### Mathematics Syllabus – Primary

#### Classes I to V

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<tr>
<th>Class</th>
<th>Geometry (10 hrs.)</th>
<th>Shapes &amp; Spatial Understanding</th>
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<td>I</td>
<td>Geometry (13 hrs.)</td>
<td>Shapes &amp; Spatial Understanding</td>
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<td>III</td>
<td>Geometry (16 hrs.)</td>
<td>Shapes &amp; Spatial Understanding</td>
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<td>IV</td>
<td>Geometry (16 hrs.)</td>
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<tr>
<td>V</td>
<td>Geometry (16 hrs.)</td>
<td>Shapes &amp; Spatial Understanding</td>
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**Class I**
- **Shapes & Spatial Understanding**
  - Develops and uses vocabulary of spatial relationship (Top, Bottom, On, Under, Inside, Outside, Above, Below, Near, Far, Before, After)
- **Solids around us**
  - Collects objects from the surroundings having different sizes and shapes like pebbles boxes, balls, cones, pipes, etc.
  - Sorts, Classifies and describes the objects on the basis of faces, edges, shapes, and other observable properties.
  - Observes and describes the way shapes affect movements like rolling and sliding.
  - Sorts 2-D shapes

**Class II**
- **Shapes & Spatial Understanding**
  - Observes objects in the environment and gets a qualitative feel for their geometrical attributes.
  - Identifies the basic 3-D shapes such as cuboid, cylinder, cone, sphere by their names.
  - Traces the 2-D outlines (faces) of 3-D objects.
  - Observes and identifies these 2-D shapes.
  - Describes intuitively the properties of these 2-D shapes.
  - Identifies and makes straight lines by folding, using straight edged objects, stretched strings and draws freehand with a scale.
  - Draws horizontal, vertical and slant lines (free hand).
  - Draw straight-line with a ruler.
  - Distinguishes between straight and curved lines.
  - Identifies objects by observing their shadows.

**Class III**
- **Shapes & Spatial Understanding**
  - Identifies the side view, top view, front view of objects.
  - Study of the net of a cuboid and its shape.
  - Tracing circles, rectangles, squares by using different objects.
  - Making shapes with matchsticks.
  - Creates shapes/objects through paper folding and paper cutting.
  - Identifies 2-D shapes (square, rectangle, triangle, circle) without naming.
  - Tiles a given region using a given shape.
  - Distinguishes between shapes that tile and shapes that do not tile.

**Class IV**
- **Shapes & Spatial Understanding**
  - Identifies the side view, top view, front view of simple objects/planes.
  - Identifies of nets of cube and cuboid shaped boxes.
  - Identifies cubes from given nets.
  - Identifies 2-D shapes viz., rectangle, square, triangle and circle by their names.
  - Making new shapes/objects using known regular shapes.
  - Making shapes on the geo-board/dotted board.
  - Identifying regular 2D & 3D shapes in objects.
  - Describes the various 2-D & 3D shapes by identifying and counting their edges, corners and faces.
  - Draws shapes and patterns - free hand and with scale.
  - Explores perimeter of simple shapes intuitively and can calculate it.
  - Explores intuitively the reflections through inkblots, paper cutting and paper folding.
  - Estimation of area.

