Marietta City Schools

2024–2025 District Unit Planner

AP Calculus AB

Unit title	**Unit 5: Analytical Applications of Differentiation**	**Unit duration (hours)**	**10-15 hours**

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

GA DoE Standards
Standards
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

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

Vocabulary

Mean Value Theorem

Extreme Value Theorem

Global Extrema, Local Extrema

First Derivative Test

Concavity

Second Derivative Test

Optimization

it is safer and easier for students to make arguments about f based directly on the graph of the derivative, as in, "f is concave up on $a < x < b$ because the graph of f' is increasing on $a < x < b$." Students should always refer to f, f', and f'' by name, rather than by "it" or "the function," which may leave the reader unsure of their intended meaning.

Notation

F’, f’’, and f with dy/dx, d^2y/dx^2

Essential Questions

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):

Skills Checks

HW

Quizzes

Progress CHecks in AP Classroom

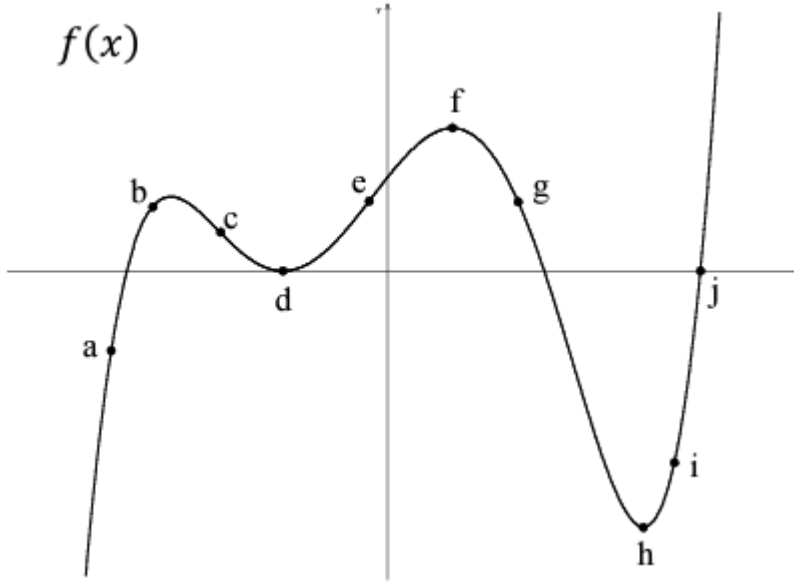
Summative Assessment(s):

Unit Test

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation

5.8 **5.9**	Predict and Confirm Provide students with the graph of a differentiable function, for example,  , but do not provide the rule for the function. Ask students to sketch a graph of the derivative of the function. Once students are done, reveal the rule for f(x). Ask students to calculate f´(x), and use technology to graph f´(x) and compare it to their sketched graph.	Collaborative groups and extension on AP classroom

Content Resources

- AP Classroom (within AP Central, collegeboard.org)
- Calculus textbook: Calculus, 11e, Larson & Edwards
- Tony Record (Avon HS) created resources
- Khan Academy
- Delta Math
- Master Math Mentor (pdf files and videos)
- Teacher created resources