

# Mathematics Syllabus

## Class VII

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### Number System (50 hrs)

#### I. Integers

- Addition, Subtraction, Multiplication and Division of integers (through patterns).
- Properties of integers under addition, multiplication & division through patterns (closure, commutative, associative, inverse, including identities and distributive properties)
- Expressing properties in a general form.
- Construction of counter examples, (e.g. Subtraction is not commutative).
- Multiplication and division by zero Word problems involving integers (on all operations)

#### II. Fractions Decimals and rational numbers:

- Multiplication of fractions
- Fraction as an operator “of”
- Division of fractions
- Reciprocal of a fraction and its use
- Word problems involving mixed fractions ( related to daily life)
- Introduction to rational numbers
- Multiplication and division of decimal fractions
- Conversion of units (length & mass)
- Comparison of rational numbers.

### Algebra (20 hrs)

#### I. Exponents and powers

- Meaning of  $x$  in  $a^x$  where  $Z \in a$
- Writing a number in the exponential form through prime factorization.
- Laws of exponents (through observing patterns to arrive at 5 generalizations)  $N \in$  where  $m, n$ 
  - $A^m a^n = a^{m+n}$
  - $(a^m)^n = a^{mn}$
  - $A^m / a^n = a^{m-n}$  where  $(m,n) \in N$
  - number with exponent zero
- Terms with negative base.
- Expressing large number in standard form (Scientific Notation)

#### II. Algebraic Expressions Introduction

- Generate algebraic expressions (simple) involving one or two variables
- Identifying constants, coefficient, powers
- Like and unlike terms, degree of expressions e.g.,  $x^2y$  etc. (exponent  $\leq 3$ , number of variables  $\leq 2$ )
- Types of algebraic expressions.

- Addition, subtraction of algebraic expressions (coefficients should be integers).
- Finding the value of the expression.

### III. Simple equations

- Simple linear equations in one variable (in contextual problems) with two operations (integers as coefficients)

## Ratio - Applications (20 hrs)

- Ratio and proportion (revision)
- Unitary method continued, consolidation, general expression.
- Direct proportion
- 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)
- Discount.
- Application to simple interest (time period in complete years).

## 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).

### II. Triangles:

- Definition of triangle.
- Types of triangles according to sides and angles
- Properties of triangles
- Sum of the sides, difference of two sides.
- Angle sum property (with notion of proof and verification through paper folding, proofs , using property of parallel lines , difference between proof and verification
- Exterior angle property of triangle
- Median and Altitude of a triangle, centroid.

### III. Congruence:

- Congruence through superposition ex. Blades, stamps etc..
- Extend congruence to simple geometrical shapes ex: Triangle , Circles,
- Criteria of congruence (by verification only)
- Property of congruencies of triangles SAS, SSS, ASA, RHS Properties with figures

#### **IV. Construction of triangles (all models)**

- Constructing a Triangles when the lengths of its 3 sides are known (SSS Criterion)
- Constructing a triangle when the lengths of 2 sides and the measures of the angles between them are known (SAS criterion)
- Constructing triangle when the measures of 2 of its angles and length of the side included between them is given (ASA criterion)
- Constructing a right angle triangle when the length of one leg hypotenuse are given (RHS criterion).
- Constructing a triangle when the lengths of 2 sides and the measures of the non included angle are known (SSA criterion)

#### **V. Quadrilaterals**

- Quadrilateral-definition.
- Quadrilateral, sides, angles, diagonals.
- Interior, exterior of quadrilateral
- Convex, concave quadrilateral differences with diagrams
- Angle sum property (By verification) , problems
- Types of quadrilaterals
- Properties of parallelogram, trapezium, rhombus, rectangle, square and kite.

#### **VI. Symmetry**

- Recalling reflection, line symmetry, lines of symmetry for regular polygons.
- Idea of rotational symmetry, observations of rotational symmetry of 2-D objects.  $^{\circ}$ ,  $180^{\circ}$ ,  $120^{\circ}$ ,  $90$
- Operation of rotation of  $^{\circ}$  and  $180^{\circ}$  through 90 simple figures.
- Order of rotational symmetry
- Examples of figures with both rotation and reflection symmetry (both operations)
- Examples of figures that have reflection and rotation symmetry and vice-versa

#### **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.

### **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.

### **Data handling (15 hrs)**

- Collection and organisation of data.
- Mean median and mode of ungrouped data – understanding what they represent.
- Reading bar-graphs Constructing double bar graphs.
- Simple pie charts with reasonable data numbers