**Class V**
- **Shapes & Spatial Understanding**
  - Draws the side view, top view, front view of simple objects/plans.
  - Makes the shapes of cubes, cuboid using nets especially designed for this purpose.
  - Uses shapes to create different shapes (tangram) and different patterns
  - Identifies the shadows of the different given objects.
  - Identifies appropriate nets for cube and cuboid
  - Explores intuitively line symmetry in familiar 3-D objects expressed as 2-D shapes.
  - Explores intuitively rotations and reflections of familiar 2-D shapes.
  - Explores intuitively the perimeter and area of simple shapes.
  - Estimates area
  - Gets the feel of an angle through observation and paper folding.
  - Identifies right angles in the environment.
  - Identifies right angle and angles more than and less
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<tr>
<td>Numbers (46 hrs.)&lt;br&gt;DEVELOPING A SENSE OF NUMBERNESS, COUNTING AND OPERATIONS OF NUMBERS 1 - 9 AND ZERO&lt;br&gt;• Observes object and makes collections of objects.&lt;br&gt;• Arranges the collection of objects in order by&lt;br&gt;  – One to one correspondence&lt;br&gt;  – Matching&lt;br&gt;• Introduction of numbers (1-5)&lt;br&gt;• Counts the number of objects in a collection.&lt;br&gt;• Makes collection of objects corresponding to a specific number.&lt;br&gt;• Introduction of numbers (6-9)&lt;br&gt;• Recognizes and speaks numbers from 1 to 9.&lt;br&gt;• Uses numbers from 1 to 9 in counting and</td>
<td>Numbers (46 hrs.)&lt;br&gt;• Reads and writes numerals for numbers up to ninety nine.&lt;br&gt;• Counts and regroups objects into tens and ones.&lt;br&gt;• Expands a number with respect to place values.&lt;br&gt;• Uses the concept of place value in the comparison of numbers.&lt;br&gt;• Counts in various ways:&lt;br&gt;  – Starting from any number.&lt;br&gt;  – Group counting etc.&lt;br&gt;• Arranges numbers up to hundred in ascending and descending order.&lt;br&gt;• Forms the greatest and the smallest two digit numbers with and without repetition of given digits.&lt;br&gt;• Indicates and identifies the position of an object in a</td>
<td>Numbers (42 hrs.)&lt;br&gt;NUMBER UPTO 1000&lt;br&gt;• Reads and writes up to 3-digit numbers.&lt;br&gt;• Understands place value in 3-digit numbers.&lt;br&gt;• Expands a number using place value.&lt;br&gt;• Compares numbers.&lt;br&gt;• Forms numbers using given digits.&lt;br&gt;• Estimates numbers&lt;br&gt;• Arrange the given numbers in ascending and descending order.&lt;br&gt;ADDITION AND SUBTRACTION&lt;br&gt;• Solves addition and subtraction problems in different situations presented through pictures and stories.&lt;br&gt;• Adds and subtracts numbers</td>
<td>Numbers (40 hrs.)&lt;br&gt;NUMBERS UPTO 1000&lt;br&gt;• Using word problems/contextual situations, reads, writes and compares 2, 3-digit numbers.&lt;br&gt;• Estimating 2, 3-digit numbers using the number line&lt;br&gt;• Understands place value in 3-digit numbers.&lt;br&gt;• Expands a number using place value.&lt;br&gt;• Forms numbers using given digits.&lt;br&gt;• Skip counting in terms of hundreds, thousands and ten thousands&lt;br&gt;ADDITION AND SUBTRACTION&lt;br&gt;• Using word problems/contextual situations for additions and subtractions up to 99999. (compare-combination and comparison types of word problems)</td>
<td>Numbers (40 hrs.)&lt;br&gt;NUMBERS UPTO 1,00,000&lt;br&gt;• Using word problems/contextual situations, reads, writes and compares 3,4,5-digit numbers.&lt;br&gt;• Understands place value in numbers up to 99,999&lt;br&gt;• Expands a number using place value.&lt;br&gt;• Forms numbers using given digits.&lt;br&gt;• Skip counting in terms of hundreds, thousands and ten thousands&lt;br&gt;ADDITION AND SUBTRACTION&lt;br&gt;• Using word problems/contextual situations for additions and subtractions up to 999999. (compare-combination and comparison types of word problems)</td>
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| comparison.  
- Reads and writes numerals from 1 to 9.  
- Adds and subtracts using real objects and pictures. (Sum not to exceed 9 and difference not to go below 1.)  
- Adds and subtracts the numbers using symbols ‘+’ and ‘-’.  
- Approaches zero through the subtraction pattern.  
**NUMBERS FROM (10 - 20)**  
- Introduction of 10  
- Forms Number sequence from 10 to 20.  
- Counts objects using these numbers.  
- divides objects into a group of 10s and single objects.  
- Develops the vocabulary of group of ‘tens’ and ‘ones’.  
- Shows the group of tens and ones by drawing.  
- Counts the number of tens and ones in a given number.  
- Writes number names ten to nineteen.  
- Writes numerals for ten to twenty.  
- Compares numbers upto 20.  
**ADDITION AND SUBTRACTION**  
(upto 20)  
- Adds and subtracts of numbers the total not exceeding 20.  
- Adds and subtracts two digit numbers by drawing representations of tens and ones without and with regrouping.  
- Adds zero to a number and subtracts zero from a number.  
- Solves addition, subtraction problems presented through pictures and verbal description.  
- Describes orally the situations that correspond to the given addition and subtraction facts.  
**PREPARATION FOR MULTIPLICATION AND DIVISION**  
- Discussion of situations involving repeated addition and situations involving equal sharing.  
- Activities of making equal groups.  
- Observe the cumulative property of multiplication  
| line.  
**ADDITION AND SUBTRACTION**  
- Adds and subtracts two digit numbers by drawing representations of tens and ones without and with regrouping.  
- Adds zero to a number and subtracts zero from a number.  
- Solves addition, subtraction problems presented through pictures and verbal description.  
- Describes orally the situations that correspond to the given addition and subtraction facts.  
**MULTIPLICATION**  
- Explains the meaning of multiplication (as repeated addition).  
- Identifies the sign of multiplication.  
- Constructs the multiplication tables of 2, 3, 4, 5 and 10  
- Uses multiplication facts in situations.  
- Construct tables for 6, 7, 8, 9  
- Multiplies two digit numbers by single digit number using standard algorithm and Lattice multiplication algorithm.  
**DIVISION**  
- Explains the meaning of division from context of equal grouping and sharing.  
- Using word problems/ contextual situations for addition of 3 numbers.  
- Estimates sums and differences of 2,3 digit numbers through word problems and in sums.  
- Adds and subtracts 2,3-digit numbers using the empty number line.  
- Frames word problems.  
- Estimates the sum and difference between two given numbers  
- Estimates the sum and difference between two given numbers.  
- Multiplies two digit numbers by single digit number using standard algorithm and Lattice multiplication algorithm.  
**DIVISION**  
- Using word problems/ contextual situations revises multiplication facts up to 10*10.(array - rate product and grouping types of word problems)  
- Multiply by 10’s and 100’s, 1000’s and 10,000s  
- Using word problems/ contextual situations multiplies 3 digit number by 2 digit numbers using the standard (column) algorithm as well as the distributive law. (array product - rate product and grouping – Cartesian product types of word problems)  
- Frames word problems.  
- Estimates products of 3 digit by 1 digit and 3 digit by 2 digit numbers.  
- Estimates the sum and difference between two given numbers  
- Multiplies two digit numbers by single digit and two digit numbers using the standard (column) algorithm as well as the distributive law. (array product - rate product and grouping types of word problems)  
- Frames word problems.  
- Estimates products 2 digit by 1 digit and 2 digit by 1 digit  
- Uses standard division  
**MULTIPLICATION**  
- Multiply by 10’s, 100’s, 1000’s and 10,000s  
- Using word problems/ contextual situations multiplies 3 digit number by 2 digit numbers using the standard (column) algorithm as well as the distributive law. (array product - rate product and grouping – Cartesian product types of word problems)  
- Frames word problems.  
- Estimates products of 3 digit by 1 digit and 3 digit by 2 digit numbers.  
- Using word problems/ contextual situations divides 2-digit numbers by two digit numbers and three digit numbers by two digit numbers- with remainder and without remainder (using both equal grouping and sharing)  
- Understands the pattern which emerges from division by 10  
- Uses standard division
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| **NUMBERS FROM 21 - 99**  
- Writes numerals for Twenty-one to Ninety nine.  
- Groups objects into tens and ones.  
- Draws representation for groups of ten and ones.  
- Groups a number orally into tens and ones. | **CLASS III**  
- Relates division with multiplication.  
- Completes division facts: (Double digit by single digit)  
  - by repeated subtraction  
  - by grouping  
  - by using multiplication tables. | **DIVISION**  
- Using word problems/ contextual situations dividing 2 and 3 digit numbers by one and 2-digit numbers - with remainder and without remainder (using both equal grouping and sharing)  
- Frames word problems.  
- Even and odd numbers  
- Estimates quotients for 2 and 3 digit numbers divided by single digit numbers.  
- Explores the relationship between multiplication and division using 2 and 1 digit numbers. | Algorithms for two-and three digit numbers divided by one and two-digit numbers  
- Frames word problems.  
- Even and odd numbers  
- Tests of divisibility for 2, 5 & 10.  
- Understanding of the multiples and factors  
- Estimates quotients  
- Explores the relationship between multiplication and division using 2 and 3 digit numbers. |
| **DAY TO DAY MATHEMATICS (3 hrs.)**  
(Money, Length, Weight, Capacity)  
- Identifies common currency  
| **DAY TO DAY MATHEMATICS (3 hrs.)**  
(Money, Length, Weight, Capacity)  
- Identifies currency - notes | **FRACTIONAL NUMBERS**  
- Identifies half, one fourth and three - fourths of a whole.  
- Identifies the symbols, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$.  
- Explains the meaning of $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{3}{4}$.  
- Identifies other fractions: $\frac{3}{2}$, $\frac{5}{2}$, $\frac{5}{4}$  
- Appreciates equivalence of $\frac{2}{4}$ and $\frac{1}{2}$; and of $\frac{2}{2}$, $\frac{3}{3}$, $\frac{4}{4}$ and 1.  
- Comparison of like fractions  
- Addition and subtraction of like fractions intuitively | **FRACTIONAL NUMBERS**  
- Finds the fractional part of a collection/ object  
- Identifies equivalent fractions $\frac{2}{4}$ and $\frac{1}{2}$; $\frac{2}{6}$ and $\frac{1}{3}$, $\frac{2}{8}$ and $\frac{1}{4}$  
- Compares like and unlike fractions(without LCM)  
- Addition and subtraction of like fractions  
- Applies simple fractions to measurements. | **DAY TO DAY MATHEMATICS (5 hrs.)**  
(Money, Length, Weight, Capacity, Space)  
- word problems/ contextual | **DAY TO DAY MATHEMATICS (5 hrs.)**  
(Money, Length, Weight, Capacity, Space)  
- word problems/ contextual  
| **DAY TO DAY MATHEMATICS (5 hrs.)**  
(Money, Length, Weight, Capacity, Space)  
- word problems/ contextual |
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| Notes and coins.  
- Puts together small amounts of money. | Notes and coins.  
- Puts together amounts of money not exceeding Rs 10/- or Rs. 50/-.  
- Adds and subtracts small amounts of money mentally.  
- Transacts an amount using 3-4 notes/coins. | Situations using more than one operations and/ or more than one concept and/or multiple stages of solving  
- Estimation in daily life | Situations using more than one operations and/ or more than one concept and/or multiple stages of solving  
- Estimation in daily life | Situations using more than one operations and/ or more than one concept and/or multiple stages of solving  
- Estimation in daily life |

**Measurement (13 hrs.)**  
**Length:**  
- Distinguishes between near, far, thin, thick, longer/taller, shorter, high, low.  
- Seriates objects by comparing their length.  
- Measures short lengths in terms of non-standard units (e.g. hand span etc.)

