Marietta City Schools

2025–2026 District Unit Planner

AP Calculus AB/BC

Unit title	**Unit 5: Contextual Applications of Differentiation**	**Unit duration (hours)**	AB 2-3 weeks BC 1-2 weeks

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
5.10 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
- Using L'Hospital's rule for determining limits of indeterminate forms

Emphasize that students must verify that $\lim_{x \to a} f(x) = \lim_{x \to a} g(x) = 0$ (or that both approach infinity) as a necessary first step before applying L'Hospital's Rule to determine $\lim_{x \to a} \frac{f(x)}{g(x)}$. Students should understand that $\frac{0}{0}$ or $\frac{\infty}{\infty}$ are appropriate labels for indeterminate forms but do not represent values in an equation. Therefore, it is incorrect to write $\lim_{x \to a} \frac{f(x)}{g(x)} = \frac{0}{0}$, for example. Note that $\lim_{x \to a} \frac{f(x)}{g(x)} \neq \frac{\lim_{x \to a} f(x)}{\lim_{x \to a} g(x)}$ when $\lim_{x \to a} g(x) = 0$. Also emphasize that the conclusion of L'Hospital's rule features the ratio of the derivatives of the numerator and denominator, respectively, rather than the derivative of the ratio.

- The derivative can be used to solve optimization problems; that is, finding a minimum or maximum value of a function on a functions. given interval.
- Determine critical points of implicit relations.

Vocabulary

Straight line motion - Position, Velocity, Acceleration

Related Rates

Local Linearity

Indeterminate form

L'Hospital's Rule

Linearization

Optimization

Absolute maximum/minimum

Notation

ESSENTIAL KNOWLEDGE

LIM-4.A.1

When the ratio of two functions tends to $\frac{0}{0}$ or $\frac{\infty}{\infty}$ in the limit, such forms are said to be indeterminate.

ESSENTIAL KNOWLEDGE

CHA-3.A.1

The derivative of a function can be interpreted as the instantaneous rate of change with respect to its independent variable.

CHA-3.A.2

The derivative can be used to express information about rates of change in applied contexts.

CHA-3.A.3

The unit for $f'(x)$ is the unit for f divided by the unit for x.

FUN-4.E.2
Second derivatives involving implicit differentiation may be relations of x, y, and $\frac{dy}{dx}$.

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?

What additional information is included in a sound mathematical argument about optimization that a simple description of an equivalent answer lacks?

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**
	4.4 **Marking the Text** Have students read through a problem and highlight/underline the given quantities and directions in a problem, stating whether that information always applies or applies only at an instant. **4.5** **Round Table** Give students different related rates problems and a paper divided into five sections, titled as following: ▪ Draw a picture ▪ Equation ▪ Derivative ▪ Specific information used ▪ Interpretation Students first draw a picture of the situation and pass the papers clockwise. Students then critique the work in the previous section, complete the next section, and pass the papers again until all sections are completed.	

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
- Math-medic