Algebra 2

Gyaanbhoomi Academic Curriculum

Course Description

Algebra 2 extends the topics of Algebra 1 and provides a deeper understanding of the function families. Students will explore complex numbers, advanced polynomial and rational functions, logarithms, sequences and series, and an introduction to trigonometry. Emphasis is placed on abstract thinking, modeling, and problem-solving.

Topics Covered

Unit 1: Functions and Their Properties

- Review of Functions: Domain, Range, and Inverses
- Parent Functions and Transformations $(af(b(x-h))+k)$
- Piecewise Functions and Absolute Value Functions
- Operations with Functions and Composition of Functions

Unit 2: Quadratic Functions and Complex Numbers

- Solving Quadratics using All Methods
- Graphing in Vertex and Standard Form
- The Imaginary Unit i and the Complex Number System $(\mathbb{C})$
- Operations with Complex Numbers

Unit 3: Polynomial Functions

- Graphing Higher-Degree Polynomials and End Behavior
- Polynomial Division: Long Division and Synthetic Division
- Finding Roots: Rational Root Theorem and Fundamental Theorem of Algebra
- Writing Polynomial Functions from given Zeros

Unit 4: Rational and Radical Functions

- Simplifying, Adding, Subtracting, Multiplying, and Dividing Rational Expressions
- Graphing Rational Functions: Asymptotes and Holes
- Solving Rational and Radical Equations (Extraneous Solutions)

- Rational Exponents and Nth Roots

Unit 5: Exponential and Logarithmic Functions

- Graphing Exponential and Logarithmic Functions
- Properties of Logarithms (Product, Quotient, Power)
- The Natural Base e and Natural Logarithms ($\ln x$)
- Solving Exponential and Logarithmic Equations

Unit 6: Sequences and Series

- Arithmetic and Geometric Sequences
- Series and Summation Notation ($\sum$)
- Formulas for Arithmetic and Geometric Series (Finite and Infinite)

Unit 7: Introduction to Trigonometry

- Right Triangle Trigonometry (SOH-CAH-TOA)
- Angles, Radian Measure, and the Unit Circle
- Graphing Sine and Cosine Functions (Amplitude, Period, Phase Shift)
- Introduction to Trigonometric Identities

Unit 8: Probability and Statistics

- Permutations and Combinations
- Theoretical and Experimental Probability
- Introduction to Probability Distributions
- Measures of Dispersion: Variance and Standard Deviation

Unit 9: Conic Sections

- Circles, Parabolas, Ellipses, and Hyperbolas
- Analyzing and Graphing Equations of Conic Sections
- Solving Systems of Quadratic Equations