**Weight:**  
- Compares between heavy and light objects.

**Capacity:**  
- Comparison of capacity of vessels

**Measurement (13 hrs.)**  
**Length:**  
- Measures lengths & distances along short & long paths using uniform non-standard units (Foot).

**Weight:**  
- Compares two or more objects by their weight using non-standard units  
- Appreciates the need for a simple balance.  
- Compares weights of given objects using simple balance.

**Capacity:**  
- Comparison of capacity of vessels

**Measurement (21 hrs.)**  
**Length:**  
- Identifies meter and cm lengths  
- Relates meter with cm.  
- Weighs objects using a balance and standard units.  
- Appreciates the conservation of weight.  
- Estimates the weight of an object. Verifies using a balance.  
- Solves problems involving length and distances in m and cm.

**Weight:**  
- Understands weight in terms of kg and g, using actual weights and their combinations  
- Relates Kg with gram  
- Weighs objects using a balance and standard units.  
- Appreciates the conservation of weight.  
- Estimates the weight of an object. Verifies using a balance.  
- Solves problems involving weight.

**Capacity:**  
- Measures and compares the capacity of different containers in terms of nonstandard units.  
- Appreciates the conservation of capacity.  
- Solves the problems on ‘capacity’ (in non standard units)  
- Determines intuitively area and perimeter.  
- Estimated length, weight, capacity of a solid body: intuitively and also by informal measurement.  
- Understands the concept of area
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<tr>
<td><strong>Time</strong></td>
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<tr>
<td>• Distinguishes between events occurring in time using terms -earlier and later.</td>
<td>• Gets familiar with the days of the week and months of the year.</td>
<td>• Reads a calendar to find a particular day and date.</td>
<td>• Appreciates the difference in time in terms of minutes, hours, days, weeks and months.</td>
<td>• Appreciates the difference in time in terms of seconds, minutes, hours, days, months and years.</td>
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<td>• Narrates the sequence of events in a day.</td>
<td>• Sequences the events occurring over longer periods in terms of dates/days.</td>
<td>• Reads the time correct to the hour.</td>
<td>• Reads the calendar, identifies and correlates the number of days, weeks, months and years.</td>
<td>• Reading time in hour, minutes and seconds</td>
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<td>• Sequences the events chronologically.</td>
<td>• Understands a leap year.</td>
<td>• Converts hours into minutes and minutes into seconds</td>
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<td>• Compares the duration of two different events.</td>
<td>• Reads clock time to the hours and minutes</td>
<td>• Expresses time, using the terms, ‘a.m.’ and ‘p.m.’</td>
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<td>• Identifies the patterns in a calendar.</td>
<td>• Solves problems on ‘time’</td>
<td>• Understanding 24 hour clock (Bus and Railway timetable) and conversion between 12 hour and 24 hour clocks</td>
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<td>• Computes the number of days between two dates.</td>
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<td>• Uses addition and subtraction in finding time intervals in simple cases.</td>
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<td><strong>Data Handling (6 hrs.)</strong>&lt;br&gt;• Collects data&lt;br&gt;• Records data in a table&lt;br&gt;• Draws inferences from data.</td>
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<td><strong>Data Handling (6 hrs.)</strong>&lt;br&gt;• Collects data&lt;br&gt;• Records data in a table&lt;br&gt;• Reads data given in the form of a pictograph&lt;br&gt;• Records data using tally marks&lt;br&gt;• Draws conclusions from the data.</td>
<td><strong>Data Handling (6 hrs.)</strong>&lt;br&gt;• Reading data using a pictograph&lt;br&gt;• Reading data using a bar graph&lt;br&gt;• Recording data using tally marks</td>
<td><strong>Data Handling (6 hrs.)</strong>&lt;br&gt;• Reading data using a pictograph&lt;br&gt;• Understands the importance of an appropriate scale for pictograph&lt;br&gt;• Reading data using bar graphs&lt;br&gt;• Organizing data using tally marks using tally marker.&lt;br&gt;• Making bar graphs based on data (without scale)</td>
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| Patterns (10 hrs.)<br>• Describes sequences of simple patterns found in shapes in the surroundings and in numbers, e.g. stamping activity using fingers and thumb.<br>• Completes a given sequence of simple patterns found in shapes in the surroundings and in numbers. | Patterns (10 hrs.)<br>• Observes and extends patterns in sequence of shapes and numbers.<br>• Searches for patterns in different ways of splitting a number.<br>• Creates block patterns by stamping thumbprints, leaf prints, vegetable prints, etc.<br>• Creates patterns of regular shapes by stamping. | Patterns (6 hrs.)<br>• Identifies simple symmetrical shapes and patterns.<br>• Makes patterns and designs from straight lines and other geometrical shapes.<br>• Identifies patterns in his Surroundings<br>• Symmetry through paper folding, paper cuttings<br>• Complete a symmetric picture using mirror. | Patterns (6 hrs.)<br>• Identifies, carries forward and makes visual patterns.<br>• Carries forward patterns in numbers based on addition, subtraction, multiplication and division | Patterns (6 hrs.)<br>• Identifies patterns in square numbers, triangular numbers.<br>• Identifies patterns in multiplication and division.<br>• Numbers between consecutive square numbers.<br>• Makes border strip and tiling patterns.<br>• Identifies the patterns in the multiples of 9.<br>• Draws symmetric pictures and symmetric axis.<br>• Identifies the block or unit of the pattern. |
Mathematics Syllabus – High School
Class VI to X

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<tr>
<td><strong>Number System</strong> (60 hrs)</td>
<td><strong>Number System</strong> (50 hrs)</td>
<td><strong>Number System</strong> (50 hrs) (67 periods)</td>
<td><strong>Number System</strong> (20 periods)</td>
<td><strong>Number System</strong> (15 periods):</td>
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<td>(i) Knowing our Numbers: Consolidating the sense of Numberness up to 99,999 (five digits)</td>
<td>(i) Integers</td>
<td>(i) Playing with numbers</td>
<td>Review of representation of natural numbers, integers, and rational numbers on the number line.</td>
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<td>• Estimation of numbers</td>
<td>• Addition, Subtraction, Multiplication and Division of integers (through patterns).</td>
<td>• Writing and understanding a 2 and 3 digit number in generalized form (100a + 10b) +c, where a, b, c can be only digits 0-9) and engaging with various puzzles concerning this. (Like finding the missing numerals represented by alphabets in sums involving any of the four operations)</td>
<td>• Representation of terminating / non terminating recurring decimals, on the number line through successive magnification.</td>
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<tr>
<td>• Comparison of numbers</td>
<td>• Properties of integers under addition, multiplication &amp; division through patterns (closure, commutative, associative, inverse, including identities and distributive properties)</td>
<td>• Rational numbers as recurring / terminating decimals.</td>
<td>• Rational numbers as recurring / terminating decimals.</td>
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<td>• Place value (recapitulation and extension);</td>
<td>• Expressing properties in a general form.</td>
<td>• Finding ( \sqrt{2} ), ( \sqrt{3} ), ( \sqrt{5} ) correct to 6-decimal places by division method.</td>
<td>• Finding ( \sqrt{2} ), ( \sqrt{3} ), ( \sqrt{5} ) correct to 6-decimal places by division method.</td>
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<td>• Connectives: use of symbols =, &lt;, &gt;.</td>
<td>• Construction of counter examples, (e.g. Subtraction is not commutative).</td>
<td>• Examples of nonrecurring / non terminating decimals such as 1.010110110111111--- 1.1211211211112--- and ( \sqrt{2} ), ( \sqrt{3} ), ( \sqrt{5} ) etc.</td>
<td>• Examples of nonrecurring / non terminating decimals such as 1.010110110111111--- 1.1211211211112--- and ( \sqrt{2} ), ( \sqrt{3} ), ( \sqrt{5} ) etc.</td>
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<td>• Word problems on number operations involving large numbers up to a maximum of 5 digits in the answer (This would include conversions of units of length &amp; mass from the larger to the smaller units)</td>
<td>• Multiplication and division by zero</td>
<td>• Understanding the logic behind the divisibility tests of 2, 3, 4, 5, 6, 7, 8, 9, and 11 for a two or three digit number expressed in the general form.</td>
<td>• Existence of non-rational numbers (irrational numbers) such as ( \sqrt{2} ), ( \sqrt{3} ), and their representation on the number line.</td>
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<td>• Estimation of outcome of number operations.</td>
<td>• Word problems involving integers (on all operations)</td>
<td>• Number puzzles and games</td>
<td>• Existence of each real number on a number line by using</td>
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<tr>
<td>• Introduction to large numbers a) up to lakhs and ten lakhs b) up to crores and ten crores</td>
<td>• Approximation of large numbers</td>
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<td>• International system of numbers (Millions.)</td>
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<td>• Use of Large numbers in daily life situations.</td>
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### Class – VI

