3$. ➤ Using repeated subtraction to create intuitive understanding of the division algorithm. ➤ Encouraging children to create real life contextual problems based on mathematical operations (not more than two at a time) and solving them. ➤ Involving children in estimating sum/differences of two numbers to do calculation mentally. ➤ Demonstrating the estimation of sum, difference of two numbers by using the Geoboard and rubber band. 	<p><i>estimation of sum, difference of two numbers.)</i></p>





Life Skills: solving daily life problems

Theme 3: Playing with Numbers

The theme will promote children's exploration with various facts and properties of counting numbers which lead to many important aspects of the use of mathematics in daily life activities. It will encourage children to work with numbers, identify the patterns and make general rules. The concepts like factors, multiples, common factors and multiples lead to classification of numbers into various interesting groups. Children will be encouraged to work in groups to generalize their explorations about number properties and enjoy working with numbers.

Learning Outcomes:

Children will be able to:

-  find out factors, prime factors and multiple of numbers;
-  understand prime and composite numbers;
-  understand divisibility by numbers;
-  calculate HCF & LCM of numbers.

Playing with Numbers		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Factors. ➤ Multiples. ➤ Prime and composite numbers. ➤ Test for divisibility by 2, 3, 4, 5, 9, 10. ➤ Prime factors- By Factor tree method and Prime Factorization Method. ➤ Highest common factor-listing method and Common Division. ➤ Lowest Common Multiples- Listing Method, Common Division. 	<ul style="list-style-type: none"> ➤ Encouraging children to understand factors of given number. ➤ Conducting activities in the class so that children use multiplication table for understanding multiplication facts. ➤ Encouraging children to first calculate common factors and then to find the highest common factor. ➤ Guiding children to calculate common multiples and then naming the smallest of them as lowest common multiples. 	<ul style="list-style-type: none"> ➤ Wooden sticks. ➤ Match sticks. ➤ Broom sticks.

Theme 4: Geometry

In the primary grades, learning of mathematics encourages children to focus on geometric features of two-dimensional shapes and three-dimensional figures. Instructional activities provide opportunities for children to manipulate, compare, sort, classify, compose, and decompose these geometric forms. These types of activities help children to identify and to informally describe some attributes and geometrical properties of two-dimensional shapes and three-dimensional figures. In the teaching learning process children continue to learn about the properties of two-dimensional shapes and three-dimensional figures through hands-on explorations and investigations.

Learning Outcomes:

Children will be able to:

- ✎ acquire an understanding about shapes around them;
- ✎ identify the centre, radius and diameter of a circle;
- ✎ find shapes that can be used for tiling;
- ✎ draw cube/ cuboids using the given nets;
- ✎ show through paper folding/ paper cutting, ink blots, etc., the concept of symmetry by reflection;
- ✎ draw top view, front view and side view of simple objects;
- ✎ observe, identify and extend geometrical patterns based on symmetry;
- ✎ represent the collected information in tables and bar graphs and draws inferences from these;
- ✎ use tangrams to create different shapes;
- ✎ tile a given region using one and more than one shape;
- ✎ draw a circle-free hand, using a round object or a compass and identify centre, radius, diameter;
- ✎ explore reflective symmetry through ink blots paper cutting and paper folding;
- ✎ explore the area and perimeter of simple shapes;
- ✎ intuitively draw the plan, elevation and side view of different objects based on observation.

Geometry		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Tangram shapes ➤ Tessellation: Tiling using one and more shapes ➤ Circle: Centre, radius, diameter. ➤ Relation between diameter and radius of a circle ➤ Reflection symmetry ➤ Area and perimeter of simple shapes. 	<ul style="list-style-type: none"> ➤ Using tangrams to create intuitional understanding of physical attributes of different 2D shapes. ➤ Providing concrete shapes (created or procured) to children in groups to cover a surface with no gaps and overlapping using one or two shapes. Discussion on which shapes tile and why or vice versa may be done. ➤ Conducting paper folding activities 	<ul style="list-style-type: none"> ➤ Tangrams of 7 pieces. ➤ Cardboards, tape cutters, glue sticks (for <i>creating tiles of different shapes</i>) ➤ Colour paper, ink markers, scissors. ➤ Circular geoboard and rubber band.

Geometry		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ▶ Perspectives of shapes: Plan, elevation and side view. ▶ Introduction of terminology: Plane, point, line, line segment, ray, parallel. ▶ Lines, intersecting and perpendicular lines. 	<p>will go a long way to create a deeper understanding of a circle and various vocabulary related to it.</p> <ul style="list-style-type: none"> ▶ Discussing symmetry in daily life context before introducing reflection symmetry. ▶ Conducting individual activities so that child has experiential learning about symmetry and line of symmetry. ▶ Creating activities for drawing the plan, elevation and side view of 3 D objects. ▶ Conducting quizzes to create an understanding of the different views of objects, houses, places etc. For example, showing top view of a chair or table and asking to guess what this object is. 	

Integration: Arts Education

Theme 5: Measurement

In this theme children will not only learn direct measurement but also develop the understanding of indirect measurements of time and temperature. These cannot be measured directly they require instruments that indirectly translate evidence of their presence into a measurable form. Children will be made aware about this. Previous learning had initiated children the learning of direct measurement i.e., by applying a unit directly to the object being measured. For example, to measure length, area or volume a specific unit is required. Selecting a unit is an arbitrary act and the units used are only conventions accepted by all to bring in uniformity for measurement.

Learning Outcomes:

Children will be able to:

- ✓ convert meters into centimeters & vice versa;
- ✓ solve problems involving lengths & distances in daily life contexts;
- ✓ use estimation and verification to find out the distance between two locations;
- ✓ use a balance to weigh different objects using standard weight like grams, kilograms etc. to different objects;
- ✓ estimate and verifies the weights of different objects using a balance;
- ✓ measure volume of different containers using containers marked with standard units of multi-litre and litre;
- ✓ correlate different units of standard measurement like millilitre and litre with different objects;
- ✓ estimate & verifies capacities of different containers by measurement;
- ✓ explore the area and perimeter of simple geometrical shapes (triangle, rectangle, square) in terms of given shape as a unit like the number of books that can completely fill the top of a table;
- ✓ convert metre into centimetre and vice-versa;
- ✓ estimate the length of an object/distance between two locations, weight of various objects, volume of liquid, etc., and verifies them by actual measurement;
- ✓ solve problem involving daily life situations related to length, distance, weight, volume and time involving four basic arithmetic operations;
- ✓ read clock time in hour and minutes and expresses the time in a.m. and p.m.;
- ✓ relate 24 hr clock with respect to 12 hr clock;
- ✓ calculate time intervals/ duration of familiar daily life events by using forward or backward counting/addition and subtraction.

Measurement		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Conversion of units: meters into centimeters, grams into kilograms, litre into millilitre & vice versa. ➤ Solve problems involving lengths/distances, weight/mass, volume/capacity in daily life contexts using four operations. ➤ Estimation and verification of length, weight, volume ➤ Conversion of days, hrs and minutes (Bigger to smaller units and vice versa). ➤ Approximate time elapsed through word problems. 	<ul style="list-style-type: none"> ➤ Organising activities for children to use appropriate units with lengths like smaller lengths using cm and metre/Km for large distances. ➤ Creating real life contexts for solving problems involving various units of lengths. ➤ Emphasizing on estimation skills and its development through activities. ➤ Creating contexts in which children use standard weights to find out the weights of different objects. ➤ Asking children to have collection of containers/pouches so as to discuss different things which are measured in milliliters and liters. Some of these containers may be used in conjunction with standard measures. ➤ Using of toy clocks/ prepared by children or other clocks in the classroom or at home to read time in hours, minutes and seconds. 	<ul style="list-style-type: none"> ➤ Measuring flasks with different markings for measurement. ➤ Shapes of cube, cuboid. ➤ Toy clock prepared by children (<i>to read time in hours, minutes, seconds</i>).

Integration: Science (Measurement)

Life Skills: solving daily life problems

Theme 6: Data Handling

This theme will enable children to discover and learn varied mathematical ways of collecting and using information. In this class, the emphasis is given to more efficient ways of representing data by pictures and graphs. The reading and interpretation of graphs is further enhanced to inculcate the data handling skills. Children will also be encouraged to draw their own graphs and pictures for the data collected by them as they will be in a better position to do so.

Learning Outcomes:

Children will be able to:

- represent collected data in pictographs using stickers, pictures etc.;
- read bar graphs and make observations based on more or less.

Data Handling		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Pictorial representation of the raw data. ➤ Interpretation of bar graph. 	<ul style="list-style-type: none"> ➤ Taking up data handling activities (slightly more complex) for representation in different graphical forms. ➤ Asking children to do simple graphical data representation from newspapers/magazines and interpreted in the class along with discussions on it. ➤ Organising group projects involving children in focusing on collecting data, interpreting it and then pictorially representing the same in terms of a bar graph. 	<ul style="list-style-type: none"> ➤ Coloured papers, glue sticks, markers, stickers of different objects. ➤ Cuttings of pictographs, bar charts, etc. from newspapers, magazines. ➤ Videos and PPTs (of simple data, findings that are presented in graphs).

Integration: Arts Education



Life Skills: Interpretation and analysis

Theme 7: Patterns

The aim of this theme will be to make children aware of and practice how to find patterns, extend them and express in various ways thereby enabling them to initiate the process of thinking towards generalizations which is termed as algebra in upper primary classes. The decimal system (base 10 place value system) has its base on patterns and their further extension from one to tens to hundreds to thousands . . . Similarly, characteristics of shapes and figures are generalized on the basis of patterns.

Learning Outcomes:

Children will be able to:

-  observe and identify patterns with more than one characteristic, like growing and reducing patterns;
-  create a rule based on observations for extending the pattern in shapes and numbers.

Patterns		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none">➤ Growing and reducing patterns.➤ Rule to extend a growing/reducing pattern in shapes and numbers.	<ul style="list-style-type: none">➤ Planning activities around patterns in which children are able to formulate a rule and verify it for the extension of pattern.	<ul style="list-style-type: none">➤ Shapes, coloured papers, stamping tools, stamp pads, ink, water colours, vegetables etc.

Integration: Arts Education

Life Skills: Logical thinking

Theme 1: Numbers

Children will be enabled to understand how the place value system works thereby helping them to think about the size of large numbers that they have not counted. Estimation is an essential skill that demonstrates number sense about base 10 system. Activities based on items such as beans or marbles help children develop strategies for estimating quantities. Numerals are written in both compact form and expanded form is used in algorithms. Rounding is a skill to estimation that requires understanding of a relationship between numbers. Opportunities will be provided to facilitate children's use of the place value frame and place value chart to represent large numbers. They will learn to express numbers in many ways like with words (number names), numerals and words, numerals only and finally develop scientific or exponential notations for large numbers in higher classes.

Learning Outcomes:

Children will be able to:

- ✓ read and write large numbers up to crores using the Indian numeration system;
- ✓ compare the Indian numeration system with the International system and read, write numbers using International numeration system;
- ✓ use place value to write a number in expanded form and vice versa;
- ✓ compare large numbers using place value;
- ✓ use place value to form greatest and smallest numbers from the given digits;
- ✓ round off numbers to nearest 10s, 100s or 1000th;
- ✓ represent numbers using roman symbols;
- ✓ acquire understanding about fractions;
- ✓ find the fractional part of a collection;
- ✓ identify and form equivalent fractions of a given fraction;
- ✓ express a given fraction $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$ in decimal notation and vice-versa. For example, in using units of length and money - ₹ 5 is half of ₹ 10.

