Pre-Calculus is a course that combines reviews of algebra, geometry, and functions into a preparatory course for calculus. The course focuses on the mastery of critical skills and exposure to new skills necessary for success in subsequent math courses. The first semester includes linear, quadratic, exponential, logarithmic, radical, polynomial, and rational functions; systems of equations; and conic sections. The second semester covers trigonometric ratios and functions; inverse trigonometric functions; applications of trigonometry, including vectors and laws of cosine and sine; polar functions and notation; and arithmetic of complex numbers.

Within each Pre-Calculus lesson, students are supplied with a post-study Checkup activity that provides them the opportunity to hone their computational skills by working through a low-stakes problem set before moving on to formal assessment. Unit-level Pre-Calculus assessments include a computer-scored test and a scaffolded, teacher-scored test.

The course is built to state standards and the National Council of Teachers of Mathematics (NCTM) standards.

Length: Two Semesters

Unit 1: Functions

- What Is a Function?
- Graphing Functions
- Linear Functions
- Arithmetic Sequences and Series
- Linear Equations and Inequalities
- Linear Systems
- Arithmetic of Functions
- Functions Wrap-Up

Unit 2: Quadratic Functions

- Forms of Quadratic Functions
- Graphing Quadratic Functions
- Transformations
- Solving Quadratic Equations
- Applications of Quadratic Functions
- Quadratic Functions Wrap-Up

Unit 3: Polynomial and Rational Functions

- Polynomial Expressions
- Dividing Polynomials
- Solving Polynomial Equations
- Graphing Polynomial Functions
- Rational Functions

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- Polynomial and Rational Functions Wrap-Up

Unit 4: Exponential and Logarithmic Functions

- Exponents and Radicals
- Exponential Functions
- Geometric Sequences
- Introduction to Logarithms
- Graphs of Logarithmic Functions
- Applications of Logarithms
- Exponential and Logarithmic Functions Wrap-Up

Unit 5: Conic Sections

- Introduction to Conic Sections
- Ellipses
- Hyperbolas
- Parabolas
- Systems of Conic Sections
- Conic Sections Wrap-Up

Unit 6: Semester 1 Review and Exam

Unit 7: Introduction to Trigonometry

- Right Triangles
- Angles and Radians
- Trigonometric Ratios and the Unit Circle
- Introduction to Trigonometry Wrap-Up

Unit 8: Trigonometric Functions

- Graphs of Sine and Cosine
- Graphs of Other Functions
- Simple Transformations of Sinusoids
- General Transformations of Periodic Graphs
- Trigonometric Functions Wrap-Up

Unit 9: Working with Trigonometric Functions

- Inverse Trigonometric Functions
- Solving Trigonometric Equations
- Modeling Simple Harmonic Motion
- Working with Trigonometric Functions Wrap-Up

Unit 10: Trigonometric Identities

- Identities and Proof
- Trigonometric Identities
- Applications of Identities
- Trigonometric Identities Wrap-Up

Unit 11: Applications of Trigonometry

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- Law of Cosines
- Law of Sines
- Vectors
- Applications of Trigonometry Wrap-Up

Unit 12: Complex Numbers

- Polar Coordinates
- Graphs of Polar Functions
- Polar Form of Complex Numbers
- Arithmetic of Complex Numbers
- Powers and Roots of Complex Numbers
- Complex Numbers Wrap-Up

Unit 13: Semester 2 Review and Exam

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