Liberal Arts Mathematics addresses the need for a course that meets graduation requirements and focuses on reinforcing, deepening, and extending a student's mathematical understanding. Liberal Arts Mathematics starts with a review of algebraic concepts before moving on to a variety of key algebraic, geometric, statistical and probability concepts. Throughout the course, students hone their computational skills and extend their knowledge through problem solving and real-world applications.

Course topics include analysis of quadratic, polynomial, exponential and logarithmic functions, arithmetic and geometric sequences, trigonometry and trigonometric functions, coordinate geometry and proofs, statistical analysis, experimental design and applications of probability.

Within each Liberal Arts Mathematics lesson, students are supplied with a scaffolded note-taking guide, called a Study Sheet, and are given ample opportunity to practice computations in low-stakes Checkup activities before moving on to formal assessment. Additionally, students will have the opportunity to formulate and justify conclusions as they extend and apply concepts through printable exercises and "in-your-own-words" interactive activities.

This course is built to state standards.

Length: Two Semesters

Unit 1: Foundations of Algebra

- Rational and Irrational Numbers
- What Is a Function?
- Graphing Functions
- Exponential and Linear Growth
- Slope-Intercept Equation of a Line
- Point-Slope Equation of a Line
- Reviewing Numbers and Functions Wrap-Up

Unit 2: Quadratic Functions

- Factoring x² + bx + c
- Factoring ax² + bx + c
- Special Cases
- Solving Quadratic Equations
- Completing the Square
- The Quadratic Formula
- Graphs of Quadratic Functions
- Imaginary Numbers
- Nonlinear Systems of Equations
- Quadratic Functions Wrap-Up

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Unit 3: Polynomial Functions

- Polynomial Basics
- Polynomial Functions
- Synthetic Division
- Factoring Polynomials Completely
- Solving Polynomial Equations
- Graphing Polynomial Functions
- Polynomial Identities
- Transformations of Polynomial Functions
- Polynomial Functions Wrap-Up

Unit 4: Exponential and Logarithmic Functions

- Exponents
- Exponential Functions
- Examples and Applications of Exponential Functions
- Graphs of Exponential Functions
- Logarithmic Functions
- Graphs of Logarithmic Functions
- Properties of Exponents and Logarithms
- Solving Exponential Equations
- Comparing and Analyzing Function Types
- Exponential and Logarithmic Functions Wrap-Up

Unit 5: Semester Exam

Unit 6: Sequences and Functions

- Arithmetic Sequences
- Geometric Sequences
- Understanding Number Sequences
- Sequences and Functions Wrap-Up

Unit 7: Trigonometry

- Right Triangles
- Angles and Radians
- Trigonometric Ratios and the Unit Circle
- Graphs of Sine and Cosine
- Graphs of Other Functions
- Simple Transformations of Sinusoids
- Trigonometry Wrap-Up

Unit 8: Coordinate Geometry

- Equations of Parallel and Perpendicular Lines and Proofs
- Coordinate Geometry with Polygons
- Geometry of Conic Sections
- Circles with Coordinates and Proofs

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- Parabolas
- Conic Sections Wrap-Up

Unit 9: Statistical Analysis

- Review of Graphical Analysis of Data
- Data Gathering and Inferential Statistics
- Experimental Design
- Evaluating Published Reports
- Applications of Statistical Techniques
- Statistical Analysis Wrap-Up

Unit 10: Applications of Probability

- What Is Probability?
- Counting Principles
- Basic Rules of Probability
- Conditional Probability
- Independence
- Applications of Probability Wrap-Up

Unit 11: Semester Exam

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