Numbers		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Indian and International system of numbers- 9 digits numbers. ➤ Place value and face value. ➤ Expanded form. ➤ Comparison of the numbers. ➤ Ascending and descending order of numbers. ➤ Formation of greatest and smallest numbers from the given digits. 	<ul style="list-style-type: none"> ➤ Collecting and discussing various contexts in which large numbers are used like cost of properties, distance between planets etc. ➤ Involving children in collecting information from newspapers and magazines having large numbers should be encouraged to write the equivalent 	<ul style="list-style-type: none"> ➤ 9 Sets of number cards from 0-9 to create large numbers. ➤ New papers and magazine cutting having references of large numbers. ➤ Spike abacus with 9 spikes to represent numbers up to 9-digits.

Numbers		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Rounding off numbers-nearest 10, 100, 1000. ➤ Construction of Multiplication Tables - 2 to 20. ➤ Addition, Subtraction, Multiplication, Division by 2-digit division. ➤ Word problems. ➤ Roman numerals for large numbers. 	<ul style="list-style-type: none"> Indian/International number system. ➤ Practicing place value and its understanding through games/activities and concrete materials. ➤ Encouraging children to form rules for comparison of large number through exploration/patterns. ➤ Using newspapers and other reports to show how approximation of numbers is used in day to day life. Children should also be encouraged to discover rules of rounding off/approximation. 	

Theme 2: Number Operations

The confidence gained in using standard algorithms for operations on whole numbers leads children to use them efficiently for problem solving and in addition, subtraction, multiplication and division of common fractions, decimal fractions and integers in later classes. Using manipulatives like place-value charts, unifix cubes and base ten blocks, 10X10 number grid and number line strengthens the understanding of standard algorithms. In using manipulatives in this context, children can be encouraged to work in pairs, one working with the models and the other recording the steps. It is important that children record the steps as they model them.

Learning Outcomes:

Children will be able to:

- ✓ apply the understanding of place value of numbers beyond 1000 in the four operations;
- ✓ divide a given number by another number (up to two digits);
- ✓ estimate sum, difference, product and quotient of numbers and verifies the same;
- ✓ use standard algorithms in addition subtraction and multiplication of numbers;
- ✓ divide a given number by another number (up to 2 digits) by using standard algorithm;
- ✓ solve problems involving four operations addition, subtraction, multiplication and division in different real life contexts;
- ✓ frame word problems based on mathematical statements involving number operations;
- ✓ explain the meaning of factors, multiples prime and composite numbers;
- ✓ find and displays multiples and factors of numbers using various techniques (e.g. factor tree);
- ✓ discover prime & composite number in the number sequence up to 100.

Number Operations		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Standard algorithms for addition subtraction and multiplication of large numbers. ➤ Division of given number by another number (up to 2 digits). ➤ Framing and solving Problem from real life contexts involving number operations. ➤ Estimation of the sum, difference, product and quotient of two or more 	<ul style="list-style-type: none"> ➤ Exploring alternate algorithms for all four operations in addition to standard algorithms. ➤ Dividing numbers using different strategies like using standard algorithms or breaking a number and then using operation. (For example, to divide 9450 by 25, divide 9000 by 25, 400 by 25, and finally 50 by 25 to obtain the answer by adding all these quotients). ➤ Providing opportunities to explore the meaning of factors. 	<ul style="list-style-type: none"> ➤ Number cards and place value cards. <i>(These will be used to demonstrate various algorithms for operations on numbers).</i> ➤ Play money notes and coins <i>(for representation of numbers according to place value).</i>

Number Operations		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
numbers.	<ul style="list-style-type: none"> ▶ Creating contextual problems (within the child's daily life context) as word stories and exchange them with peers to solve. ▶ Providing opportunities for children to frame rules for estimation of the net result of four operations applied on numbers in daily life contexts. 	

Life Skills: solving daily life problems

Theme 3: Fractions and Decimals

Children's comprehension of whole numbers and common fractions forms the basis for their understanding of decimal fractions. Real-world examples of things separated into tenths and hundredths are less common than are examples of common fractions. A better understanding will be developed through metric sub units like Deci (one-tenth), centi (one-hundredth), milli (one-thousandth) etc. An understanding of decimal fractions and their relationship with common fractions develops gradually, thus the focus will be on work with physical material, diagrams and real life situations.

Learning Outcomes:

Children will be able to:

- ✓ define proper, improper and mixed fractions;
- ✓ write equivalent fractions of given fraction by multiplying/dividing numerator and denominator;
- ✓ compare 3 or more fractions;
- ✓ add and subtract unlike fractions and mixed numbers;
- ✓ solve word problems on addition and subtraction of fractions;
- ✓ explain multiplication of fraction as 'of';
- ✓ multiply fractions- fraction by a whole number, fraction by fraction;
- ✓ relate fractions with denominator 10, 100, 1000 as decimal fraction;
- ✓ represent decimal fractions pictorially;
- ✓ find place value of decimal fractions as -tenths, hundredths, thousandths etc.;
- ✓ expand decimal fractions e.g. $234.67 = 200 + 30 + 4 + \frac{6}{10} + \frac{7}{100}$;
- ✓ classify decimal fractions as equivalent, like, and unlike;
- ✓ compare and order decimal fractions;
- ✓ add and subtract decimal fractions;
- ✓ solve word problems on addition and subtraction of decimal numbers;
- ✓ construct rules to multiply decimal fraction by 10, 100, 1000;
- ✓ multiply decimal number by whole number and decimal number by decimal number.

Fractions and Decimals

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Comparison of 3 or more fractions. ➤ Addition and subtraction of unlike fractions. ➤ Addition and subtraction of mixed numbers. ➤ Word problems on addition and subtraction of fractions. ➤ Multiplication of fractions- fraction by whole numbers and fraction and fraction. ➤ Division of fractions- whole number by a fraction, fraction by a fraction. ➤ Relationship between fractions and Decimals fraction. ➤ Pictorial representation of decimal fraction. ➤ Place value of decimal fraction- tenths, hundredths, thousandths. ➤ Expanded form: Decimal and fraction expansion ➤ Types of decimal fractions- equivalent, like, and unlike ➤ Comparing decimal fractions. ➤ Ordering of decimal fraction ➤ Addition and subtraction of decimal fraction. ➤ Word problems on addition and subtraction of decimal fraction. ➤ Multiplication of decimal fractions by 10, 100, 1000. ➤ Multiplication of decimal number by whole number and decimal number by decimal number. 	<ul style="list-style-type: none"> ➤ Using Paper folding to demonstrate like-unlike fractions, addition and subtraction of fractions and equivalent fractions. ➤ Encouraging children using origami paper for folding into equal number of parts to show fractions and their operations. ➤ Conducting activities for multiplication of fraction by another fraction as operation “of” through paper folding, coloring and forming rules. For example, $\frac{1}{2} \times \frac{1}{3}$ is half of one – third ➤ Associating the idea of division of fractions with division of whole numbers as number of times the divisor lies in the dividend. For example, $\frac{1}{2} \div \frac{1}{4}$ means number of $\frac{1}{4}$ in $\frac{1}{2}$ which is nothing but 2. ➤ Introducing through demonstration -decimal fractions as fraction with 10, 100, 1000 etc. as denominators and discussing the ways in which such numbers can be written using place value system. ➤ Involving children in framing rules to operate decimal fractions using the rules used for operating fractions. ➤ Measuring tape and scale can be used to demonstrate fractions, decimals and their relationship. 	<ul style="list-style-type: none"> ➤ Origami paper (<i>for showing fractions and their operations by folding in to equal number of parts</i>). ➤ Bending wire. ➤ Wooden sticks. ➤ Number cards. ➤ Measuring tape and scale.

Theme 4: Playing with Numbers (Factors and Multiples)

There are many relationships in the Numbers system which include even and odd numbers, prime and composite numbers. The classification of numbers into two groups is made on the basis of some properties of the numbers. Factors are one of such properties. Work with prime and composite numbers extends understanding of factors, divisors and multiples encountered in the study of multiplication and division. Children should learn that factors and division mean the same thing and that they can be used interchangeably. When two whole numbers are multiplied they should yield a product and can be called either factors or divisors of their product (exceptionally zero can be a factor but not a divisor). The product of two numbers also called multiple of the two numbers is another concept that is directly related with multiplication of numbers. The children then can adopt any of the two ways of finding factors of numbers; determining by examination and the second more systematic way is using factor trees. children must be advised to use the examination method to factor numbers and to name the greatest of them as HCF. Likewise they should adopt their own ways to find and name the smallest multiple of two or numbers as their LCM.

Learning Outcomes:

Children will be able to:

- ✎ write multiples of numbers;
- ✎ find factors of numbers;
- ✎ identify prime and composite numbers, twin primes and co-prime numbers;
- ✎ test divisibility of numbers by 2, 3, 4 and 5;
- ✎ find prime factors- by Factor Tree;
- ✎ find the Highest Common Factor (HCF)- Listing Method and Common Division;
- ✎ find the Lowest Common Multiples (LCM)- Listing Method and Common division;
- ✎ relate HCF and LCM and uses to find one when other is given.

Factors and Multiples		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Factors, common factors and Highest common factors of two numbers. ➤ Multiples, common multiples and Lowest Common multiples of two numbers. ➤ Prime and composite numbers, Twin primes and co-prime. ➤ Prime factors- Factor Tree Method. ➤ Highest Common Factor(HCF)- Listing Method 	<ul style="list-style-type: none"> ➤ Exploring counting numbers for multiples of numbers through various strategies like multiplication tables, number line, skipping the number etc. ➤ Using various strategies by children monitored by the teacher to find factors of a number. ➤ Involving children in finding and displaying 	<ul style="list-style-type: none"> ➤ Set of counters. (so that children can make equal groups to understand factors like, 24 counters can be grouped equally in to 24, 12, 8, 6, 4, 3, 2 and 1 groups) ➤ Wooden sticks of same and different sizes.

Factors and Multiples

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p>and Common Division.</p> <ul style="list-style-type: none"> ➤ Lowest Common Multiples(LCM)- Listing Method and Common Division. ➤ Relationship between HCF and LCM. ➤ Test for divisibility by 2, 3, 4, 5, 9 10, 11 (forming rules by observation). 	<p>multiples and factors of numbers using various techniques (e.g. <i>factor tree</i>, <i>multiplication tables</i>, <i>skip counting on a number line etc.</i>)</p> <ul style="list-style-type: none"> ➤ Encouraging children to find prime numbers based on factors. Discussion may be held with them focusing on why prime numbers are important and useful. ➤ Involving children in discovering prime and composite numbers in the number sequence up to 100. 	

Theme 5: Introduction to Negative Numbers

The concept of a number having a value of less than zero and number indicating a direction are not easily understandable through words alone. In this theme children through situations will be exposed to involving negative and positive number (integers). This will enable children to visualize and understand them better. Number line helps children understand moving up and down the number sequence, magnitude of numbers and the concepts of more than and less than. When used to compare numbers, children see that any number is greater than any other number to its left. The same property holds for negative numbers too. When integers are ordered on a number line, as negatives number get larger their value get smaller and smaller.

Learning Outcomes:

Children will be able to:

- ✓ represent whole numbers through number line;
- ✓ develop idea of integers as counting number, zero and negatives of counting numbers;
- ✓ compare integers through number line;
- ✓ arrange integers in ascending and descending order;
- ✓ add and subtract integers.