- **(ii) Whole numbers**
  - Natural numbers, whole numbers
  - Properties of whole numbers (closure, commutative, associative, distributive, additive identity, multiplicative identity)
  - Division by zero
  - Number line: Binary operations (addition, subtraction, multiplication) on the number line
  - Seeing patterns, identifying and formulating rules to be done by children.
  - Utility of properties in fundamental operations

- **(iii) Playing with Numbers:**
  - Consolidating divisibility rules of 2, 3, 5, 6, 9, 10
  - Discovering divisibility rules of 4, 8, 11 through observing patterns.
  - Multiples and factors,
  - Prime & composite numbers, Co-prime numbers and twin prime numbers,
  - Prime factorization, every number can be written as products of prime factors.
  - HCF and LCM, prime factorization and division method.
  - Property $\text{LCM} \times \text{HCF} = \text{mixed fractions (related to daily life)}$

### Class – VII

- **General rule of divisibility by any number.**
- **(ii) Rational Number**
  - Properties of rational numbers. (including identities).
  - Using general form of expression to describe properties.
  - Appreciation of properties.
  - Representation of rational numbers as decimal (denominators other than 10, 100, …)
  - Representation of decimal numbers (terminating, non terminating but recurring) in rational form.
  - Consolidation of operations on rational numbers.
  - Word problems on rational numbers (all operations)

### Class – VIII

- **Pythogorian result.**
- **Square root of a surd of the form $a+\sqrt{b}$ (simple problems)**
- **Concept of a Surd.**
- **Rationalisation of a monomial, binomial surds of second order.**
- **Laws of logarithms**
  - $\log xy = \log x + \log y$;
  - $\log x/y = \log x - \log y$;
  - $\log x^n = n \log x,$
  - $a^{\log x} = N$.
- **Standard base of logarithms and usage**

### Class – IX

### Class – X

- **(ii) Sets (8 periods):**
  - Venn diagrams
    - Sets, subsets
    - Disjoint sets.
  - Basic operations on sets
    - Union, intersection, difference of sets
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</table>
| product of two numbers.  
- LCM & HCF of co-primes.  
(iv) Negative Numbers and Integers  
- How negative numbers arise, models of negative numbers, connection to daily life, ordering of negative numbers, representation of negative numbers on number line.  
- Understanding the definition of integers, identification of integers on the number line  
- Comparison of integers, ordering of integers by using symbols  
- Operation of addition and subtraction of integers, showing the operations on the number line (Understanding that the addition of negative integer reduces the value of the number)  
(V) Fractions and Decimals:  
- Revision of what a fraction is, Fraction as a part of whole  
- Representation of fractions (pictorially and on number line)  
- Fraction as a division, proper, improper & mixed fractions, equivalent fractions, like, unlike fractions.  
- Comparison of fractions | operations, including ideas like area)  
(iii) Square numbers, cube numbers, Square roots, Cubes, Cube roots.  
- Square numbers and square roots.  
- Square roots using factor method and division method for numbers containing.  
a) not more than 4 digits and  
b) not more than 2 decimal places  
- Pythagorean triplets and problems involving Pythagorean triplets.  
- Cube numbers and cube roots (only factor method for numbers containing at most 3 digits).  
- Estimating square roots and cube roots. Learning the process of moving nearer to the required number. |
### Class – VI
- Addition and subtraction of fractions
- Word problems (Avoid large and complicated calculations)
- Review of the idea of a decimal fraction
- Place value in the context of decimal fraction, inter conversion of fractions and decimal fractions (avoid recurring decimals at this stage)
- Word problems involving addition and subtraction of decimals (word problems should involve two operations)
- Contexts: money, mass, length.

### Algebra (15 hrs)
**(i) Introduction to Algebra**
- Introduction to variable through patterns and through appropriate word problems and generalizations (example $5 \times 1 = 5$ etc.)
- Generate such patterns with more examples.
- Introduction to unknowns through examples with simple contexts (single operations)
- Rules from Geometry and Mensuration.

** (ii) Simple Equations**
- Introduction
- Solution of simple equation

### Class – VII
**(i) Exponents and powers**
- Meaning of $x$ in $a^x$ where $a \in \mathbb{Z}$
- Writing a number in the exponential form through prime factorization.
- Laws of exponents (through observing patterns to arrive at five generalizations) where $m, n \in \mathbb{N}$
  - $(i) a^m \cdot a^n = a^{m+n}$
  - $(ii) (a^m)^n = a^{mn}$
  - $(iii) a^m/a^n = a^{m-n}$, where $(m, n) \in \mathbb{N}$
  - $(iv) a^0, b^0 = (ab)^0$
  - $(v)$ number with exponent zero

### Class – VIII
**Algebra (20 hrs)**
** (27 periods)**
**Exponents & powers**
- Decimal numbers in exponential notation.
- Integers as exponents.
- Laws of exponents with integral powers
- Representing large numbers in standard (scientific) notation.

**Algebraic Expressions**
- Addition and subtraction of algebraic expressions
- Multiplications of algebraic expressions (Coefficient should be known)

### Class – IX
**Algebra (20 hrs)**
** (27 periods)**
**Polynomials (25 periods)**
- Definition of a polynomial in one variable, its coefficients, with examples and counter examples, its terms, zero polynomial.
- Constant, linear, quadratic, cubic polynomials; monomials, binomials, trinomials. Zero / roots of a polynomial / equation.
- Division of polynomials
- State and motivate the Remainder Theorem with examples and analogy to integers (motivate).
- Statement and verification of the Factor Theorem.
- Recall of algebraic expressions and identities.
- Further identities of the type:

### Class – X
**Algebra (i) Polynomials (8 periods)**
- Zeroes of a polynomial (Linear, Quadratic cubic polynomials).
- Geometrical meaning of zeroes of quadratic and cubic polynomials using graphs.
- Relationship between zeroes and coefficients of a polynomial with particular reference to quadratic polynomials.
- Statement and simple problems on division algorithm for polynomials with integral coefficients.
- Zeroes of a biquadratic polynomial.

