All Things Algebra® PRE-CALCULUS CURRICULUM

Unit 1: Fundamental Skills

- Laws of Exponents
- Polynomial Operations
- Factoring Polynomials
- Rational Expressions
- Complex Fractions
- Radicals
- Rational Exponents
- Complex Numbers
- Linear & Absolute Value Equations
- Quadratic Equations
- Rational Equations
- Inequalities: Set Builder and Interval Notation
- Linear & Absolute Value Inequalities

Unit 2: Functions & Their Graphs

- Functions
- Evaluating Functions
- Domain, Range
- Critical Points, Intercepts, Zeros
- Tests for Symmetry; Even and Odd Functions
- Continuity; Types of Discontinuity
- End Behavior
- Average Rate of Change
- Parent Functions
- Transformations
- Graphing Functions
- Function Operations
- Composition of Functions
- Piecewise Functions
- Inverse Relations & Functions

Unit 3: Polynomial & Rational Functions

- Graphing Power Functions & Identifying Characteristics (includes integral and rational exponents)
- Graphing Polynomial Function & Identifying Characteristics
- Zeros, Linear Factors, Multiplicity
- Dividing Polynomials (Long and Synthetic)
- The Remainder and Factor Theorems
- Rational Zero Theorem
- Descartes' Rule
- Fundamental Theorem of Algebra
- Using Zeros to Write Polynomial Functions
- Graphing Rational Functions
- Nonlinear Inequalities

Unit 4: Exponential & Logarithmic Functions

- Graphing Exponential Functions
- The Natural Exponential Function
- Logarithms (Evaluating & Change of Base)
- Graphing Logarithmic Functions
- Natural Logarithms
- Properties of Logarithms
- Expanding & Condensing Logarithms
- Exponential Equations
- Logarithmic Equations
- Exponential Growth and Decay Applications
- Logistic Growth Function
- Compound Interest
- Regression (Exponential, Power, Logistic, Logarithmic)

Unit 5: Trigonometric Functions

- Standard Form of an Angle
- Degrees & Radians; Coterminal Angles
- Degree- Minute-Second Form
- Arc Lengths & Area of Sectors
- Circular Motion (Linear and Angular Speed)
- Trigonometric Functions: sin, cos, tan
- Reciprocal Functions: csc, sec, cot
- Right Triangle Trigonometry
- Reference Angles & The Unit Circle
- Law of Sines and Law of Cosines
- Graphs of Sine and Cosine Functions
- Graphs of Tangent Functions
- Graphs of Reciprocal Functions
- Vertical and Phase Shifts of Trigonometric Functions
- Graphs of Inverse Trigonometric Functions
- Compositions of Trigonometric Functions

Unit 6: Trigonometric Identities & Equations

- Reciprocal and Quotient Identities
- Pythagorean Theorem Identities
- Cofunction Identities
- Odd-Even Identities
- Simplify Trigonometric Expressions using Identities
- Proving Trigonometric Identities
- Sum and Difference Identities
- Double-Angle
- Half-Angle Identities
- Product-Sum Identities
- Solving Trigonometric Equations

Unit 7: Polar Coordinates & Parametric Equations

- Graphing Polar Coordinates
- Converting between Polar and Rectangular Coordinates
- Graphing Polar Equations
- Symmetry of Polar Graphs
- Identifying Classic Polar Curves
- Converting Equations Between Rectangular and Polar Form
- Graphing Complex Numbers
- Polar Form of Complex Numbers
- Multiplying and Dividing Complex Numbers
- DeMoivre's Theorem; Finding n^{th} Roots
- Graphing Parametric Equations
- Writing Parametric Equations in Rectangular Form
- Modeling with Parametric Equations

Unit 8: Vectors

- Representing Vectors
- Magnitude and Direction of a Vector
- Component Form of a Vector
- Operations with Vectors
- Standard Unit Vector
- Linear Combinations
- Trigonometric Forms of Vectors
- Vector Applications
- Dot Products
- Orthogonal Vectors
- Vector Projections
- Force and Work Applications
- Vectors in Three-Dimensional Space

Unit 9: Conic Sections	**Unit 10:** Systems of Equations & Matrices
• Graphing Circles • Writing Equations of Circles • Graphing Ellipses • Writing Equations of Ellipses • Graphing Hyperbolas • Writing Equations of Hyperbolas • Graphing Parabolas • Writing Equations of Parabolas • Applications of Conic Sections • General Conic Form • Classifying Conic Sections • Polar Forms of Conic Equations	• Linear Systems of Two-Variables Review: (graphing, substitution, and elimination methods) • Nonlinear Systems • Three-Variable Systems • Matrix Addition and Subtraction • Scalar Multiplication • Matrix Multiplication • Determinant of a Matrix • Inverse Matrices • Augmented Systems • Triangular Form for Linear Systems • Gaussian Elimination (row-echelon form) • Gauss-Jordan Elimination (reduced row-echelon form) • Solving Systems with Cramer's Rule • Solving Systems with Inverse Matrices • Partial Fractions
Unit 11: Sequences, Series, & Induction	**Unit 12:** Introduction to Calculus
• Sequences (Recursive & Explicit) • Series & Partial Sums • Summation Notation • Arithmetic Sequences • Arithmetic Series • Geometric Sequences • Geometric Series • Infinite Geometric Series • Mathematical Induction • The Binomial Theorem/Pascal's Triangle	• Finding Limits Graphically • One-Sided vs. Two-Sided Limits • Finding Limit Algebraically • Properties of Limits • Direct Substitution • Limits at Infinity • Limits of Sequences • Tangent Lines • Derivatives (using the definition) • Derivative Rules • Average Rate of Change/Velocity • Instantaneous Rate of Change/Velocity