Introduction to negative numbers

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Introduction to negative numbers through number line. ➤ Idea of integers as counting number, zero and negatives of counting numbers. ➤ Comparison of integers through number line. ➤ Ascending and Descending order of integer. ➤ Rules for addition, subtraction of integers. 	<ul style="list-style-type: none"> ➤ Involving children in discussion to have necessity of numbers less than zero like having measurement in opposite directions with reference to a point (<i>above and below sea level, temperature above and below zero etc.</i>) ➤ Encouraging children to use number line for representation of negative numbers. ➤ Letting children explore the ways to name negative and positive numbers together along with zero. ➤ Using number line to show that negative numbers are mirror image points corresponding to counting numbers (<i>natural numbers</i>) ➤ Number line may be used to represent integers and their ascending and descending orders. 	<ul style="list-style-type: none"> ➤ Number line. ➤ Counters of two colours where the colours represent opposite numbers.

Theme 6: Geometry

The levels described by the Van Hiele are sequential, and success at one level depends on the development of geometric thinking at the preceding level. Typically, children at the primary level demonstrate characteristics of level 0 and are moving toward level 1 of the Van Hiele's levels of geometric thought. Children entering the class V are most likely functioning in the visualization and analysis levels (0 and 1) of geometric thought. The goal of teaching geometry at this stage is to provide instructional activities that will encourage children to develop thinking and reasoning skills needed to move towards level 2 of the hierarchy, informal deduction (at upper primary stage). Building on children's experiences with non-standard to standard measures they are ready to begin work with acquiring a confidence in using standard units and relate bigger to smaller and vice-versa.

Learning Outcomes:

Children will be able to:

- ✎ explore idea of angles and shapes;
- ✎ classify angles into right angle, acute angle, obtuse angle and represents the same by drawing and tracing;
- ✎ identify 2D shapes from the immediate environment that have rotation and reflection symmetry like alphabet and shapes;
- ✎ identify angles in the environment through observation and paper folding;
- ✎ identify rights angles in the objects and in the environment;
- ✎ classify angles into right, acute, obtuse angles based on their visible attributes;
- ✎ represent different angles (like acute, obtuse, right angles) by drawing and tracing on the paper;
- ✎ explore symmetry in familiar 3D shapes;
- ✎ explore reflection symmetry and rotational symmetry w.r.t. to familiar 2D- geometrical shapes;
- ✎ construct the shapes of cubes, cuboids, cylinders and cones from the given nets (designed for this purpose).

Geometry		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Angle and its measures. ➤ Classification of angles into right, acute, obtuse angles. ➤ Identification and representation of acute, obtuse and right angles. ➤ Symmetry in familiar 3D 	<ul style="list-style-type: none"> ➤ Using paper folding activities (fold art angle) right angles can be identified in the vicinity and in objects. ➤ Buildings, class room door windows etc. can provide excellent concrete support to the concept of an angle. 	<ul style="list-style-type: none"> ➤ Coloured papers, cardboards, scissors, etc. ➤ Small pieces of mirrors with rounded edge. ➤ Empty card board boxes. ➤ Thick card board sheets, pencils, markers and cutters.

Geometry		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
shapes like Cube, human body, buildings etc. ➤ Reflection and rotational symmetry in familiar 2D-geometrical shapes like circle, rectangle, square, triangle and circles. ➤ Nets of cubes, cuboids, cylinders and cones.	➤ Classification of angles may be encouraged by finding obtuse and acute angles in surroundings and in the objects around us. ➤ Discovering symmetry in the objects/environment may be encouraged. ➤ Using concrete materials to explore reflective as well as rotational symmetry. Card board cut out shapes, may be rotated from different points to find out their rotational symmetry. Paper folding, making shapes/designs using carbon papers etc. may be used for developing a deeper understanding of concept of the symmetry. ➤ Encouraging children to bring empty boxes, open them up and trace their nets. Also using the nets so traced are able to create boxes.	

Integration: Science (Solids, Liquids and Gases)

Theme 7: Measurement

The early learning of measurement is largely inventive and investigative by nature. Children up to primary grades begin with activities to establish the everyday contexts for measurement and to introduce measurement with nonstandard units. This theme will enable children to begin to conserve length and area and understand that these concepts do not change, even when an object's position or appearance is altered. Children will also learn to use standard units by providing them frequent opportunities to measure objects so that they construct their understanding of units and of the measurement process.

Learning Outcomes:

Children will be able to:

- ✎ relate different commonly used larger and smaller units of length, weight, time and money and convert larger units to smaller units and vice versa;
- ✎ estimate the volume of a solid body in known units like volume of a bucket in about 20 times that of a mug;
- ✎ apply the four operations in solving problems involving money, length, mass, capacity and time intervals;
- ✎ explain the terms area and perimeter of simple geometrical shapes;
- ✎ compute area and perimeter of simple geometrical shapes.

Measurement		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Area and perimeter of simple geometrical shapes; ideas and their measurement. ➤ Daily life problems involving length, weight, time, money & volume: Use of four number operations. ➤ Idea of larger and smaller units of length, weight, time, money & volume and conversion . 	<ul style="list-style-type: none"> ➤ Developing and using Square grids, dot grid to facilitate the understanding of concepts related to area and perimeter. ➤ Conducting exploration activities with groups of children to infer that area and perimeter are not co-related i.e. figures having same area may have different perimeters. ➤ Creating and solving contextual problems regarding calculations of length, weight, volume etc. ➤ Providing practice questions for inter conversion of bigger units into smaller units and vice versa in various interesting ways. 	<ul style="list-style-type: none"> ➤ Squared grid papers, dot grid printed papers. ➤ Coloured markers, scissors etc. ➤ Daily life objects such as match boxes, sugar cubes, paper weight, etc. (<i>for demonstration of length, area, volume and weight</i>).

Integration: Science

Life Skills: solving daily life problems

Theme 8: Introduction to Percentage

This theme will focus on children becoming aware and understanding the importance use and different applications of percentage in a variety of ways in many daily life aspects. Percent expresses a relationship between some number and 100. The symbol % and word percent means per hundred or out of hundred. The children at this stage will be provided opportunities to understand the meaning of percent through their experiences. As percent is common fraction with 100 as denominator, so it is also a decimal fraction representing hundredths. A conscious attempt will be made to extensively build on children's understanding about these earlier learnt concepts to further build their understanding about percent.

Learning Outcomes:

Children will be able to:

- ✎ define percentages as fraction with 100 as denominator;
- ✎ establish relationship between fractions, decimal fractions and percentages;
- ✎ pictorially represent percentage;
- ✎ convert fractions to percentages and vice- versa;
- ✎ convert decimals to percentages and vice-versa;
- ✎ solve simple word problem on percentage.

Introduction to Percentage		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none">➤ Introduction of percentages.➤ Relationship between fractions, decimals and percentage.➤ Pictorial representation of percentage.➤ Conversion of fractions to percentages and percentages to Fractions.➤ Conversion of decimals to percentages and percentages to decimals.➤ Simple word problems on percentage.	<ul style="list-style-type: none">➤ Introducing percentage as fraction with denominator as 100 and relating it with decimal representation.➤ Letting children form the rules for percentage and conversion using the known rules of fractional and decimals.➤ Encouraging children to relate their marks obtained in different subject with percentage.➤ Measuring tapes, scales may be used to explain fractions and decimals.	<ul style="list-style-type: none">➤ Measuring tape.➤ Scale.➤ Number sticks.➤ Paper magazine cuttings.

Life Skills: solving daily life problems

Theme 9: Data Handling

Various graphs like pie charts, line graphs and bar graphs relate to children's daily life experiences like newspapers and sports transmission shown on TV. Children will be encouraged to devise their own ways of reading and interpreting these pictographs. At this stage children are skilled to attempt the drawing of bar graphs for the data either collected by them or obtained from other sources. The data related to issues related to environment, classroom activities etc. will help children in connecting the skill of data handling with their daily activities.

Learning Outcomes:

Children will be able to:

- ✓ collect data related to various daily life situations, represents it in tabular form and by bar graphs and interpret a given bar graph.
- ✓ interpret pie charts and line graphs generally found in newspapers and magazines.

Data Handling		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Pictorial representation of the raw data. ➤ Interpretation of Bar graph, line graph and pie chart. 	<ul style="list-style-type: none"> ➤ Conducting group activities on data collection, tabulation (in graphic form) and interpretation within and outside classrooms. ➤ Advising children to make presentation as groups on their whole activity as a project. This should have tabular and graphical representations as used in newspaper/magazines ➤ Providing opportunities to interpret pie charts and line graphs given in textbooks, newspaper and magazine cuttings. 	<ul style="list-style-type: none"> ➤ Coloured papers, stickers of different objects, glue sticks. ➤ Newspaper and magazines cuttings having bar graphs, pie charts and line graphs.

Integration: Arts Education





Life Skills: analysis and interpretation











Theme 10: Patterns

Children are now confident at this stage with observing and generalizing patterns in numbers and shapes. This will help them in other themes of mathematics like applying operations on numbers (whole numbers, common and decimal fractions), properties of various 2-D shapes and 3-D figures and measurements. They should explore additional properties of whole numbers like triangular and square numbers through patterns.

Learning Outcomes:

Children will be able to:

-  observe and identify patterns with a unit of repeat and extend it;
-  observe and generalize a rule to extend a progressive pattern;
-  create a pattern with more than one characteristic;
-  observe and generalize patterns of triangular and square numbers.

Patterns		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Patterns with a unit of repeat and their extension. ➤ Progressive patterns. ➤ Extension of progressive patterns. ➤ Patterns with more than one characteristic. ➤ Triangular and square numbers. 	<ul style="list-style-type: none"> ➤ Providing a lot of patterns that are in the near vicinity of children and have a unit of repeat. Let them identify this unit and extend the pattern. ➤ Dividing children in to group of two-three each. Let one group form a pattern with repeat and other extend it. ➤ Giving exposure to progressive patterns which are commonly found in numbers and shapes. For example: <div style="margin-top: 10px;"> <p>2, 4, 6,; 5, 10, 15, 20,</p> <p>.....   </p> </div> ➤ Providing opportunities for finding a rule for extension of the pattern of numbers that can be placed as triangle and square. Let children find further few terms on the basis of the rule and without finding all previous terms. ➤ Triangular numbers <div style="margin-top: 10px;">     </div> <p style="text-align: center;">1 3 6 10</p> <p>Square Numbers</p>    <p style="text-align: center;">1 4 9</p> 	<ul style="list-style-type: none"> ➤ Number sticks. ➤ Triangular, square, rectangular shapes made from thick paper cutter. ➤ Use of charts showing patterns with numbers, and different shapes.

Integration: Arts Education

Life Skill: Logical thinking, reasoning

Theme 1: Number System

The idea about numbers that children built-up up to class V is of representing the number of items/objects in a collection. But in class VI children have to initiate the learning of numbers that are abstract which starts with negative numbers and extension of whole numbers to integers. This is the stage where the collection of integers is seen as a system that satisfy certain properties and have correlated structure.

A preparation of the extension of fractions and integers to rational numbers also takes place in this class. A gradual move helps children in developing these concepts. Let children observe various patterns while applying operations on integers and fractions (common and decimals). Generalization of these patterns will lead to many properties of integers and decimal fractions.

The multiples and factors of numbers can be obtained by just playing with numbers. Therefore, it is expected that children will learn about these concepts through a play way method. Children will be enabled to explore and develop their own rules for finding HCF and LCM of two or more numbers.