** (ii) Pair of Linear Equations in Two Variables (15 periods)**

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<tr>
<td>by Trial and Error method.</td>
<td>• Terms with negative base.</td>
<td>• Identities: Derivation and geometric verification of ((a \pm b)^2 = a^2 \pm 2ab + b^2), (a^2 - b^2 = (a - b)(a + b))</td>
<td>((x+y+z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx) ((x+y)^2 = x^2 + 2xy + y^2) ((x\pm y)^2 = x^2 \pm 2xy + y^2) ((x+y-z)^2 = x^2 + y^2 + z^2 - 2xy - 2yz - 2zx) ((x^2 + y^2 + z^2 - 3xyz) = (x+y+z)) ((x^2 + y^2 + z^2 - xy - yz - zx))</td>
<td>• Pair of linear equations in two variables. Geometric representation of different possibilities of solutions / inconsistency.</td>
</tr>
<tr>
<td>(ii) Algebraic Expressions Introduction</td>
<td>Generate algebraic expressions (simple) involving one or two variables</td>
<td>• Factorization (simple cases only) as examples of the following types (a(x + y), (x \pm y)^2, x^2 - y^2, (x + a)(x + b))</td>
<td>(x^3 + y^3 = (x+y)(x^2 - xy + y^2)) (x^3 - y^3 = (x-y)(x^2 + xy + y^2)) and their use in factorization of polynomials. Simple expressions reducible to these polynomials.</td>
<td>• Algebraic conditions for number of solutions (Consistent, inconsistent).</td>
</tr>
<tr>
<td>(iii) Simple equations</td>
<td>• Identifying constants, coefficient, powers</td>
<td>(iii) Simple equations</td>
<td>• Solution of a linear equation in two variables substitution and graphical methods</td>
<td>• Solution of pair of linear equations in two variables algebraically – by substitution, by elimination methods – Simple situational problems.</td>
</tr>
<tr>
<td>• Like and unlike terms, degree of expressions e.g., (x^2y) etc. (exponent (\leq 3), number of variables (\leq 2))</td>
<td>• Finding the value of the expression.</td>
<td>• Division of algebraic expression</td>
<td>• Simple word problems related to linear equations</td>
<td>• Simple problems on equations reducible to linear equations in two variables.</td>
</tr>
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<td>• Types of algebraic expressions.</td>
<td>(iii) Simple equations</td>
<td>(iv) Progressions (12 periods)</td>
<td>(iii) Quadratic Equations (12 periods)</td>
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<tr>
<td>• Addition, subtraction of algebraic expressions (coefficients should be integers).</td>
<td>• Simple linear equations in one variable (in contextual problems) with two operations (integers as coefficients)</td>
<td>• Recall of linear equations in one variable.</td>
<td>• Standard form of a quadratic equation (ax^2 + bx + c = 0), (a \neq 0).</td>
<td>• Sequence and series</td>
</tr>
<tr>
<td>• Finding the value of the expression.</td>
<td>• Introduction to the equation in two variables.</td>
<td>• Introduction to the equation in two variables.</td>
<td>• Solutions of quadratic equations (only real roots) by factorization and by completing the square, i.e., by using formula to find roots of quadratic equation.</td>
<td>• Motivation for studying AP. Derivation of standard results of finding the (n^{th})</td>
</tr>
<tr>
<td>(iii) Simple equations</td>
<td>• Solving linear equations in one variable in contextual problems involving multiplication and division (word problems) (with integral coefficient in the equations)</td>
<td>• Solution of a linear equation in two variables substitution and graphical methods</td>
<td>• Graph of a linear equation in two variables</td>
<td>problems related to day-to-day life situations.</td>
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<td>• Simple linear equations</td>
<td>• Equations of lines parallel to x-axis and y-axis.</td>
<td>• Equations of lines parallel to x-axis and y-axis.</td>
<td>• Equations of lines parallel to x-axis and y-axis.</td>
<td>(iv) Progressions (11 periods)</td>
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<td>(iii) Simple equations</td>
<td>• Simple word problems related to linear equations</td>
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<td>• Simple word problems related to linear equations</td>
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<td>• Motivation for studying AP. Derivation of standard results of finding the (n^{th})</td>
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<td>(iii) Simple equations</td>
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<tr>
<td>Ratio and Proportion (15hrs)</td>
<td>Ratio - Applications (20 hrs)</td>
<td>Business Mathematics (25 hrs)</td>
<td>Trigonometry (i) Introduction (15 periods)</td>
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<tr>
<td>• Concept of Ratio</td>
<td>• Ratio and proportion (revision)</td>
<td>• Compound ratio – Word problems.</td>
<td>• Trigonometric ratios of an acute angle by using right-angled triangle i.e. sine, cosine, tangent, cosecant and cotangent.</td>
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<tr>
<td>• Ratio in different situations.</td>
<td>• Unitary method continued, consolidation, general expression.</td>
<td>• Problems involving applications on percentages, profit &amp; loss, overall expenses, discount, tax. (Multiple transactions)</td>
<td>• Values (with proofs) of the trigonometric ratios of 30°, 45° and 60°.</td>
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<tr>
<td>• Comparison of ratios of different units</td>
<td>• Direct proportion</td>
<td>• 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.</td>
<td>• Motivate the ratios, whichever are defined at 0° and 90°.</td>
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<tr>
<td>• Division of a quantity in a given ratio.</td>
<td>• Percentage- an introduction.</td>
<td>• Direct variation – Simple and direct word problems. Inverse variation – Simple and direct word problems. Mixed problems on direct, inverse variation</td>
<td>• Relationship between the ratios.</td>
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<tr>
<td>• Proportion as equality of two ratios</td>
<td>• Understanding percentage as a fraction with denominator 100.</td>
<td>• Time &amp; work problems – Simple and direct word</td>
<td>• Trigonometric Identities: Proof and applications of the identities sin²A+cos²A=1. 1+tan²A=sec²A [\cot^2A+1=\cosec²A]</td>
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<tr>
<td>• Unitary method (with only direct variation implied)</td>
<td>• Converting fractions and decimals into percentage and vice-versa.</td>
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<td>• Simple problems on identities</td>
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<tr>
<td>• Word problems</td>
<td>• Application to profit and loss (single transaction only)</td>
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<td>• Trigonometric ratios of complementary angles.</td>
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<tr>
<td>• Understanding ratio and proportion in Arithmetic.</td>
<td>• Discount.</td>
<td>(ii) Applications of trigonometry (8 periods)</td>
<td>(ii) Applications of trigonometry (8 periods)</td>
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<td>• Application to simple interest (time period in complete years).</td>
<td>• Angle of elevation, angle of depression</td>
<td>• Simple and daily life problems on heights and distances. Problems should not involve more</td>
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<tr>
<td>problems</td>
<td>Time &amp; distance: Simple and direct word problems</td>
<td>Coordinate geometry (9 periods)</td>
<td>Coordinate geometry Lines (In two-dimensions) (15 periods)</td>
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<td>• Introduction</td>
<td>• Review the concepts of coordinate geometry done by the graphs of linear equations.</td>
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<td>• Cartesian system</td>
<td>• Distance between two points i.e. P ((x_1, y_1)) and Q ((x_2, y_2))</td>
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<td>• Representation of a point in a plane by its location.</td>
<td>• Section formula (internal division of a line segment in the ratio m:n).</td>
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<td>• Plotting a point in a plane if its co-ordinates are given.</td>
<td>• Area of a triangle on coordinate plane.</td>
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<td>• Slope of a triangle on coordinate plane.</td>
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**Geometry (65 hrs)**

**i) Basic geometrical ideas (2-D):**
- Introduction to geometry. Its linkage with and reflection in everyday experience.
- Point, Line, line segment, ray.
- Open and closed figures.
- Curvilinear and linear boundaries
- Interior and exterior of closed figures.
- Angle — Vertex, arm, interior and exterior, Triangle — vertices, sides, angles, interior and exterior.

