Mathematics III incorporates advanced functions, trigonometry, and probability and statistics as students synthesize their prior knowledge and solve increasingly challenging problems. Students learn through discovery and application, developing the skills they need to break down complex challenges and demonstrate their knowledge in new situations.

Course topics include formulating inferences and conclusions from data; polynomial, rational, and radical relationships; trigonometry of general triangles and trigonometric functions; and mathematical modeling.

This course supports all students as they simultaneously develop computational fluency, deepen conceptual understanding, and apply mathematical practice skills. Students begin each lesson by discovering new concepts through guided instruction, and then confirm their understanding in an interactive, feedback-rich environment. Modeling activities equip students with tools for analyzing a variety of real-world scenarios and mathematical ideas. Journaling activities allow students to reason abstractly and quantitatively, construct arguments, critique reasoning, and communicate precisely. Performance tasks prepare students to synthesize their knowledge in novel, real-world scenarios and require that they make sense of multifaceted problems and persevere in solving them. Throughout the course students are evaluated through a diversity of assessments specifically designed to prepare them for the content, form, and depth of state assessments.

This course is built to state standards.

Length: Two Semesters

Unit 1: Statistical Analysis

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

Unit 2: Functions

- What Is a Function?
- Graphing Functions
- Linear Functions
- Linear Equations and Inequalities
- Solving Literal Equations and Formulas

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- Linear Systems
- Quadratic Functions
- Nonlinear Systems of Equations
- Nonlinear Systems of Inequalities
- Functions Wrap-Up

Unit 3: Transforming Functions

- Inverses
- Graphs of Inverses
- Parent Functions
- Shifting Functions
- Stretching Functions Vertically
- Transformation of Parent Functions
- Arithmetic of Functions
- Performance Task: Transforming Functions
- Transforming Functions Wrap-Up

Unit 4: Polynomial Functions

- Polynomial Basics
- Polynomial Functions
- Working with Complex Numbers
- Synthetic Division
- Factoring Polynomials Completely
- Solving Polynomial Equations
- Graphing Polynomial Functions
- Polynomial Identities
- Binomial Theorem
- Transformations of Polynomial Functions
- Polynomial Functions Wrap-Up

Unit 5: Rational Expressions and Functions

- Proportions
- Rational Expressions
- Simplifying Rational Expressions
- Multiplying and Dividing Rational Expressions
- Adding and Subtracting Rational Expressions
- Inverse Variation
- Solving Rational Functions
- Vertical Asymptotes
- Graphing Rational Functions
- Rational Expressions and Functions Wrap-Up

Unit 6: Semester 1 Exam

Unit 7: Radical Expressions and Functions

- Basics of Radicals

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- Multiplying and Dividing Radicals
- Adding and Subtracting Radicals
- Rationalizing Denominators
- Solving Radical Functions
- Applications of Radical Equations
- Rational Exponents
- Review of Complex Numbers
- Performance Task: The Skid Distance Problem
- Radical Expressions and Functions Wrap-Up

Unit 8: Exponential and Logarithmic Functions

- Geometric Sequences
- 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
- Solving Logarithmic Equations
- Applications of Logarithms
- Comparing and Analyzing Function Types
- Exponential and Logarithmic Functions Wrap-Up

Unit 9: Right Triangles and Trigonometry

- The Pythagorean Theorem
- Proving Congruence of Right Triangles
- Similar Right Triangles
- Special Right Triangles
- Trigonometric Ratios
- Area of a Triangle with Coordinate Geometry
- Law of Cosines and Proofs
- Law of Sines and Proofs
- Right Triangles and Trigonometry Wrap-Up

Unit 10: Trigonometry

- Right Triangle Trigonometry
- Angles and Radians
- Trigonometric Ratios and the Unit Circle
- Graphs of Sine and Cosine
- Graphs of Other Functions
- Simple Transformations of Sinusoids
- General Transformations of Periodic Graphs
- Identities and Proof
- Trigonometric Identities

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- Trigonometry Wrap-Up

Unit 11: Three-Dimensional Solids

- Three Dimensions
- What Is a Polyhedron?
- Cylinders and Cones
- Platonic Solids
- Surface Area
- Volume
- Spheres
- Similar Solids
- Three-Dimensional Solids Wrap-Up

Unit 12: Semester 2 Exam

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