Sets are important way of expressing groups of numbers and other objects. In this class a preliminary idea of language and terminology related to sets is to be introduced. This will also help children in looking into various collection of numbers as sets satisfying certain properties. The knowledge about sets will be further strengthened in higher classes too.

Learning Outcomes:

Children will be able to:

- ✓ describe place and face values of a digit in a large number;
- ✓ create situations around them in which they find negative numbers;
 - ♥ through situations like money transactions, measuring of height, budget, etc. child uses larger numbers and thus appreciates their use;
 - ♥ reduces fractions involving larger numbers to simplest (lowest) forms;
- ✓ identify a situation for a given fraction (like proper, improper, equivalent, etc.);
- ✓ construct examples through which they demonstrate the addition and subtraction of integers;
- ✓ create daily life situations where opposites are involved and represent such quantities by positive and negative numbers;
- ✓ make their own strategies of ordering, adding and subtracting integers;
- ✓ use divisibility rules to find factors of a number;
- ✓ demonstrate ways of finding HCF and LCM of two numbers;
- ✓ devise strategies to identify appropriate situations to use the concepts of HCF and LCM.

Number System		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
Numbers <ul style="list-style-type: none"> ➤ Consolidating the <i>sense</i> of numberness up to 5 digits, size, estimation of numbers, identifying smaller, larger, etc. ➤ Place value (recapitulation and extension., ➤ Operations on large numbers. ➤ Word problems on number operations involving large numbers This would include conversions of units of length & mass (from the larger to the smaller units). ➤ Estimation of outcome of number operations. ➤ Introduction to a sense of the largeness of, and initial familiarity with, large numbers up to 8 digits and approximation of large numbers). ➤ Numbers in Indian and International Systems and their comparison. 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning. ➤ Making children compare numbers up to 5 digits through various situations like cost of two houses, number of spectators present in two cricket matches etc. ➤ Extending number up to 8 digits through patterns that exist in numbers up to five digits and then citing/observing daily life situations e.g. cost of property, ➤ Involving children in the activities that include classification of numbers on the basis of their properties like even, odd, multiples and factors. These properties can be used to classify numbers in to various categories. ➤ Providing opportunities to children to observe divisibility rules through patterns in multiplication facts. This could be followed by taking different division problems and discussing their use. For example, let children form multiplication tables of different numbers like 2, 3, 4, etc. and then from the multiplication facts ask them to identify the pattern like multiple of 3 has sum its digits divisible by 3, multiple of 5 has either 5 or zero in its one's place, etc. 	<ul style="list-style-type: none"> ➤ Number cards to create large numbers. ➤ Number cards to demonstrate operations on numbers. ➤ Maths Kit. ➤ Multiplication table chart.
Natural numbers and Whole numbers. <ul style="list-style-type: none"> ➤ Natural numbers. ➤ Whole numbers. ➤ Properties of numbers (commutative, associative, distributive, additive identity, multiplicative identity). ➤ Number line. ➤ Seeing patterns, identifying and 	<ul style="list-style-type: none"> ➤ Provide opportunities to children to understand that whole numbers are extension of natural numbers with the number zero included in it. ➤ Provide children opportunities to perform operations of natural numbers with zero and to form rules like when zero is added to any number or subtracted from any 	<ul style="list-style-type: none"> ➤ Maths Kit. ➤ Geoboard with rubber band. ➤ Videos/Life history of Mathematicians and their contributions.

Number System		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
formulating rules for operations on numbers.	<p>number the result is the same number.</p> <p>➤ Conducting the activity to conclude that $a \div 0$ is not defined. For example, $a/0$ is a number whose product with zero is a, which never exist if a is non-zero.</p>	
Negative Numbers and Integers <p>➤ Need for negative numbers.</p> <p>➤ Connection of negative numbers in daily life.</p> <p>➤ Representation of negative numbers on number line.</p> <p>➤ Ordering of negative numbers, Integers.</p> <p>➤ Identification of integers on the number line,</p> <p>➤ Operation of addition and subtraction of integers,</p> <p>➤ Addition and subtraction of integers on the number line</p> <p>➤ Comparison of integers, ordering of integers.</p>	<p>➤ Conducting activities in the classes in groups of 4-5 children to represent opposite situations by numbers like moving up and down from a reference point, paying and getting some amount etc.</p> <p>➤ Asking children to extend the number line to represent negative numbers and zero along with natural numbers and let them realise that corresponding to every positive numbers there is a negative number and vice-versa.</p>	<p>➤ Maths Kit.</p> <p>➤ Geoboard with rubber band.</p>
Sets <p>➤ Idea of sets.</p> <p>➤ Representation of sets.</p> <p>➤ Types of sets: Finite/infinite and empty.</p> <p>➤ Cardinality of a set.</p>	<p>➤ Taking examples from children's context for introducing the idea of set.</p> <p>➤ Letting children work out their own definitions and rules to work with sets as specific collections like classifying sets as finite/infinite and empty.</p>	<p>➤ Maths Kit.</p>
Fractions <p>➤ Revision of what a fraction is.</p> <p>➤ Fraction as a part of whole.</p> <p>➤ Representation of fractions (pictorially and on number line).</p> <p>➤ Fraction as a division.</p> <p>➤ Proper, improper & mixed fractions.</p> <p>➤ Equivalent fractions.</p>	<p>➤ Conducting activities with paper folding to show the product of two fractions as 'of' e.g. $\frac{2}{5} \times \frac{4}{5}$ as two-third of four-fifths</p> <p>➤ Encouraging children to demonstrate similar such products by paper folding and to generalise that product of two fractions can be obtained by multiplying the numerators to get numerator and denominator can be</p>	<p>➤ Maths Kit</p>

Number System		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Comparison of fractions, ➤ Operations on fractions (Avoid large and complicated unnecessary tasks). (Moving towards abstraction in fractions). ➤ Review of the idea of a decimal <i>fraction</i>. ➤ Place value in the context of decimal <i>fraction</i>. ➤ Inter conversion of fractions and decimal fractions (avoid recurring decimals at this stage). ➤ Word problems involving addition and subtraction of decimals (two operations together on money, mass, length and temperature). 	<p>obtained by multiplying denominators.</p>	
<p>Playing with Numbers</p> <ul style="list-style-type: none"> ➤ Simplification of brackets. ➤ Multiples and factors, ➤ divisibility rule of 2, 3, 4, 5, 6, 8, 9, 10, 11. (All these through observing patterns. Children would be helped in deducing some and then asked to derive some that are a combination of the basic patterns of divisibility) ➤ Even/odd and prime/composite numbers, Co-prime numbers, prime factorisation, every number can be written as products of prime factors. ➤ HCF and LCM, prime factorization and division method for HCF and LCM, the property $LCM \times HCF = \text{product of two numbers}$. 	<ul style="list-style-type: none"> ➤ Encouraging children to create number patterns through which HCF and LCM can be discussed. ➤ Conducting activities for number operations to be performed by children which through discussions could help them to know the different properties like closure, commutativity, associativity etc. ➤ Creating situations in which numbers are required to be represented for opposite situations, like directions, give and take situations etc. And discuss with children about the ways to represent such situations by numbers. ➤ Presenting daily life situations and pictures to introduce fractions and decimals like representing part of a whole as number, a dot mark placed to separate rupees and paisa, meter and centimetre, kilometre and meter, litter and millilitre etc. 	<ul style="list-style-type: none"> ➤ Maths Kit.

Number System		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
All the above concepts are to be embedded in children's contexts so that it brings out the significance and provide motivation to the child for learning these ideas.	<ul style="list-style-type: none"> ➤ Encouraging children to look at the pictures showing sum and difference of like fractions and to generalize. ➤ Letting children work on their own to evolve and understand that to add or subtract two unlike fractions it is required to convert them into equivalent fractions of same denominators (like fractions). 	

Life Skills: Solving daily life problems

Theme 2: Ratio and Proportion

There are many situations when two quantities are compared by using properties of division of numbers, like heights of two objects as one is half of other or double of other. Using such contexts the terminologies related to ratios need to be brought in home for children. The theme in this class mainly focuses on the basic idea of ratios and proportions which ultimately lead to the major applications of arithmetic in our daily life called commercial 'mathematics'. Percentage, unitary method, simple and compound interests, time and speed, work and time and profit and loss will be focused on in classes VII and VIII. Hence building a strong foundation in Class VI about ratio and proportion is very important.

Learning Outcomes:

Children will be able to:

- ✓ understand how the comparison of two quantities through ratio is different from comparisons done earlier;
- ✓ explain the meaning of proportion;
- ✓ know how ratio and proportion are related to unitary method;
- ✓ solve problems related to daily life using unitary method;
- ✓ try to construct examples that require the concept of ratio
- ✓ solve problems related to speed, distance and time.

Ratio and Proportion		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Difference between fraction and ratio. ➤ Concept of Ratio. ➤ Proportion as equality of two ratios. ➤ Unitary method (with only direct variation implied). ➤ Word problems on ratio and proportions. ➤ Idea of percent as fraction with 100 as denominator ➤ Idea of speed and simple daily life problems related to speed, time and distance. 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning. ➤ Presenting situations before the children that would prompt them to form patterns and feel the need for a symbol in place of number. ➤ Organising discussions in the class to show different methods of comparison of quantities are helpful in different situation(s). ➤ Encouraging children to create examples to show the difference between comparison of quantities done through operation of subtraction and that through division (ratio) ➤ Encouraging children to frame and solve problems on unitary method to understand unit of which quantity is to be found. ➤ Providing situations to children to find out the rate and the total 	<ul style="list-style-type: none"> ➤ Maths Kit.

Ratio and Proportion		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
	<p>amount in related context using unitary method.</p> <ul style="list-style-type: none"> ➤ Discussing examples to show the difference between ratio and proportion and to relate them. ➤ Solving daily life problems related to unitary method that exist in children's daily life like while shopping finding out the rate etc. 	







Life skill: solving daily life problems

Theme 3: Algebra

Children have idea of using symbols/letter for numbers from very early classes. Even in class I children use to solve problem like $5 + \square = 7$, $\square + \square = 9$ etc. and in class V they learnt that perimeter of a square is $4 \times$ where x is it's side. Thus the introduction of this topic should be made through these examples which children are already acquainted with and avoid directly bring the abstract idea of variable, unknowns and constants. The aim of this theme in this class is that children will be enabled to understand algebra as generalization patterns on numbers in term of using a letter of any number. Ultimately children learn that algebra is generalization of arithmetic and hence we use all rules as we have in number operations.

Learning Outcomes:

Children will be able to:

-  describe variable and unknown through patterns and through appropriate word problems and generalise (example $5 \times 1 = 5$, etc.);
-  generate patterns with more examples;
-  understand unknowns through examples with simple contexts (single operations);
-  define terminology associated with algebra like literal numbers, terms, expressions, factor, coefficient, polynomials, degree, like and unlike terms;
-  frame algebraic expressions;
-  evaluate value of algebraic expressions by substituting a number for the variable.

Algebra		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Introduction to constants, variable and unknown through patterns and through appropriate word problems and generalisations (For example $1+3=2^2$, $1+3+5=3^2$, $1+3+5+7=4^2$, sum of first n odd numbers $= n^2$). ➤ Generate such patterns with more examples and generalisation. ➤ Introduction to unknowns through examples with simple contexts (single operations) ➤ Terminology associated with algebra- like literal numbers, terms, expressions, factor, coefficient, polynomials, degree, like and unlike terms. ➤ Framing algebraic expressions. 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning. ➤ Providing situations in which a pattern or phenomenon is to be generalised like area of a rectangle can be obtained by multiplying the measure of its' two adjacent sides. ➤ Encouraging children to find ways to represent this in shorter and more compact way by considering the two adjacent sides as l and b or S_1 and S_2. ➤ Providing situations which can be mathematically expressed by using numbers and letters in place of numbers like any even number is double of a natural number can be expressed as: Even number $= 2n$, where n is a natural number. 	<ul style="list-style-type: none"> ➤ Maths Kit

Algebra		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Evaluation of algebraic expressions by substituting a value for the variable. ➤ Introduction to linear equation in one variable. 		

