



AP Calculus(AB) Curriculum

In AP Calculus AB, students explore the key concepts, methods, and applications of single-variable calculus including functions, graphs, limits, derivatives, integrals, and the Fundamental Theorem of Calculus. The students will become familiar with concepts, results, and problems expressed in multiple ways including graphically, numerically, analytically, and verbally. They will use technology to help solve problems, experiment, interpret results, and support their conclusions. Completion of this course will prepare students to take the Advanced Placement test in May. Students are required to have a TI-83 or TI-84 calculator.

Course Goals

Students should be able to:

- work with functions represented in a variety of ways: graphical, numerical, analytical, or verbal. They should understand the connections among these representations.
- understand the meaning of the derivative in terms of a rate of change and local linear approximation and they should be able to use derivatives to solve a variety of problems.
- understand the meaning of the definite integral both as a limit of Riemann sums and as the net accumulation of change and should be able to use integrals to solve a variety of problems.
- understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus.
- communicate mathematics both orally and in well-written sentences and should be able to explain solutions to problems.
- model a written description of a physical situation with a function, a differential equation, or an integral.
- use technology to help solve problems, experiment, interpret results, and verify conclusions.
- determine the reasonableness of solutions, including sign, size, relative accuracy, and units of measurement.
- develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishment.

Course Topics

1. Functions, Graphs, and Limits

- Analysis of Graphs
- Limits of Functions (incl. one-sided limits)
- Asymptotic and Unbounded Behavior
- Continuity as a Property of Functions

2. Derivatives

- Concept of the Derivative
- Derivative at a Point
- Derivative as a Function
- Second Derivatives
- Applications of Derivatives
- Computation of Derivatives

3. Integrals

- Interpretations and Properties of Definite Integrals
- Applications of Integrals
- Fundamental Theorem of Calculus
- Techniques of Antidifferentiation
- Applications of Antidifferentiation
- Numerical Approximations to Definite Integrals