Pre-Algebra
Gyaanbhoomi Academic Curriculum

Course Description

This course is designed to build a strong foundation for success in Algebra 1 and all subsequent mathematics courses. Students will bridge the gap between the concrete concepts of arithmetic and the abstract concepts of algebra, focusing on problem-solving, logical reasoning, and the symbolic language of mathematics.

Topics Covered

Unit 1: Foundations of Algebra

- Operations with Integers and Rational Numbers ($\mathbb{Z}, \mathbb{Q}$)
- Order of Operations (PEMDAS)
- Variables, Expressions, and Properties of Real Numbers
- The Distributive Property and Simplifying Expressions

Unit 2: Solving Linear Equations & Inequalities

- One-Step and Two-Step Equations
- Solving Multi-Step Equations with Variables on Both Sides
- Writing, Solving, and Graphing One-Variable Inequalities
- Introduction to Compound Inequalities

Unit 3: Ratios, Proportions, and Percentages

- Ratios, Rates, and Unit Conversion
- Solving Proportions and Scale Models
- Applications of Percentages: Discount, Tax, Tip, and Simple Interest
- Financial Literacy: Budgeting and Savings

Unit 4: Introduction to Functions

- The Coordinate Plane and Plotting Points
- Relations vs. Functions and the Vertical Line Test
- Graphing Linear Functions using Tables of Values
- Introduction to Function Notation $f(x)$

Unit 5: Linear Equations

- Rate of Change and Slope ($m = \frac{\Delta y}{\Delta x}$)
- Slope-Intercept Form ($y = mx + b$)
- Point-Slope and Standard Forms
- Parallel and Perpendicular Lines

Unit 6: Powers, Exponents, and Radicals

- Integer Exponents and Scientific Notation
- Properties of Exponents (Product, Quotient, Power Rules)
- Square Roots, Cube Roots, and Irrational Numbers
- Simplifying Radical Expressions

Unit 7: Geometric Concepts

- Angle Relationships (Complementary, Supplementary, Vertical)
- The Pythagorean Theorem and Its Applications
- Perimeter, Area, and Circumference of 2D Figures
- Volume and Surface Area of 3D Solids (Prisms, Cylinders, Cones)

Unit 8: Data Analysis, Statistics, and Probability

- Measures of Central Tendency: Mean, Median, Mode
- Box-and-Whisker Plots and Measures of Dispersion (Range, IQR)
- Theoretical vs. Experimental Probability
- Introduction to Set Theory and Venn Diagrams