Skills: Developing efficient strategies for numerical calculation, describing relationships and applying algebraic techniques

Theme 4: Geometry

Children in this class should be now in Van Heile's level 2 of geometry learning i.e. Properties are perceived at Level 2, but they are isolated and unrelated. At Level 2 children would say "I know it's a rectangle because it is closed; it has 4 sides and 4 right angles; opposite sides are parallel; opposite sides are congruent; diagonals bisect each other; adjacent sides are perpendicular; etc...." All the properties known are listed since the student doesn't perceive any relationship between the properties, e.g., one implies the other. There is no knowledge of necessary and sufficient conditions. Like wise children develop their understanding about properties of other shapes and figure in this class.

Learning Outcomes:

Children will be able to:

- ☒ differentiate between different geometrical figures on the basis of their observable properties;
- ☒ classify angle into different types on the basis of their measurement;
- ☒ understand the difference between different types of triangles and the basis on which they are classified;
- ☒ classify quadrilaterals as trapezium, parallelogram, rectangle, square, rhombus;
- ☒ classify angles in different groups/types;
- ☒ draw different types of triangles and quadrilaterals;
- ☒ attempt to prepare solids using their nets;
- ☒ observe the objects and tries to make strategies to decide about the symmetry of the object;
- ☒ observe the reflection of objects in mirror and then tries to formulate rules about the symmetry of the object;
- ☒ try to see the logic behind drawing an angle of certain measure using geometrical properties;
- ☒ device ways to draw related angles after learning to draw an angle of certain measure;
- ☒ identify 3-d shapes and their parts;
- ☒ identify 2-d symmetrical objects;
- ☒ understand reflection symmetry;
- ☒ construct angles of different measures using compasses;
- ☒ draw perpendicular line segments.

Geometry		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p>➤ Basic geometrical ideas (2 -D): Introduction to geometry. Its linkage with and reflection in everyday experiences.</p> <ul style="list-style-type: none"> ➤ Line, line segment, ray. ➤ Open and closed figures. ➤ Interior and exterior of closed figures. ➤ Curvilinear and linear boundaries ➤ Angle — Vertex, arm, interior and exterior. 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning. ➤ Performing activities in which students can be shown concrete models and pictures of different geometrical shapes. ➤ Involving children in activities to identify, angles, triangles & quadrilaterals and their nets. 	<ul style="list-style-type: none"> ➤ Maths Kit. ➤ Cardboard, Hardboard, cutter, pencil, adhesive, scale. ➤ Geometry Boxes. ➤ Geoboard with rubber band.

Geometry		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ☛ Triangle — vertices, sides, angles, interior and exterior, altitude and median. ☛ Quadrilateral — Sides, vertices, angles, diagonals, adjacent sides and opposite sides (only convex quadrilateral are to be discussed), interior and exterior of a quadrilateral. ☛ Circle — Centre, radius, diameter, arc, sector, chord, segment, semicircle, circumference, interior and exterior. ➤ Understanding Elementary Shapes (2-D and 3-D): <ul style="list-style-type: none"> ☛ Measure of Line segment. ☛ Measure of angles. ☛ Pair of lines – Intersecting and perpendicular lines, Parallel lines. ☛ Types of angles- acute, obtuse, right, straight, reflex, complete and zero angle. ☛ Classification of triangles (on the basis of sides, and of angles). ☛ Types of quadrilaterals – Trapezium, parallelogram, rectangle, square, rhombus. ☛ Simple polygons (introduction) (Upto octagons regulars as well as non-regular). ☛ Identification of 3-D shapes: Cubes, Cuboids, cylinder, sphere, cone, prism (triangular and square), pyramid (triangular and square), Identification and locating in the surroundings. ☛ Elements of 3-D figures. (Faces, Edges and vertices). ☛ Nets for cube, cuboids, cylinders, cones and tetrahedrons. ➤ Symmetry: (reflection) <ul style="list-style-type: none"> ☛ Observation and identification of 2-D symmetrical objects for reflection symmetry. ☛ Operation of reflection (taking mirror images) of simple 2-D objects. 	<ul style="list-style-type: none"> ➤ Asking children to make models and Nets of 3-D shapes to get an idea of their number of edges, faces and corners (vertices) etc. ➤ Conduct discussion on number and type of corners, edges and faces after showing solid objects to the children like models of cube, cuboid, cylinder, cone, pyramid, prism etc. ➤ Performing activities with mirrors in which children are asked to observe the reflections of one part of a shape with its image and image with the other part. This will be followed by discussion. ➤ Using the activity of folding of a paper cut out of a shape along specific lines to show the reflection symmetry in case the two halves exactly cover each other. ➤ Providing children opportunities to draw an angle measuring 60° using compasses. On the basis of this construction let them construct other angles that measure 30°, 120°, 90°, etc. ➤ Giving children a feel of dividing a circle into equal segments that correspond to an angle. For example, a circle can be divided into six equal parts by the chords of length equal to radius of the circle and this actually forms $1/6^{\text{th}}$ of complete angle i.e. 60° at the centre. ➤ Providing opportunities to children to draw different geometrical figures that involve angles of various measures, line segments etc. ➤ Demonstrating the construction of bisector of an angle and a line segment. 	

Geometry		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Recognising reflection symmetry (identifying axes). ➤ Constructions (using Straight edge Scale, protractor, compasses) <ul style="list-style-type: none"> ➤ Drawing of a line segment. ➤ Perpendicular bisector. ➤ Construction of angles (using protractor). ➤ Angle 60°, 120° (Using Compasses) ➤ Angle bisector- making angles of 30°, 45°, 90° etc. (using compasses). ➤ Angle equal to a given angle (using compass.) ➤ Drawing a line perpendicular to a given line from a point a) on the line b) outside the line. ➤ Construction of circle. 	<ul style="list-style-type: none"> ➤ Encouraging children to construct perpendicular bisector of line segment and angles of measure 30°, 15°, 45°, etc. ➤ Appreciating children efforts in making angles to let them evolve methods of constructing angles like 75°. 	

Integration: Arts Education






Skills: to identify, visualise and quantify measures, relating abstract information to real life situations

Theme 5: Mensuration

In the previous three classes children were learning the measurement of various quantities like length, mass, temperature and time. Mathematically proficient students communicate precisely by engaging in discussion about their reasoning using appropriate mathematical language. The terms students should learn to use with increasing precision are area, surface area, volume, decomposing, edges, dimensions, net, vertices, face, base, height, trapezoid, isosceles, right triangle, quadrilateral, rectangles, squares, parallelograms, trapezoids, rhombi, kites, right rectangular prism, and diagonal. Children continue to strengthen their understanding that area is the number of squares needed to cover a plane figure. They will also know the formulas for rectangles and triangles. "Knowing the formula" does not mean memorization of the formula but to have an understanding of why the formula works and how the formula relates to the measure (area) and the figure. All children should be enabled to develop this understanding.

Learning Outcomes:

Children will be able to:

-  describe the concept of perimeter of various shapes;
-  demonstrate the idea of area and volume of shapes;
-  calculate the perimeter of different shapes given, she tries to formulate the perimeter of shapes like rectangle, square;
-  calculate the areas of rectangle and square by dividing them into appropriate smaller units. she tries to think of such small units;
-  use conversion of units of mass, money, time, and capacity in different daily life situations.

Mensuration		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Concept of perimeter and introduction to area ➤ Introduction and general understanding of <i>perimeter</i> using many shapes. ➤ Shapes of different kinds with the same perimeter. ➤ Concept of area, Area of a rectangle and a square ➤ Conversion of units (Mass, time, money, and capacity) from to smaller to larger and vice-versa ➤ Counter examples to different misconceptions related to perimeter and area. 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning. ➤ Showing different shapes and through the notion of boundary, the concept of perimeter can be discussed ➤ Organising discussion in the classroom on the measurement of boundary of a closed shape (2-D) and naming this measure as perimeter. ➤ Encouraging children to find perimeter of different rectangles and evolving the rule to find perimeter of any rectangle like ➤ Perimeter of a rectangle = 2(sum of the measure of its two adjacent sides) = $2(l+b)$ ➤ Forming small groups of 3-4 children to evolve ways to find the measure of 	<ul style="list-style-type: none"> ➤ Maths Kit. ➤ Use of visuals available in classroom and in surroundings.

Mensuration		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Perimeter of a rectangle – and its special case – a square. ➤ Deducing the formula of the perimeter for a rectangle and then a square through pattern and generalisation. 	<p>a region enclosed by a closed shape on a plane surface. This discussion will lead to understanding the concept of area.</p> <ul style="list-style-type: none"> ➤ Encouraging children through small hints to drive the rule/formula to find the area of a rectangle when the two adjacent sides are known. ➤ Providing opportunities to frame and solve simple daily life problems involving perimeter and area of rectangular regions. 	

Skills: solving daily life problems

Theme 6: Data Handling

This theme focusses on building on and reinforcing children's understanding of numbers, they begin to develop their ability to think statistically. Children recognize that a data distribution may not have a definite centre and that different ways to measure centre yield different values. The median measures centre in the sense that it is roughly the middle value. The mean measures centre in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point.

Learning Outcomes:

Children will be able to:

- ✓ understand the use of organizing data;
- ✓ represent data through pictograph, bar graph;
- ✓ identify patterns in numbers and shapes;
- ✓ identify daily life situations in which the information is required to be properly arranged;
- ✓ explore different ways to organise and represent data;
- ✓ appreciate the need for finding a representative value for given data;
- ✓ find mean and median of data having not more than ten observations.

Data Handling		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Collection of data to examine a hypothesis ➤ Collection and organisation of data - examples of organising it in tally bars and a table. ➤ Pictograph- Need for scaling in pictographs interpretation & construction of pictograph ➤ Construction of bar graphs for given data interpreting bar graphs. ➤ Mean and median of data not having more than ten observations 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning. ➤ Discussing daily life situations involving quantitative information and its presentation. ➤ Encouraging children through discussion (whole class/in small groups) to reason out why data should be organised. Children can be motivated to use their own ways in organizing data. ➤ Asking children to explore their own ways of representing the data in the form of diagrams/ pictures (Bar Graph) and in tables of numbers. ➤ Providing children various situations for interpreting data given in tabular or pictorial form like newspaper cuttings, TV programmes etc. 	<ul style="list-style-type: none"> ➤ Maths Kit ➤ Newspapers. ➤ TV Programmes.

Integration: Arts Education

Life Skills: Understanding and interpreting data, drawing inferences

Theme 1: Number System

In this theme the rules developed by children for addition and subtraction of integers will be extended to the formation of rules for their multiplication and division by using patterns and generalization.