**Geometry (60 hrs)**

**i) Lines and Angles**
- Pairs of angles (linear pair)
  1. complementary,
  2. supplementary,
  3. adjacent, vertically opposite angles. (verification and simple proof of vertically opposite angles)
- Transversal – Angles formed by the transversal.
- Properties of parallel lines with transversal (alternate, corresponding, interior, exterior angles, interior angles on the same side of transversal).

**Geometry (40 hrs)**

**i) Construction of Quadrilaterals: (54 periods)**
- Review of quadrilaterals and their properties.
- Four sides, one angle
- Four sides, one diagonal
- Two adjacent sides, three angles
- Three sides, two diagonals.
- Three sides, two angles in between.
- Construction of

**Geometry (40 hrs)**

**i) Introduction to Euclid’s Geometry (6 periods)**
- History – Euclid and geometry in India. Euclid’s method of formalizing observed phenomenon onto rigorous mathematics with definitions, common / obvious notions, axioms / postulates, and theorems. The five postulates of Euclid. Equivalent varies of the fifth postulate. Showing the relationship between axiom and theorem.
- Given two distinct points, there exists one and only one line through them.

**Geometry (40 hrs)**

**i) Similar triangles (18 periods)**
- Meaning, examples, properties of similar triangles.
- Difference between congruency and similarity of triangles.
- (Prove) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.
- (Motivate) If a line divides two sides of a triangle in
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<tr>
<td>exterior.</td>
<td>Quadrilateral — Sides, vertices, angles, diagonals, adjacent sides and opposite sides, adjacent and opposite angles (only convex quadrilateral are to be discussed), interior and exterior of a quadrilateral.</td>
<td>special type of quadrilaterals.</td>
<td>(Prove) Two distinct lines cannot have more than one point in common.</td>
<td>the same ratio, the line is parallel to the third side.</td>
</tr>
<tr>
<td>Circle — Centre, radius, diameter, chord, arc, sector, segment, semicircle, circumference, interior and exterior.</td>
<td>(ii) Triangles:</td>
<td>(ii) Representing 3-D in 2-D</td>
<td>(ii) Lines and Angles (10 periods)</td>
<td>(Motivate) If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the triangles are similar (AAA).</td>
</tr>
<tr>
<td>(i) Measures of Lines and Angles:</td>
<td>- Definition of triangle.</td>
<td>- Identify and Match pictures with objects [more complicated e.g. nested, joint 2-D and 3-D shapes (not more than 2)].</td>
<td>- Pair of angles.</td>
<td>(Motivate) If the corresponding sides of two triangles are proportional, their corresponding angles are equal and the two triangles are similar (SSS).</td>
</tr>
<tr>
<td>- Measure of Line segment</td>
<td>- Types of triangles according to sides and angles</td>
<td>- Drawing 2-D representation of 3-D objects (Continued and extended) with isometric sketches.</td>
<td>- (Motivate) If a ray stands on a line, then the sum of the two adjacent angles so formed is 180° and it’s converse.</td>
<td>(Motivate) If one angle of a triangle is equal to one angle of another triangle and the sides including these angles are proportional, the two triangles are similar.</td>
</tr>
<tr>
<td>- Types of angles - acute, obtuse, right, straight, reflex, complete and Zeroes angle.</td>
<td>- Properties of triangles</td>
<td>- Counting vertices, edges &amp; faces &amp; verifying Euler’s relation for 3-D figures with flat faces (cubes, cuboids, tetrahedrons, prisms and pyramids)</td>
<td>- (Prove) If two lines intersect, the vertically opposite angles are equal.</td>
<td>(Prove) The ratio of the areas of two similar triangles is equal to the ratio of the squares on their corresponding sides.</td>
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<tr>
<td>- Examples of angles in the surroundings.</td>
<td>- Sum of the sides, difference of two sides.</td>
<td>- (iii) Exploring geometrical figures</td>
<td>- (Motivate) Relation between corresponding angles, alternate angles, interior angles when a transversal intersects two parallel lines.</td>
<td>(Motivate) If a ray stands on a line, then the sum of the two adjacent angles so formed is 180°.</td>
</tr>
<tr>
<td>- Measure of angles</td>
<td>- Angle sum property (with notion of proof and verification through paper folding, proofs, using property of parallel lines, difference between proof and verification</td>
<td>- Congruent figures</td>
<td>- Concurrent lines concurrent point.</td>
<td>(Motivate) If a side of a triangle is equal to the sum of the two interior opposite angles.</td>
</tr>
<tr>
<td>- Classifying angles according to their measure.</td>
<td>- Exterior angle property of triangle</td>
<td>- Similar figures</td>
<td>- (Motivate) Lines, which are parallel to given line, are parallel.</td>
<td>(Motivate) Relation between corresponding angles, alternate angles, interior angles when a transversal intersects two parallel lines.</td>
</tr>
<tr>
<td>- Pair of lines Intersecting and perpendicular lines and parallel lines</td>
<td>- Median and Altitude of a triangle, centroid.</td>
<td>- Symmetry in geometrical figures w.r.t. to triangles, quadrilaterals and circles.</td>
<td>- (Prove) The sum of the angles of interior triangle is 180°.</td>
<td>(Prove) The ratio of the areas of two similar triangles is equal to the ratio of the squares on their corresponding sides.</td>
</tr>
<tr>
<td>iii) Practical Geometry</td>
<td>(iii) Congruence:</td>
<td>(iii) Exploring geometrical figures</td>
<td>- (Motivate) If a side of a triangle is equal to the sum of the two interior opposite angles.</td>
<td>(Motivate) If two triangles are congruent if any two sides and the included angle of one triangle are equal to any two sides and the included angle of the other triangle (SAS Congruence).</td>
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<tr>
<td>(Constructions)</td>
<td>- Congruence through superposition ex. Blades, stamps etc.</td>
<td>- Congruent figures</td>
<td>- (Prove) Two triangles are congruent if any two angles and the included side of one triangle are equal to any two angles and the included side of the other triangle (ASA Congruence).</td>
<td>(Prove) Two triangles are congruent if any two sides and the included angle of one triangle are equal to any two sides and the included angle of the other triangle (SAS Congruence).</td>
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<tr>
<td>- Drawing of a line segment (using Straight edged Scale, compasses)</td>
<td>- Extend congruence to simple geometrical shapes ex: Triangle, Circles,</td>
<td>- Similar figures</td>
<td>- (Motivate) Two triangles are congruent if any two sides and the included angle of one triangle are equal to any two sides and the included angle of the other triangle (SAS Congruence).</td>
<td>(Prove) Two triangles are congruent if any two angles and the included side of one triangle are equal to any two angles and the included side of the other triangle (ASA Congruence).</td>
</tr>
<tr>
<td>- Construction of circle</td>
<td>- Criteria of congruence (by verification only)</td>
<td>- Symmetry in geometrical figures w.r.t. to triangles, quadrilaterals and circles.</td>
<td>- (Motivate) If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the triangles are similar (AAA).</td>
<td>(Motivate) If one angle of a triangle is equal to one angle of another triangle and the sides including these angles are proportional, the two triangles are similar.</td>
</tr>
<tr>
<td>- Perpendicular bisector</td>
<td>- Property of congruencies of triangles SAS, SSS, ASA,</td>
<td>- Revision of reflection symmetry, rotational symmetry and it’s applications</td>
<td>- (Motivate) Relation between corresponding angles, alternate angles, interior angles when a transversal intersects two parallel lines.</td>
<td>(Motivate) If a ray stands on a line, then the sum of the two adjacent angles so formed is 180°.</td>
</tr>
<tr>
<td>- Drawing a line</td>
<td>- Point symmetry</td>
<td>- Point symmetry</td>
<td>- Concurrent lines concurrent point.</td>
<td>(Motivate) If a side of a triangle is equal to the sum of the two interior opposite angles.</td>
</tr>
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<td></td>
<td>- Estimation of heights</td>
<td>- Estimation of heights</td>
<td>- (Motivate) Lines, which are parallel to given line, are parallel.</td>
<td>(Motivate) If a side of a triangle is equal to the sum of the two interior opposite angles.</td>
