



Marietta City Schools
2023–2024 District Unit Planner

AP Calculus BC

Unit title	Unit 5: Analytical Applications of Differentiation	Unit duration (hours)	3 weeks
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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

Notation

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):

Notebook, HW Quizzes

Summative Assessment(s):

Unit Test

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
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	Mixed Six activity for The First Derivative <ol style="list-style-type: none">1. Factual recall2. Carry out a procedure3. Classify a mathematical object4. Prove, show, justify5. Extend a concept6. Critique a fallacy	Collaborative groups Technology: desmos, graphing calculators, if 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 <ol style="list-style-type: none">1. Factual recall2. Carry out a procedure3. Classify a mathematical object4. Prove, show, justify5. Extend a concept6. 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
- Khan Academy
- Delta Math
- Master Math Mentor (pdf files and videos)
- Teacher created resources