Another important type of number called rational number will also be introduced in this class. This exposure will develop children's understanding about various kinds of numbers as a system and a structure. At this stage a relationship will also be established between fractions and rational numbers for which children will extend the rules used for performing operations on fractions to integers. This is also the time when children will be enabled to understand that fractions are not only representing part of a whole but also a number that operates on quantities. Extension of fractions and rational numbers is further done to decimal fractions. Once children understand that decimal notation of numbers is another convenient way of writing fractions with denominator as 10, 100, 1000 etc, they will be able to form rules for operating decimal fractions too. Children's exploration on properties of natural numbers through a play way method will help in learning exponential form of numbers, divisibility rules, LCM and HCF. The learning of Sets and their types and use in daily life is further extended in this class.


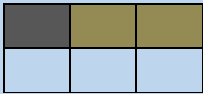
Learning Outcomes:

Children will be able to:

- ✓ multiply integers by using patterns and generalize the rules to multiply a positive integer by a negative integer, a negative integer by a positive integer and two negative integers;
- ✓ divide integers by using patterns and forms rules to perform division in integers;
- ✓ get a feel of necessity of rational numbers (through representation on number line);
- ✓ perform operations on rational numbers (addition, subtraction, multiplication and division);
- ✓ solve daily life problems involving rational numbers (all operations);
- ✓ observe patterns in multiplication tables and forms divisibility rules;
- ✓ understand and use fraction as an operator;
- ✓ find reciprocal of a fraction;
- ✓ multiply fractions by using patterns/paper folding/pictures and form general rules;
- ✓ divide fractions by using patterns/visualization/picture and forms rules;
- ✓ solve word problems involving mixed fractions and operations on them;
- ✓ represent rational number as a decimal and vice-versa;
- ✓ multiplication and division of decimal fractions;
- ✓ use exponential form and their rules to solve problems related to repeated multiplication;
- ✓ revise idea of sets;
- ✓ define equal, equivalent, and universal sets;
- ✓ find and use cardinality of finite sets.

Number System

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Multiplication and division of integers ➤ Properties of operations on integers: Commutativity, associativity, existence of identity and inverse and distributivity ➤ Problem solving using operations on integers ➤ Solution of word problems involving integers (all operations) ➤ Introduction to rational numbers (with representation on number line) ➤ Word problems on rational numbers (all operations) ➤ Decimal representation of rational numbers ➤ Problem solving using operations on rational numbers and decimal fractions ➤ Fraction as an operator ➤ Reciprocal of a fraction ➤ Multiplication and division of decimal fractions ➤ Exponents only natural numbers. ➤ Laws of exponents (through observing patterns to arrive at generalisation.) ➤ Application of laws of exponents in simple daily life problems ➤ Revision idea of sets ➤ Equal, equivalent, universal sets ➤ Cardinal property of sets 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning. ➤ Involving children in discussion to find their own ways of multiplying integers using their understanding about the rules for multiplication and division of whole numbers ➤ Providing enough time to children to use patterns in multiplying a negative integer by another integer as this may be a new idea. Up till now they have learnt that multiplication is repeated addition or an operator in case of fractions. Sufficient time should be given to children to appreciate why the product of two negative integers is positive. ➤ Encouraging children to explore and use the concept of dividing a natural number by another by simply finding the number which when multiplies the divisor gives the dividend as product. So to find $-4 \div -2$ we have to find the number which on multiplication with -2 gives the result -4. Many children will be able to infer that the required number must be $+2$. Many such examples will help the child to make their own rule like $+ve \div -ve = -ve$, $-ve \div +ve = -ve$ and $-ve \div -ve = +ve$. ➤ Involving children in classification of numbers on the basis of their properties like even, odd, multiples and factors. These numbers can be used to classify numbers in to various categories ➤ Introducing divisibility rules using patterns, and then different division problems could be discussed to show their use. For example, let children form multiplication tables of different numbers like 2, 3, 4, etc. and then from the multiplication facts ask them to identify the pattern like multiple of 3 has sum of its digits divisible by 3, 	<ul style="list-style-type: none"> ➤ Shapes used in daily life (for demonstrating number system, algebra, geometry mensuration and data handling) ➤ Geoboard with rubber bands (for demonstrating various shapes and Charts) ➤ Brief life history of mathematicians with their contributions at elementary level. ➤ Maths Kit

Number System		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
	<p>multiple of 5 has either 5 or zero in its one's place etc.</p> <p>➤ Utilising children's knowledge about describing multiplication of fractions as operator 'of' and explain by paper folding, shading parts of whole etc. for example $\frac{1}{3} \times \frac{1}{2}$ is one-third of one-half which can be shown as:</p>   <p>The double shaded region is one-sixth of the whole which shows that $\frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$.</p> <p>➤ Solving of sums by children and observing the pattern that in all cases the product of fractions can be obtained by multiplying their numerators and their denominators</p> <p>➤ Providing opportunities to children to observe and find through pictures that $\frac{1}{3} \div \frac{1}{4}$ means the number of one-fourths in one-half. Simple visualization is required to find that one-half contains two one-fourths. Let children observe the patterns and find their own ways of dividing a fraction by another fraction</p> <p>➤ Conducting discussion with children to observe and generalise that to divide a fraction by another fraction (non-zero) can be done by multiplying the dividend by reciprocal of the divisor.</p> <p>➤ Involving children in exploring their own ways of writing repeated multiplication in a short form as repeated addition is represented by multiplication. With discussion let the children reach the conclusion of writing repeated multiplication in exponent form.</p>	

Life Skills: Solving daily life problems

Theme 2: Ratio and Proportion

This theme will focus on developing children's ability to solve higher problems on the use of ratio and proportion in daily life in this class. Children are enabled to use ratio, proportion and their properties appropriately in problem solving. The idea of percentage, unitary method, simple interest, time, work and speed are also introduced through simple daily life problems. Children will appreciate that this is the part of mathematics that they can use the most in their daily lives.

Learning Outcomes:

Children will be able to:

- ✓ recall ratio and proportion done in early classes;
- ✓ solve problems using unitary method (getting feel of how formulae for calculation of simple interest and understand percentage as a fraction with denominator 100);
- ✓ re write fractions and decimals into percentage and vice-versa;
- ✓ solve problems related to profit and loss (single transaction only);
- ✓ apply simple interest (time period in complete years) in daily life situations;
- ✓ solve problems related to speed, distance and time.

Ratio and Proportion		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Ratio and proportion (revision) ➤ Unitary method continued, consolidation, general expression for unitary method ➤ Percentage- an introduction. ➤ Understanding percentage as a fraction with denominator 100 ➤ Converting fractions and decimals into percentage and vice-versa. ➤ Application to profit and loss (single transaction only) ➤ Application to simple interest (time period in complete years). ➤ Speed, distance, time 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning. ➤ Children know about many ways of comparing quantity. Utilise their experiences to conclude that ratio is another way of comparing quantities. Percentages and their applications are also in child's daily life experiences which can be used to form various formulae and solving problems using them. 	<ul style="list-style-type: none"> ➤ Maths Kit

Life Skills: Solving daily life problems

Theme 3: Algebra

Children in class VI were exposed to and were enabled to understand that algebra is an extension and generalization of arithmetic. Letters for numbers are to be seen as a compact language to express situations in expressions. The basic idea of various terminologies that form the language to learn algebra is also to be communicated to children in a gradual manner. Children should get a feel that algebra is just extension of numbers and quantities. They should also gain fluency in mathematical language through operations on algebraic expressions and solving linear equations.

Learning Outcomes:

Children will be able to:

- ✎ identify terms related to algebra like constants, variable, terms, coefficient of terms, like and unlike terms etc.;
- ✎ generate algebraic expressions involving one or two variables/unknowns;
- ✎ add and subtract algebraic expressions;
- ✎ express situations in simple linear equations and find solution of related problems;
- ✎ find solution to simple inequalities ($<$ or $>$) in one variable.

Algebra		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Terms related to algebra like constants, variable, terms, coefficient of terms, like and unlike terms, etc. ➤ Generate algebraic expressions ➤ Performs operations (addition and subtraction) on algebraic expressions with integral coefficients only ➤ Simple linear equations in one variable (in contextual problems) with two operations. ➤ Inequalities and solution of simple inequalities in one variable 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning. ➤ Use child's context and encourage them to generate algebraic expressions by proper choice of variable/unknown and operations. ➤ Child's daily life experiences like adding/subtracting a group of 2 notebooks and 5 pencils to/from another group of 3 notebooks and 8 pencils etc. Let children form their own rule that like terms can only be added or subtracted. ➤ Involve children in groups of three or four to explore situations which can be expressed by simple equations and solve them. Textbooks have many such examples. 	<ul style="list-style-type: none"> ➤ Notebooks, pencils, pens, etc. ➤ Textbooks








Skills: pursuing assumptions to logical conclusions

Theme 4: Geometry

Children in this class will be enabled to perceive relationships between properties of figures. The children will develop the ability to give the minimum number of properties, eliminating redundancies and formulate meaningful definitions and understand inclusion relationships such as every square is a special type of rectangle, but not every rectangle is a square. Note that if a student is requiring to "know a definition" before attaining this level, it will be a memorized definition with little meaning to the student. Their concept definition is likely not to match their concept image.

Learning Outcomes:

Children will be able to:

-  identify pairs of angles like linear, supplementary, complementary, adjacent and vertically opposite and find one when the other is given;
-  hypothesize the relationship between pairs of angles out of eight angles formed by a transversal with two parallel lines;
-  verify angle sum and other properties of triangles and use these properties to find unknown elements of a triangle;
-  appreciate the rotational symmetry of various shapes and figures;
-  read simple maps and construct own maps like home to school, map of her village, house etc.;
-  establish congruence criterion for triangles and circles;
-  construct simple triangles when three out of six elements are given (like three sides, two sides and included angle, a side and two angles etc.).

Geometry		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p>➤ Understanding shapes:</p> <ul style="list-style-type: none"> ➤ Pairs of angles (linear, supplementary, complementary, adjacent, vertically opposite) ➤ Properties of parallel lines with transversal (alternate, corresponding, interior, exterior angles) <p>➤ Properties of triangles:</p> <ul style="list-style-type: none"> ➤ Angle sum property ➤ Exterior angle property ➤ Pythagoras Theorem (Verification only) 	<p>➤ Revising previous concepts learnt by children.</p> <p>➤ Building on children's previous learning</p> <p>➤ Using diagrams to help children in visualizing the relationship between various pairs of angles when a transversal cuts two lines (parallel and non-parallel), angles of triangle and relationship among its sides.</p> <p>➤ Involve children in experimentation with measurement of sides of right angled triangles and recognition of pattern to hypothesize the Pythagorean relation.</p> <p>➤ Conducting activities with children that are given in textbooks (paper folding and observing diagrams) and encouraging them to visualize symmetry and criterion for rotational symmetry of various shapes.</p>	<p>➤ Maths Kit</p> <p>➤ Geoboard with rubber band</p> <p>➤ Geometry box</p>

Geometry		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p>➤ Symmetry</p> <ul style="list-style-type: none"> Recalling reflection symmetry Idea of rotational symmetry, observations of rotational symmetry of 2-D objects. (90°, 120°, 180°) <p>➤ Representing 3-D in 2-D:</p> <ul style="list-style-type: none"> Identification and counting of vertices, edges, faces, nets (for cubes cuboids, and cylinders, cones). Mapping the space around approximately through visual estimation. <p>➤ Congruence</p> <ul style="list-style-type: none"> Congruence through superimposition Extend congruence to simple geometrical shapes e.g. triangles, circles. Criteria of congruence <p>➤ Construction</p> <ul style="list-style-type: none"> Construction of a line parallel to a given line from a point outside it Construction of simple triangles. 	<p>➤ Assigning group work to children with traced copies of various shapes and superimposing one above the other help them in establishing congruence criterion.</p> <p>➤ Adopting exploration, problem-solving and hands-on experiences with children, to engage in discussions and activities with them that address many of the dimensions of geometry (spatial relationships, properties of geometric figures, constructions, geometric modelling, geometric transformations, coordinate geometry, the geometry of measurement, informal geometric reasoning, and geometric connections to the physical world).</p> <p>➤ Teachers will explore two- and three-dimensional shapes, paper folding and origami, tessellations and geometric designs, and the use of other manipulatives to develop geometric understanding.</p> <p>Through these activities, it is anticipated that teachers will develop new techniques that are sure to enhance student achievement in their classroom.</p>	



Skill: Identify, visualise and quantify measures of shapes and objects

Theme 5: Mensuration

This theme will focus on developing children's understanding and ability on measurement of area, volume and capacity. This begins with children finding rules/ forming formulae for standard figures like cube, cuboid, cylinder etc. The major focus will be on finding the area of 2-D shapes and surface area of 3-D shapes. It is also expected that children will be able to learn to write measurement in smaller and larger units with conversion.

