Marietta City Schools

2024–2025 District Unit Planner

AP Calculus AB

Unit title	**Unit 6: Integration & Accumulation of Change**	**Unit duration (hours)**	**15-20 hours**

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): ***What will students learn?***

GA DoE Standards

Standards

6.1 Exploring accumulations of change
6.2 Approximating areas with Reimann sums
6.3 Riemann sums, summation notation, and definite integral notation
6.4 The fundamental theorem of calculus and accumulation functions
6.5 Interpreting the behavior of accumulation functions involving area
6.6 Applying properties of definite integrals
6.7 The fundamental theorem of calculus and definite integrals
6.8 Finding antiderivatives and indefinite integrals: basic rules and notation
6.9 Integrating using substitution
6.10 Integrating functions using long division and completing the square
6.14 Selecting techniques for antidifferentiation

Concepts/Skills to support mastery of standards

- Exploring accumulations of change
- Approximating areas with Reimann sums
- Riemann sums, summation notation, and definite integral notation
- The fundamental theorem of calculus and accumulation functions
  - Interpreting the behavior of accumulation functions involving area
  - Applying properties of definite integrals
  - The fundamental theorem of calculus and definite integrals
  - Finding antiderivatives and indefinite integrals: basic rules and notation

- Integrating using substitution
- Integrating functions using long division and completing the square
- Selecting techniques for antidifferentiation

Vocabulary

Riemann Sums, Trapezoidal Sums, Trapezoidal Rule, Definite integral , indefinite integral, summation notation, Fundamental Theorem of Calculus, accumulation, antidifferentiation, integration, u-substitution,

Notation

$$\sum_{i=1}^{n} a_i$$

$$\int_{a}^{b} f(x)\,dx$$

The definite integral of a continuous function f over the interval $[a, b]$, denoted by $\int_a^b f(x)dx$, is the limit of Riemann sums as the widths of the subintervals approach 0. That is, $\int_a^b f(x)dx = \lim_{\max \Delta x_i \to 0} \sum_{i=1}^{n} f(x_i^*)\Delta x_i$, where n is the number of subintervals, Δx_i is the width of the ith subinterval, and x_i^* is a value in the ith subinterval.

FUN-5.A.2

If f is a continuous function on an interval containing a, then $\frac{d}{dx}\left(\int_a^x f(t)dt\right) = f(x)$, where x is in the interval.

FUN-6.B.2

If a function f is continuous on an interval containing a, the function defined by $F(x) = \int_a^x f(t)dt$ is an antiderivative of f for x in the interval.

Graphical, numerical, analytical, and verbal representations of a function f provide information about the function g defined as $g(x) = \int_a^x f(t)dt$.

FUN-6.B.3

If f is continuous on the interval $[a, b]$ and F is an antiderivative of f, then $\int_a^b f(x)dx = F(b) - F(a)$.

FUN-6.C.1

$\int f(x)dx$ is an indefinite integral of the function f and can be expressed as $\int f(x)dx = F(x) + C$, where $F'(x) = f(x)$ and C is any constant.

Essential Questions
How can integration be used to describe how a value changes over time? How is integration related to finding area? How are integration and differentiation related?
Assessment Tasks
List of common formative and summative assessments.
Formative Assessment(s): Skills check, HW, AP Classroom Progress Checks **Summative Assessment(s):** Unit Test

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
6.7 The fundamental theorem of calculus and definite integrals	Calc Medic 6.7 Go FIgure task Relating velocity to total distance traveled to exemplify the fundamental theorem of calculus.	Collaborative groups Technology: desmos, graphing calculators, if desired.

Content Resources

- AP Classroom (within AP Central, collegeboard.org)
- Calculus textbook: Calculus, 11e, Larson & Edwards
- Tony Record (Avon HS) created resources
- flippedmath.com
- Khan Academy

- Delta Math
- Master Math Mentor (pdf files and videos)
- Teacher created resources