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<td>- (Prove) The sum of the angles of interior triangle is 180°.</td>
<td>- (Motivate) If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the triangles are similar (AAA).</td>
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<td>- (Motivate) If a side of a triangle is equal to the sum of the two interior opposite angles.</td>
<td>- (Motivate) Two triangles are congruent if any two sides and the included angle of one triangle are equal to any two sides and the included angle of the other triangle (SAS Congruence).</td>
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<td>perpendicular to a given line from a point a)on the line b)outside the line.</td>
<td>• Constructing a triangle when the lengths of 2 sides and the measures of the angles between them are known (SAS criterion)</td>
<td>similar figures</td>
<td>• (Motivate) Two triangles are congruent if the three sides of one triangle are equal to three sides of the other triangle (SSS Congruence).</td>
<td>sum of the squares on the other two sides.</td>
</tr>
<tr>
<td>• Construction of angles (using protractor)</td>
<td>• Constructing triangle when the measures of 2 of its angles and length of the side included between them is given (ASA criteria)</td>
<td>• (Motivate) Two right triangles are congruent if the hypotenuse and a side of one triangle are equal to the hypotenuse and a side of the other triangle.</td>
<td>• (Prove) In a triangle, if the square on one side is equal to sum of the squares on the other two sides, the angles opposite to the first side is a right triangle.</td>
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<tr>
<td>• Angle equal to a given angle (using compass)</td>
<td>• Constructing a right angle triangle when the length of one leg hypotenuse are given (RHS criterion).</td>
<td>• (Motivate) The sides opposite to equal sides of a triangle are equal.</td>
<td>• Problems based on above theorems.</td>
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<tr>
<td>• Angle 60°, 120° (Using Compasses)</td>
<td>• Constructing a triangle when the lengths of 2 sides and the measures of the non included angle are known (SSA criterion)</td>
<td>• (Motivate) Triangle inequalities and relation between ‘angle and facing side’; inequalities in a triangle.</td>
<td>• Construction:</td>
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<tr>
<td>• Angle bisector- making angles of 30°, 45°, 90° etc. (using compasses)</td>
<td>(v) Quadrilaterals</td>
<td>(iv) Quadrilaterals (10 periods)</td>
<td>• Division of a line segment using basic proportionality theorem.</td>
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<tr>
<td>vi) Understanding 3D, 2D shapes</td>
<td>• Quadrilateral-definition.</td>
<td>(Prove) In a parallelogram the diagonal divides a parallelogram into two congruent triangles.</td>
<td>A triangle similar to given triangle as per the given scale factor.</td>
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<tr>
<td>• Identification of 3-D shapes: Cubes, Cuboids, cylinder, sphere, cone, prism (triangular), pyramid (triangular and square) Identification and locating in the surroundings</td>
<td>• Quadrilateral, sides, angles, diagonals.</td>
<td>(Motivate) In a parallelogram opposite sides are equal and its converse.</td>
<td>(ii) Tangents and secants to a circle (15 periods)</td>
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<tr>
<td>• Elements of 3-D figures. (Faces, Edges and vertices)</td>
<td>• Interior, exterior of quadrilateral</td>
<td>(Motivate) In a parallelogram opposite angles are equal and its converse.</td>
<td>• Tangents to a circle</td>
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<tr>
<td>• Polygons- introduction, types of polygons, regular polygons</td>
<td>• Convex, concave quadrilateral differences with diagrams</td>
<td>(Motivate) A quadrilateral is a parallelogram if a pair of its opposite sides is parallel and equal.</td>
<td>motivated by chords</td>
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<tr>
<td>v) Symmetry: (reflection)</td>
<td>• Angle sum property (By verification) , problems</td>
<td>(Motivate) In a parallelogram, the diagonals bisect each other and its converse.</td>
<td>drawn from chords</td>
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<tr>
<td>• Observation and identification of 2-D symmetrical objects for reflection symmetry</td>
<td>• Types of quadrilaterals</td>
<td>(Motivate) In a triangle, the line segment joining the mid points of any two sides is parallel to the third side and its converse.</td>
<td>closer and closer to the point.</td>
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<tr>
<td>• Operation of reflection (taking mirror images) of simple 2-D objects</td>
<td>• Properties of parallelogram, trapezium, rhombus, rectangle, square and kite.</td>
<td>• (Prove) The tangent at any point of a circle is perpendicular to the radius through the point of contact.</td>
<td>• (Prove) The lengths of tangents drawn from an external point to a circle are equal.</td>
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<td>• Recognizing reflection symmetry (identifying axes)</td>
<td>(vi) Symmetry</td>
<td>• Recalling reflection, line symmetry, lines of symmetry for regular</td>
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<td>• Demonstrates an understanding of line symmetry by (one line) linear symmetry.</td>
<td>• Recalling reflection, line symmetry, lines of symmetry for regular</td>
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<thead>
<tr>
<th>Class – VI</th>
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</table>
| • Multiple lines of symmetry.  
• Creating symmetrical 2-D shapes. | polygons.  
• Idea of rotational symmetry, observations of rotational symmetry of 2-D objects. (90°, 120°, 180°) | (v)Area (4 periods)  
• Review concept of area, recall area of a rectangle.  
• (Prove) Parallelograms on the same base and between the same parallels have the same area.  
• (Motivate) Triangles on the same base and between the same parallels are equal in area and its converse.  
• If A parallelogram and a triangle are on the same base and between the same parallels. The area of the triangle is equal to half the area of the parallelogram. | (vi)Circles (15 periods)  
• Definitions of circle related concepts of circle; radius, circumference, diameter, chord, arc, subtended angle. The points within, on outside the circle.  
• (Prove) Equal chords of a circle subtend equal angles at the centre and (motivate) its converse.  
• (Motivate) The perpendicular from the centre of a circle to a chord bisects the chord and its converse  
• (Motivate) There is one and only one circle passing through three non-collinear points.  
• (Motivate) Equal chords of a circle (or of congruent circles) are equidistant from the centre (s) and its converse.  
• (Prove) The angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.  
• (Motivate) Angles in the same segment of a circle are equal.  
• (Motivate) If a line segment joining two points subtends equal angle at two other points lying on the same side of | • Segment of a circle made by the secant.  
• Finding the area of the minor/ major segment of a circle.  
• Constructions  
A tangent to a circle through point given on it.  
• Pair of tangents to a circle drawn from an external point. |
| (vii) Understanding 3-D in 2-D shapes:  
• Nets for cube, cuboids, cylinders, cones and tetrahedrons.  
• Drawing 3-D figures in 2-D showing hidden faces through oblique sketches and Isometric sketches. | | | | |
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<td>the line segment, the four points lie on a circle.</td>
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<td>(Motivate) The sum of the either pairs of the opposite angles of a cyclic quadrilateral is $180^\circ$ and its converse. (vii)</td>
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<tr>
<td>(vii)Constructions (10 periods)</td>
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<tr>
<td>- Construction of a triangle given its base, sum / difference of the other two sides and one base angles.</td>
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<td>- Construction of a triangle when its perimeter and base angles are given.</td>
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<tr>
<td>- Construct of segment of a circle containing given chord and angle.</td>
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### Mensuration (15 hrs)