Learning Outcomes:

Children will be able to:

-  measure approximate area of simple regular and irregular closed shapes by using unit square grid sheet;
-  form formulae to find area of the region enclosed in a rectangle and a square as a better way of counting the number of unit squares that fill them completely.

Mensuration		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Revision of perimeter and Idea of Circumference of Circle ➤ Area <ul style="list-style-type: none"> ➤ Concept of measurement using a basic unit area of a square, rectangle, triangle, parallelogram and circle, rings and combined figures. 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning ➤ Involving children in activities targeted to measurement of region enclosed by closed figures on a plan surface and encouraging them to come to the conclusion that a unit is required. ➤ Conducting activities related to measuring units squares within a figure drawn on a square grid and to compare the various regions. 	<ul style="list-style-type: none"> ➤ Maths Kit

Theme 6: Data Handling

Finding a representative value for a given set of observations called data is a necessary requirement in most of the daily life situations, like one number for heights of the children in a class, number of children in a class when numbers of total children in all classes of the school is known etc. This theme aims at developing children's understanding about the meaning and use of averages like mean, median and mode of simple data not having more than 15 observations. They will also be able to represent data as bar graphs and interpret them.

Learning Outcomes:

Children will be able to:

- ✎ find various representative values (Mean, Median and mode) for simple data from her daily life;
- ✎ represent data by simple bar graphs and interpret them.

Data Handling		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Collection and organisation of data – choosing the data to collect for a hypothesis testing ➤ Mean, median and mode of ungrouped data – understanding what they represent ➤ Constructing and interpreting bar graphs ➤ Feel of probability using data through experiments. Notion of chance in events like tossing coins, dice etc. Tabulating and counting occurrences of 1 through 6 in a number of throws. Comparing the observation with that for a coin. Observing strings of throws, notion of randomness. 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning ➤ Utilizing children's daily life experiences and contextual problems to test hypothesis by collection and organization of data. Situations like finding a representative value to data help in understanding the idea of finding mean, median and mode of ungrouped data. Staring with small sets of numbers will be easier to visualize and represent it by bar graphs. ➤ Involving children in drawing inferences for future events from the existing data 	<ul style="list-style-type: none"> ➤ Maths Kit

Integration: Arts Education

Life Skills: Understanding and interpreting data, drawing inferences

Theme 1: Number System

Rational numbers as extension of integers to make the system closed for division (by non-zero numbers) was introduced in class VII. In this class children will be enabled to explore the properties of rational numbers to find inadequacy in them and to realize the need for new numbers like irrational numbers. Children should also get the feel of another very interesting and important property of rational numbers i.e. between any two rational number there lie many infinite rational numbers. Number line and representation of rational numbers on number line forms the basis for visualizing that for every rational number there is a point on the number line but its converse is not true. Number operations are also extended to exponents. This understanding leads to classify positive integers into various classes like square and cube numbers. Children should also understand and develop the ability to properly apply the division algorithm for finding the square root of numbers.

Learning Outcomes:

Children will be able to:

- ✓ describe properties of rational numbers and express them in general form;
- ✓ consolidate operations on rational numbers;
- ✓ represent rational numbers on the number line;
- ✓ understand that between any two rational numbers there lies another rational number (making children see that if we take two rational numbers then unlike for whole numbers, in this case you can keep finding more and more numbers that lie between them.);
- ✓ generalise and verify properties of rational numbers. (including identities);
- ✓ use general form of expression to describe properties of operations on rational numbers like closer, commutative, associative, existence of identity and existence of inverse;
- ✓ do word problem (higher logic, two operations, including ideas like area);
- ✓ write repeated multiplication and division using integers as exponents;
- ✓ describe and verify laws of exponents with integral powers;
- ✓ find squares, square roots, cubes, cube roots of number;
- ✓ find square and square roots;
- ✓ undertake calculating square roots using the factor and division method for numbers containing;
- ✓ no more than 4 digits and
- ✓ no more than 2 decimal places
- ✓ find cubes and cube roots;
- ✓ estimate square roots and cube roots.
- ✓ learn the process of moving nearer to the required number;
- ✓ write and understand a 2 and 3 digit number in generalized form ($100a + 10b + c$, where a, b, c can be only digit 0-9) and engage with various puzzles concerning this. (like finding the missing numerals represented by alphabets in sums involving any of the four operations.);
- ✓ construct and solve problems and puzzles;
- ✓ solve number puzzles and games;
- ✓ deduce the divisibility test rules of 2, 3, 5, 9, 10 for a two or three-digit number expressed in the general form;
- ✓ find union and intersection of sets;
- ✓ define disjoint sets;
- ✓ find complement of a set.

Number System		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p>➤ Rational Numbers</p> <ul style="list-style-type: none"> ☛ Properties of rational numbers. (including identities). Using general form of expression to describe properties ☛ Representation of rational numbers on the number line ☛ Between any two rational numbers there lies another rational number ☛ Word problem <p>➤ Exponents Powers</p> <ul style="list-style-type: none"> ☛ Laws of exponents with integral powers ☛ Square and Square roots using factor method and division method for numbers containing (a) no more than total 4 digits and (b) no more than 2 decimal places ☛ Cubes and cubes roots (only factor method for numbers containing at most 3 digits) <p>➤ Playing with numbers</p> <ul style="list-style-type: none"> ☛ Writing and understanding a 2 and 3 digit number in <i>generalized form</i> ($100a + 10b + c$, where a, b, c can be only digit 0-9) and engaging with various puzzles Children to solve and create problems and puzzles. ☛ Deducing the divisibility test rules of 2, 3, 5, 9, 10 for a two or three-digit number expressed in the general form. <p>➤ Sets</p> <ul style="list-style-type: none"> ☛ Union and intersection of sets ☛ Disjoint set ☛ Complement of a set 	<p>➤ Revising previous concepts learnt by children.</p> <p>➤ Building on children's previous learning</p> <p>➤ Involving children in writing general form of rational numbers and associating it with the rules of algebra. The operations on algebraic expressions will help in describing properties of rational numbers.</p> <p>➤ Encouraging children to use the rules for comparison of integers and fractions to develop their own rules for comparison of rational numbers.</p> <p>➤ Encouraging children to reach the conclusion that half of the sum of two rational numbers lies between them and thus a rational number can be obtained between any two rational numbers. Providing hints to children while reaching the conclusion that the process of finding a rational number between any two numbers never stops and thus there lies infinite many rational numbers between any two rational numbers</p> <p>➤ Facilitating children to see and understand that if we take two rational numbers then unlike for whole numbers, in this case you can keep finding more and more numbers that lie between them.</p> <p>➤ Facilitating children to observe patterns in square numbers and to form their rules for perfect square numbers and square roots.</p> <p>➤ Facilitating children to observe patterns in perfect cube numbers and form rule for cube root numbers</p> <p>➤ Encouraging children to play with numbers to find square roots and cube roots using prime factorisation</p> <p>➤ Encouraging children practice the division method to find square roots of numbers.</p> <p>➤ Utilising children's understanding about algebra to introduce the generalised form of 2 and 3 digit numbers and to prove divisibility test of numbers.</p>	<p>➤ Maths Kit</p>

Theme 2: Ratio and Proportion

This theme, at this stage develops in children the ability to understand and appreciate another way of the application of mathematics in daily life called commercial mathematics. The percentage, unitary method, profit and loss, simple and compound interest etc. are based on ratio and proportion. Understanding of ratio and proportion and the skill of applying them in daily life is further required to be strengthened in this class. Children will be properly exposed to higher level problems on profit and loss, compound interest and direct and indirect variations. The problems on these topics should be picked up from daily life situations like banking, taxation, loan transaction etc.

Learning Outcomes:

Children will be able to:

- ✎ solve slightly advanced problems involving application on percentages, profit and loss, overhead expenses, discount and tax;
- ✎ explore the difference between simple and compound interest (compounded yearly up to 3 years or half-yearly up to 3 steps only),
- ✎ arriving at the formula for compound interest through patterns and using it for simple problems;
- ✎ solve simple and direct word problems related to direct and inverse variation, and time and work problems.

Ratio and Proportion		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none">➤ Slightly advanced problems involving applications on percentages, profit & loss, overhead expenses, Discount, tax.➤ Difference between simple and compound interest (compounded yearly up to 3 years or half-yearly up to 3 steps only)➤ Direct and inverse variations – Simple and direct word problems➤ Time and work problems– Simple and direct word problems	<ul style="list-style-type: none">➤ Arriving at the formula for compound interest through patterns and using it for simple problems.	<ul style="list-style-type: none">➤ Maths Kit









Life Skills: Solving daily life problems

Theme 3: Algebra

In this theme the focus will be on developing skills in children to use linear equations and systems of linear equations to represent, analyse, and solve a variety of problems. They should recognize equations for proportions ($y/x = m$ or $y = mx$) as special linear equations ($y = mx + b$) and use a linear equation to describe the association between two quantities in bivariate data (such as arm span vs. height for students in a classroom). In this class, fitting the model, and assessing its fit to the data are done informally. Interpreting the model in the context of the data requires children to express a relationship between the two quantities in question and to interpret components of the relationship in terms of the situation. They should be able to strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions of the original equation. Children will be able to solve systems of two linear equations in two variables and relate the systems to pairs of lines in the plane; these intersect, are parallel, or are the same line. They will also understand the construction of algebraic expressions and extend the addition and subtraction to multiplication and division of expressions. In this Class children should understand various identities and their use in solving problems related to multiplication and division (factorization) of algebraic expressions.

Learning Outcomes:

Children will be able to:

-  multiply and divide algebraic expressions (integral coefficient only);
-  focus on some common errors like $2 + x \neq 2x$, $7x + y \neq 7xy$ etc.;
-  prove and use identities $(a \pm b)^2 = a^2 \pm 2ab + b^2$, $a^2 - b^2 = (a - b)(a + b)$ $(a+b)^2 = a^2 + 2ab + b^2$;
-  factorize algebraic expressions (simple cases only) as examples the following types $a(x + y)$, $(x \pm y)^2$, $a^2 - b^2$, $(x + a)(x + b)$;
-  solve linear equations in one variable in contextual problems involving multiplication and division (simple rational coefficient in the equations);
-  multiply two algebraic expressions and forms algebraic identities for square of binomials;
-  factorize an algebraic expression using identities;
-  find solution to inequalities in one variable using properties of in equalities.

