Marietta City Schools

2024–2025 District Unit Planner

AP Calculus BC

Unit title	MHS Unit 3 - AP Calc BC Unit 4 & 5: Applications of Differentiation	Unit duration (hours)	20 hours

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

GA DoE Standards

Standards

4.1 Interpreting the meaning of the derivative in context
4.2 Straight-line motion: Connecting position, velocity, and acceleration
4.3 Rates of change in applied contexts other than motion
4.4 Introduction to related rates
4.5 Solving related rates problems
4.6 Approximating values of a function using local linearity and linearization
4.7 Using L'Hospital's rule for determining limits of indeterminate forms

5.1 Using the mean value theorem
5.2 Extreme value theorem, global versus local extrema, and critical points
5.3 Determining intervals on which a function is increasing or decreasing
5.4 Using the first derivative test to determine relative (local) extrema
5.5 Using the candidates test to determine absolute (global) extrema
5.6 Determining concavity of functions over their domains
5.7 Using the second derivative test to determine extrema
5.8 Sketching graphs of functions and their derivatives
5.9 Connecting a function, its first derivative, and its second derivative
5.10 Introduction to optimization problems
5.11 Solving optimization problems
5.12 Exploring behaviors of implicit relations

Concepts/Skills to support mastery of standards

- Interpreting the meaning of the derivative in context
- Straight-line motion: Connecting position, velocity, and acceleration
- Rates of change in applied contexts other than motion
- Introduction to related rates
- Solving related rates problems
- Approximating values of a function using local linearity and linearization
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- Introduction to optimization problems
- Solving optimization problems
- Exploring behaviors of implicit relations

Vocabulary

Straight line motion - Position, Velocity, Acceleration

Related Rates

Local Linearity

Indeterminate form

L'Hospital's Rule

Mean Value Theorem

Extreme Value Theorem

Global Extrema, Local Extrema

First Derivative Test

Concavity

Second Derivative Test

Optimization

Notation

Essential Questions

How are derivatives used to solve problems regarding position, velocity, and acceleration?
How can you use related rates to solve problems with multiple variables changing?
How can we use L'Hopitals rule to determine the limit of an equation with an indeterminate form?
How can calculus be used to verify certain aspects about a function?
How can we use derivatives to understand the behavior of the graph of a function without the use of a graphing device?
How is calculus used to find an optimal solution to a problem?

Assessment Tasks

List of common formative and summative assessments.

Formative Assessment(s):

Notebooks, HW quizzes

Summative Assessment(s):

Unit Test

Learning Experiences
Add additional rows below as needed.

Objective or Content	**Learning Experiences**	**Personalized Learning and Differentiation**
4.4 Related Rates	Calc Medic Activity - Lesson 4.4 - Intro to related rates. (Unit 4 Day 7)	Collaborative groups Technology: desmos, graphing calculators, if desired.
5.2 Extreme value theorem, global versus local extrema, and critical points	Mixed Six activity for The First Derivative 1. Factual recall	Collaborative groups Technology: desmos, graphing calculators, if

5.3 Determining intervals on which a function is increasing or decreasing 5.4 Using the first derivative test to determine relative (local) extrema	2. Carry out a procedure 3. Classify a mathematical object 4. Prove, show, justify 5. Extend a concept 6. Critique a fallacy	desired.
5.6 Determining concavity of functions over their domains 5.7 Using the second derivative test to determine extrema	Mixed Six activity for The Second Derivative 1. Factual recall 2. Carry out a procedure 3. Classify a mathematical object 4. Prove, show, justify 5. Extend a concept 6. Critique a fallacy	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
- Calc Medic
- Khan Academy
- Delta Math
- Master Math Mentor (pdf files and videos)
- Teacher created resources