Ridgefield Public Schools

AP Calculus BC
Curriculum at a Glance

Overview

Advanced Placement Calculus BC is a college level course designed for highly motivated students who have demonstrated consistently advanced mathematical abilities, and who are willing to devote a considerable amount of time for independent work outside of class. AP Calculus BC includes all topics from AP Calculus AB with the addition of parametric and polar equations, advanced integration techniques, improper integrals, arc length, sequences and series, tests of convergence, and Taylor and Maclaurin polynomials. Students must be prepared for the rigor and pace of the course. All students are expected to take the AP exam in May. A graphing calculator is required for this course.

Units of Study	
Unit 1:	Limits and Continuity ● Limit Notation ● Determining Limits ● Squeeze Theorem ● Types of Discontinuities and Defining Continuity at a Point and over an Interval ● Intermediate Value Theorem
Unit 2:	Differentiation: Definition and Fundamental Properties ● Average and Instantaneous Rates of Change at a Point ● Differentiability ● Derivative Rules: Power, Constant, Sum, Difference, Constant Multiple, Sine, Cosine, Tangent, Exponential, Logarithm, Power, Quotient,

	Cotangent, Secant, and Cosecant
Unit 3:	Differentiation: Composite, Implicit, and Inverse Functions • Chain Rule • Implicit Differentiation • Differentiating Inverse Functions and Inverse Trigonometric Functions • Higher Order Derivatives
Unit 4:	Contextual Applications of Differentiation • Straight Line Motion: Position, Velocity, and Acceleration • Rates of Changes in Contexts • Related Rates • Local Linearity and Linearization • L'Hospital's Rule and Limits of Indeterminate Forms
Unit 5:	Analytical Applications of Differentiation • Mean Value Theorem • Extreme Value Theorem • Extrema and Increasing/Decreasing Intervals • First Derivative Test • Second Derivative Test • Sketching Functions and Their Derivatives • Optimization
Unit 6:	Integration and Accumulation of Change • Approximating Areas with Riemann Sums • The Fundamental Theorem of Calculus • Properties of Definite Integrals • Finding Antiderivatives and Indefinite Integrals • Techniques for Integration: Substitution, Long Division, and Completing the Square • Integration Using Integration by Parts • Using Linear Partial Fractions • Evaluating Improper Integrals
Unit 7:	Differential Equations • Slope Fields

	• Separation of Variables • Exponential Models with Differential Equations • Euler's Method • Logistics Models with Differential Equations
Unit 8:	Applications of Integration • Finding Average Value on an Interval • Position, Velocity, and Acceleration of Functions Using Integrals • Using Accumulation Functions and Definite Integrals in Applied Contexts • Area Between Curves • Volumes with Cross Sections, Disc Method, and Washer Methods • Arc Length of Smooth, Planar Curves
Unit 9:	Parametric Equations, Polar Coordinates, and Vector-Valued Functions • Differentiating and Finding Second Derivative of Parametric Equations • Finding Arc Lengths of Curves Given by Parametric Equations • Differentiating and Integrating Vector-Valued Functions • Motion Problems Using Parametric and Vector-Valued Functions • Polar Coordinates and Differentiating in Polar Form • Area of a Polar Region
Unit 10:	Infinite Sequences and Series • Convergent and Divergent Infinite Series • Geometric, Harmonic, and p-Series • Tests for Convergence • Absolute or Conditional Convergence • Alternating Series Error Bound • Taylor Polynomial Approximations of Functions • Lagrange Error Bound • Radius and Intervals of Convergence • Power, Maclaurin, and Taylor Series