Algebra		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Algebraic Expressions ➤ Multiplication and division of algebraic expression (Coefficient should be integers) ➤ Identities $(a \pm b)^2 = a^2 \pm 2ab + b^2$, $a^2 - b^2 = (a - b)(a + b)$. ➤ Properties of in equalities. ➤ Factorisation (simple cases only) as examples the following types $a(x + y)$, $(x \pm y)^2$, $a^2 - b^2$, $(x + a)(x + b)$ 	<ul style="list-style-type: none"> ➤ Encouraging children to undertake multiplication of algebraic expressions based upon the distributive property of multiplication over addition and subtraction of numbers. Moreover, children already have the idea that same number multiplied repeatedly can be expressed in powers and the same is true for variables. Children should be encouraged 	<ul style="list-style-type: none"> ➤ Maths Kit.

Algebra		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p>➤ Solving linear equations in one variable in contextual problems involving multiplication and division (word problems) (avoid complex coefficient in the equations)</p>	<p>to develop their own results for algebraic identities by using the multiplication of algebraic expressions.</p> <p>➤ Continuing the idea of numerical coefficient and factors of a term to evolve methods of writing an expression in terms of product of two or more expressions. This will lead to the factorisation of algebraic expressions.</p> <p>➤ Drawing attention of children to and laying special emphasis on the common errors that children commit while learning algebra like $2 + x = 2x$, $7x + y = 7xy$ etc.</p>	

Skill: establish relationship between known and unknown facts

Theme 4: Geometry

The theme in this class will focus on making the definitions more meaningful and enabling children to perceive relationships between properties and figures. Logical implications and class inclusions should be understood, but the role and significance of deduction may not be understood.

The children will be prepared to enter into the fourth level of geometrical thinking at this stage by learning informal deduction in this class. They learn to construct proofs, understand the role of axioms and definitions, and know the meaning of necessary and sufficient conditions. The children should be able to give reasons for steps in a proof. The another important way of learning about shapes and figures is through relating it with numbers i.e using the analytical geometry. Initiation of this process will be done in this class with introduction of representing any point in a plane as ordered pair of real numbers. With this introduction child should be able to geometrically represent numerical relation between two variables Children will then construct the concept of linear graph and relationship between the variables as linear equation.

Learning Outcomes:

Children will be able to:

- ☑ explore and verify properties of quadrilaterals like sum of angles of a quadrilateral is equal to 360° (by verification);
- ☑ explore and verify properties of parallelogram (by verification) like
 - (i) opposite sides of a parallelogram are equal,
 - (ii) opposite angles of a parallelogram are equal,
 - (iii) diagonals of a parallelogram bisect each other. [also find justification to why (iv), (v) and (vi) follow from (ii)]
 - (iv) diagonals of a rectangle are equal and bisect each other
 - (v) diagonals of a rhombus bisect each other at right angles.
 - (vi) diagonals of a square are equal and bisect each other at right angles.
- ☑ identify and match pictures with objects [more complicated e.g. nested, joint 2-D and 3-D shapes (not more than 2)];
- ☑ draw 2-D representation of 3-D objects (continued and extended);
- ☑ count number of vertices, edges & faces & verifying Euler's relation for 3-D figures with flat faces (cubes, cuboids, tetrahedrons, prisms and pyramids);
- ☑ generalize the sum of angles of quadrilateral and use it in solving various problems related to finding angles of a quadrilateral;
- ☑ explain properties of parallelograms and tries to reason out how one property is related to other;
- ☑ represent 3-D shapes on a plan surface like paper, board, wall etc.;
- ☑ make nets of prisms and pyramids and forms the shapes from the nets;
- ☑ construct quadrilaterals using pair of compasses and straight edge given:
 - ☛ four sides and one diagonal
- ☑ three sides and two diagonals
 - ☛ three sides and two included angles
 - ☛ two adjacent sides and three angles
- ☑ construct quadrilaterals given:
 - ☛ four sides and one diagonal
 - ☛ three sides and two diagonals
 - ☛ three sides and two included angles
 - ☛ two adjacent sides and three angles.
- ☑ describe the meaning of axes (same units), Cartesian plane, plotting points for different kind of situations (perimeter vs length for squares, area as a function of side of a square, plotting of multiples of different numbers, simple interest vs number of years etc.);
- ☑ read linear graphs;
- ☑ distinguish the shapes that are symmetrical and find line of symmetry by paper folding;
- ☑ define and identify various parts of a circle.

Geometry		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p>➤ Understanding shapes:</p> <ul style="list-style-type: none"> ☛ Properties of quadrilaterals – Angle Sum property ☛ Properties of parallelogram (By verification) (i) Opposite sides of a parallelogram are equal, (ii) Opposite angles of a parallelogram are equal, (iii) Diagonals of a parallelogram bisect each other. (iv) Diagonals of a rectangle are equal and bisect each other. (v) Diagonals of a rhombus bisect each other at right angles. (vi) Diagonals of a square are equal and bisect each other at right angles. <p>➤ Representing 3-D in 2-D</p> <ul style="list-style-type: none"> ☛ Identify and match pictures with objects [more complicated e.g. nested, joint 2-D and 3-D shapes (not more than 2)]. ☛ Drawing 2-D representation of 3-D objects (Continued and extended) ☛ Counting vertices, edges & faces & verifying Euler's relation for 3-D figures with flat faces (cubes, cuboids, tetrahedrons, prisms and pyramids) <p>➤ Construction of Quadrilaterals:</p> <ul style="list-style-type: none"> ☛ Given four sides and one diagonal ☛ Three sides and two diagonals ☛ Three sides and two included angles ☛ Two adjacent sides and three angles <p>➤ Idea of reflection symmetry and symmetrical shapes</p> <p>➤ Circle</p> <ul style="list-style-type: none"> ☛ Circle, centre, radius/ diameter, arc, chord, sector and segment. 	<p>➤ Involving children in activities of measuring angles and sides of shapes like quadrilaterals and parallelograms and to identify patterns in the relationship among them. Let them make their hypothesis on the basis of the generalisation of the patterns and later on to verify their assertions.</p> <p>➤ Involving children in expressing/representing a 3-D shape into 2-D from their life like drawing a box on plane surface, showing bottles on paper etc.</p> <p>➤ Facilitating children making nets of various shapes like cuboids, cubes, pyramids, prisms etc. Again from nets let them make the shapes and to establish relationship among vertices, edges and surfaces. Through pattern let them reach to Euler's relation.</p> <p>➤ Constructing various figures by children using compasses and a straight edge. But it is also important to involve children to argue why a particular step is required. For example, on drawing an arc using compasses we find all those points that are at the given distance from the point where the metal end of the compasses was placed.</p>	<p>➤ Maths Kit</p> <p>➤ Geoboard with rubber band</p> <p>➤ Geometry box</p>

Life Skill: deductive reasoning





Theme 5: Mensuration

Children should be clear about the idea of area as measure of region occupied by a shape on a surface and the formulae to find area of rectangle and square. In this class the theme will enable them to evolve the methods of finding the area of shapes like trapezium and other polygons. The idea behind the formulae of finding area of rectilinear shapes is moving from known to unknown i.e. developing the methods using the formulae they know like rectangle. Children will develop the ability to think how a trapezium and parallelogram can be converted into a rectangle of same area.

Using this understanding the methods of finding the surface area of 3-D figures is to be introduced. For this the nets of simple figures like cuboid will be useful to visualize the shapes of different surfaces of this figure. This visualization will help children in evolving formula for finding area of all surfaces. There are many figures like cuboid in children's vicinity like room with four walls, roof and floor, and cartons used for packing various items. Problems related to finding surface area and volume/capacity of such shapes are in children's daily life. Therefore, in this class children should be able to construct meaningful problems and solve them using this understanding.

Learning Outcomes:

Children will be able to:

-  find area of trapezium and polygons by using square grid and also by using formulae;
-  find surface area of cuboid, cube and cylinder through their nets and later on by using formulae;
-  form formula to find volume of a cuboid and cylinder by observing and generalizing patterns of counting units cubes that completely fill the cuboids.
-  find volume and capacity (measurement of capacity) of cuboidal and cylindrical vessels

Mensuration		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Area of a trapezium, a polygon and semi-circle. ➤ Surface area of a cube, cuboid, cylinder. ➤ Idea of Total surface area and curved surface areas of various 3-D figures ➤ Concept of volume, measurement of volume using a basic unit, volume of a cube, cuboid and cylinder ➤ Volume and capacity (measurement of capacity) 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning ➤ Encouraging children to discuss in groups about converting trapezium and parallelograms into rectangles of equal area. This will help them in formation of formulae to find these areas. ➤ Involving children in finding the surface area of a cube and cuboid and in opening such boxes and realizing that all these surfaces are made up of rectangles and squares only. The rest of the activity will be focused on finding the total surface area (TSA) which will only be to add these areas. 	<ul style="list-style-type: none"> ➤ Maths Kit ➤ Daily use readymade 2D,3D shapes

Mensuration		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
	<p>➤ Based on children's previous learning and understanding and the vocabulary they have related to measurement of volume and capacity through their daily life experiences involving them in activities to get a feel of filling a given space and to measure it by just counting the unit items that fill it completely. This will also help them in deciding why a cube is taken as a unit of measuring volume.</p>	







Life Skills: Solving daily life problems

Theme 6: Data Handling

Based on children's learning about mean, median and mode in earlier classes, in this class, children will be enabled to develop the ability to apply this learning for data with large number of observations which may require to be grouped. Avoid giving irrelevant numbers as data. Let children collect data and find an appropriate average. They will also learn to interpret pie charts being commonly seen in newspapers. Once they are comfortable with interpretation they will learn to represent data as pie charts. Understanding that the probability of chance event is a number between 0 and 1 that expresses the likelihood of the event occurring is developed in this class. Through various random experiments like tossing of coin, throwing a die, occurrence of a letter say E in random selected paragraphs etc. children should infer larger numbers indicate greater likelihood. The ability to find that a probability near 0 indicates an unlikely event, a probability around $\frac{1}{2}$ indicates an event that is neither unlikely nor likely (called as equally likely event), and a probability near 1 indicates a likely event will also be focused on.

Learning Outcomes:

Children will be able to:

-  arrange ungrouped data into groups and represent grouped data through bar-graphs;
-  construct and interpret bar-graphs;
-  interpret simple pie charts with reasonable data numbers;
-  consolidate and generalise the notion of chance in events like tossing coins, dice etc. and relating it to chance in life events;
-  throw a large number of identical dice/coins together and aggregating the result of the throws to get large number of individual events. observing the aggregating numbers over a large number of repeated events;
-  make a hypothesis on chances of coming events on the basis of its earlier occurrences like after repeated throws of dice and coins;

Data Handling		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Arranging ungrouped data, it into groups, representation of grouped data through bar-graphs, constructing and interpreting bar-graphs. ➤ Simple Pie charts with reasonable data numbers ➤ Consolidating and generalising the notion of chance in events like tossing coins, dice etc. Relating it to chance in life events. 	<ul style="list-style-type: none"> ➤ Conducting activities with children related to throwing a large number of identical dice/coins together and aggregating the result of the throws to get a large number of individual events. ➤ Involving children in making their assumption for the future events on the basis of the above data. Observing the aggregating numbers over a large number of repeated events will also help them in forecasting the chances of future events. Comparing with the data for a coin. Observing strings of throws will help children in developing notion of randomness. 	<ul style="list-style-type: none"> ➤ Maths Kit ➤ Coins, dice, etc.

Life Skills: Understanding and interpreting data, drawing inferences