**Perimeter and Area**
- Introduction and general understanding of perimeter using many shapes.
- Shapes of different kinds with the same perimeter.
- Perimeter of a rectangle – and its special case – a square.
- Perimeter of regular polygons.
- Deducing the formula of the perimeter for a rectangle and then a square through pattern and generalization.
- Concept of area, Area of a rectangle and a square. Counter examples to different misconcepts related to perimeter and area.

**Mensuration (15 hrs)**

**Area and Perimeter**
- Revision of perimeter and Area of Rectangle, Square.
- Area of parallelogram.
- Area of a triangle
- Area of rhombus.
- Idea of Circumference of Circle.
- Area of rectangular paths.

**Mensuration (15 hrs)**

- Area of a triangle: formulae (without proof) and its application in finding the area of a quadrilateral.
- Area of a trapezium
- Area of the quadrilateral and other polygons.
- Area of the circle & circular paths and area of sector – Simple word problems.
- Surface area of a cube, cuboid
- Concept of volume, measurement of volume using a basic unit,
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<td>• Word problems on perimeter and area.</td>
<td>• Volume of a cube, cuboid</td>
<td>• Volume and capacity.</td>
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<tr>
<td><strong>Data handling (10 hrs)</strong></td>
<td><strong>Data handling (15 hrs)</strong></td>
<td><strong>Data handling (15 hrs)</strong></td>
<td><strong>Statistics (13 periods)</strong></td>
<td><strong>Data handling (15 hrs)</strong></td>
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<tr>
<td>• What is data</td>
<td>• Collection and organisation of data.</td>
<td>• Revision of Mean, Median and Mode of ungrouped data.</td>
<td>• Frequency distribution for ungrouped and grouped data</td>
<td>(i) Statistics (15 periods)</td>
</tr>
<tr>
<td>• Collection and organisation of data - examples of organizing it in tally marks and a table.</td>
<td>• Mean median and mode of ungrouped data – understanding what they represent.</td>
<td>• Determination of mean by Deviation Method.</td>
<td>• Mean, Median and Mode of ungrouped frequency distributions (weighted scores).</td>
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<tr>
<td>• Pictograph- Need for scaling in pictographs interpretation &amp; construction.</td>
<td>• Reading bar-graphs Constructing double bar graphs.</td>
<td>• Scope and necessity of grouped data.</td>
<td><strong>Probability (12 periods)</strong></td>
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<tr>
<td>• Bar graphs: Interpreting bar graphs, drawing vertical and horizontal bar graphs for given data.</td>
<td>• Simple pie charts with reasonable data numbers</td>
<td>• Preparation of frequency distribution table</td>
<td>• Feel of probability using data through experiments. Notion of chance in events like tossing coins, dice etc.</td>
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<td><strong>Probability (12 periods)</strong></td>
<td><strong>Probability (10 periods)</strong></td>
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<td>• Revision of Mean, Median and Mode of ungrouped data.</td>
<td>• Revision of Mean, Median and Mode of ungrouped data.</td>
<td>• Tabulating and counting occurrences of 1 to 6 in a number of throws.</td>
<td>• Concept and definition of Probability.</td>
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<td>• Reading bar-graphs Constructing double bar graphs.</td>
<td>• Scope and necessity of grouped data.</td>
<td>• Consolidating and generalizing the notion of chance in events like tossing coins / dice.</td>
<td><strong>Simple problems on finding Mean, Median and Mode for grouped / ungrouped data.</strong></td>
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<td>• Simple pie charts with reasonable data numbers</td>
<td>• Preparation of frequency distribution table</td>
<td>• Relating probability to chances in life-events.</td>
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<td><strong>Probability (10 periods)</strong></td>
<td><strong>Probability (10 periods)</strong></td>
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<td>• Revision of Mean, median and mode of ungrouped (frequency distribution) data.</td>
<td>• Frequency distribution for ungrouped and grouped data</td>
<td>• Visual representation of frequency outcomes of repeated throws of the same kind of coins or dice.</td>
<td>• Concept and definition of Probability.</td>
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<td>• Scope and necessity of grouped data.</td>
<td>• Mean, Median and Mode of ungrouped frequency distributions (weighted scores).</td>
<td>• Throwing a large number of identical dice/coins together and aggregating the result of the throws to get large number of individual events.</td>
<td><strong>Simple problems (day to day life situation) on single events simple using set notation.</strong></td>
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<tr>
<td>• Preparation of frequency distribution table</td>
<td><strong>Probability (12 periods)</strong></td>
<td>• Observing and aggregating number of occurrences of 1 to 6 in a number of throws.</td>
<td>• Concept of complimentary events.</td>
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<td><strong>Statistics (15 periods)</strong></td>
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<td>• Concept and definition of Probability.</td>
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<td>• Preparation of frequency distribution table</td>
<td><strong>Probability (12 periods)</strong></td>
<td>• Feel of probability using data through experiments. Notion of chance in events like tossing coins, dice etc.</td>
<td><strong>Simple problems on finding Mean, Median and Mode for grouped / ungrouped data.</strong></td>
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<tr>
<td>• Cumulative frequency distribution table</td>
<td>• Tabulating and counting occurrences of 1 to 6 in a number of throws.</td>
<td>• Comparing the observation with that for a coin. Observing strings of throws, notion of randomness.</td>
<td><strong>Usage and different values and central tendencies through Ogives.</strong></td>
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<tr>
<td>• Frequency graphs (histogram for equal and unequal class intervals, frequency polygon, frequency curve, cumulative frequency curves)</td>
<td>• Comparing the observation with that for a coin. Observing strings of throws, notion of randomness.</td>
<td>• Consolidating and generalizing the notion of chance in events like tossing coins / dice.</td>
<td><strong>(ii) Probability (10 periods)</strong></td>
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<td><strong>Concept of complimentary events.</strong></td>
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<td>over a large number of repeated events. Observing strings of throws notion of randomness</td>
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<thead>
<tr>
<th>Class – IX</th>
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<tbody>
<tr>
<td>Proofs in Mathematics</td>
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<tr>
<td>Mathematical Statement, Verification of statement</td>
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<tr>
<td>Mathematical Reasoning, Deductive reasoning</td>
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<tr>
<td>Theorems, Conjectures and Axioms</td>
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<tr>
<td>What is a Mathematical proof? Steps of Mathematical proofs.</td>
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<tr>
<td>Mathematical Modeling (8 periods)</td>
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<td>Concept of Mathematical modeling</td>
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<td>Discussing the broad stages of modeling – real life, situations (Simple Interest, probability, fare installments, payments etc.)</td>
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