

PRECALCULUS — 8-MONTH SYLLABUS

2 Classes per Week • 8 Months • Approximately 64 Classes

Course Length	8 Months
Class Frequency	2 classes per week
Approx. Total	64 classes (8 months $\times$ 8 weeks)
Course Level	High School Precalculus
Focus	Functions • Algebra • Trigonometry • Analytic Geometry • Vectors • Data & Modeling • Calculus Readiness

MONTH 1 • Functions & Algebraic Foundations

- Week 1 — Class 1: Function notation, domain and range. | Class 2: Evaluating and interpreting functions.
- Week 2 — Class 1: Transformations of functions. | Class 2: Composition of functions and inverse functions.
- Week 3 — Class 1: Polynomial functions and graphs. | Class 2: Rational expressions, equations and restrictions.
- Week 4 — Class 1: Algebraic modeling and function analysis. | Class 2: Review, mixed practice and Unit 1 assessment.

MONTH 2 • Polynomial, Rational & Radical Functions

- Week 5 — Class 1: Polynomial operations and the Factor/Remainder Theorems. | Class 2: Zeros, multiplicity and polynomial graphs.
- Week 6 — Class 1: Complex numbers and polynomial equations. | Class 2: Fundamental Theorem of Algebra.
- Week 7 — Class 1: Rational functions, asymptotes and discontinuities. | Class 2: Rational equations and inequalities.
- Week 8 — Class 1: Radical functions and equations. | Class 2: Mixed function problems and assessment.

MONTH 3 • Exponential & Logarithmic Functions

- Week 9 — Class 1: Exponential functions and transformations. | Class 2: Exponential growth and decay models.
- Week 10 — Class 1: Logarithms and properties. | Class 2: Solving exponential and logarithmic equations.
- Week 11 — Class 1: Applications of logarithmic models. | Class 2: Natural logarithms and continuous growth.
- Week 12 — Class 1: Exponential/logarithmic inequalities and graphs. | Class 2: Modeling, review and assessment.

MONTH 4 • Trigonometric Functions & Unit Circle

- Week 13 — Class 1: Angle measure in degrees and radians. | Class 2: Unit circle and exact trigonometric values.
- Week 14 — Class 1: Sine, cosine and tangent graphs. | Class 2: Amplitude, period, phase shift and transformations.
- Week 15 — Class 1: Reciprocal trigonometric functions. | Class 2: Inverse trigonometric functions.
- Week 16 — Class 1: Trigonometric modeling and applications. | Class 2: Unit circle review and assessment.

MONTH 5 • Trigonometric Identities & Equations

- Week 17 — Class 1: Fundamental identities. | Class 2: Pythagorean and reciprocal identities.

- Week 18 — Class 1: Sum and difference identities. | Class 2: Double-angle and half-angle identities.
- Week 19 — Class 1: Solving basic trigonometric equations. | Class 2: Solving equations using identities and factoring.
- Week 20 — Class 1: Trigonometric proofs and applications. | Class 2: Mixed trig practice and assessment.

MONTH 6 • Analytic Geometry, Vectors & Parametric Equations

- Week 21 — Class 1: Conic sections overview. | Class 2: Circles and standard/general equations.
- Week 22 — Class 1: Parabolas and geometric properties. | Class 2: Ellipses and hyperbolas.
- Week 23 — Class 1: Coordinate transformations and conic applications. | Class 2: Parametric equations and motion.
- Week 24 — Class 1: Vectors in two and three dimensions. | Class 2: Vector operations, magnitude and applications; assessment.

MONTH 7 • Sequences, Probability & Data Modeling

- Week 25 — Class 1: Arithmetic and geometric sequences. | Class 2: Recursive and explicit formulas.
- Week 26 — Class 1: Series and summation notation. | Class 2: Geometric series and applications.
- Week 27 — Class 1: Counting principles and probability. | Class 2: Conditional probability and expected value.
- Week 28 — Class 1: Data analysis, regression and modeling. | Class 2: Mixed applications and unit assessment.

MONTH 8 • Calculus Readiness & Comprehensive Review

- Week 29 — Class 1: Introduction to limits and graphical behavior. | Class 2: Average vs. instantaneous rate of change.
- Week 30 — Class 1: Difference quotients and derivative intuition. | Class 2: Basic derivative concepts and tangent lines.
- Week 31 — Class 1: Comprehensive algebra and function review. | Class 2: Comprehensive trigonometry and analytic geometry review.
- Week 32 — Class 1: Full-length cumulative practice and error analysis. | Class 2: Final review, problem-solving strategies and calculus readiness assessment.

Assessment & Course Preparation

Component	Recommended Approach
Every Class	5–10 min review • concept instruction • worked examples • guided practice • independent problem solving
Weekly	Practice set, application problem or short mastery check
Monthly	Unit assessment with conceptual, algebraic and application problems
Mid-Course	Cumulative assessment after Month 4 with timed practice
Final Month	Full-length cumulative practice, error analysis and calculus-readiness review

Learning Outcomes

- Analyze functions using notation, graphs, tables, transformations, composition and inverses.
- Work confidently with polynomial, rational, radical, exponential and logarithmic functions.
- Use the unit circle and trigonometric functions to solve equations and model real situations.
- Apply trigonometric identities and prove relationships algebraically.
- Analyze circles, parabolas, ellipses and hyperbolas using analytic geometry.
- Use vectors and parametric equations to represent and solve geometric and motion problems.
- Apply sequences, series, counting, probability and data modeling.
- Interpret rates of change and introductory limits to prepare for calculus.
- Communicate mathematical reasoning clearly and efficiently.
- Develop strong problem-solving skills for advanced mathematics, AP Calculus and college-level study.

Pacing Note

This plan is designed for two classes per week over eight months. The pacing can be adjusted for holidays, school calendars and student needs, with additional practice added before major assessments.