Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Mathematics	Course:	AP Calculus AB	Unit 2 Title:	Derivatives	Grade Level(s):	10-12
Assessed Trimester:	Trimester A	Pacing:	25-31 days	Date Created:	2/2/2010	Last Revision Date:	6/19/2014

Course Understandings: Students will understand that:

- A. The meaning of limit represents function behavior.
- B. The meaning of the derivative represents a rate of change and is a local linear approximation and should understand that derivatives can be used to solve a variety of problems.
- D. The relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus.
- E. You can model a written description of a physical situation with a function, a differential equation, or an integral.
- F. You can use technology to help solve problems, experiment, interpret results, and support conclusions.

DESIRED RESULTS (Stage 1) - WHAT WE WANT STUDENT TO KNOW AND BE ABLE TO DO?

Established	Goals
-------------	-------

Minnesota State/Local/College Board/Technology Standard(s) addressed:

• AP: II. Derivatives

- a. Concept of the derivative
 - Derivative presented graphically, numerically, and analytically
 - Derivative interpreted as an instantaneous rate of change
 - Derivative defined as the limit of the difference quotient
 - Relationship between differentiability and continuity

b. Derivative at a point

- Slope of a curve at a point. Examples are emphasized, including points at which there are vertical tangents and points at which there are no tangents.
- Tangent line to a curve at a point and local linear approximation
- Instantaneous rate of change as the limit of average rate of change
- Approximate rate of change from graphs and tables of values

c. Derivative as a function

- Corresponding characteristics of graphs of f and f'
- Relationship between the increasing and decreasing behavior of f and the sign of f'
- The Mean Value Theorem and its geometric interpretation
- Equations involving derivatives. Verbal descriptions are translated into equations involving derivatives and vice versa.
- d. Second derivatives
 - Corresponding characteristics of the graphs of f, f', and f''
 - Relationship between the concavity of f and the sign of f''
 - Points of inflection as places where concavity changes
- f. Computation of derivatives
 - Knowledge of derivatives of basic functions, including power, exponential, logarithmic, trigonometric, and inverse trigonometric functions
 - Derivative rules for sums, products, and quotients of functions
 - Chain rule and implicit differentiation

Transfer

Students will be able to independently use their learning to: (product, high order reasoning)

•

	Meaning		
Unit Understanding(s):	Essential Qu		
Students will understand that:	Students will keep considering:		
The definition of a derivative as a limit	 Do derivatives exist at all points? 		
The definition of a derivative as a slope of a tangent line	 What does a derivative tell me? 		
How to evaluate a derivative graphically, numerically, and algebraically	 Is there some connection between a derivative and 		
A derivative is the instantaneous rate of change	 Are derivatives used in any real-life situations? 		

Acquisition

 Knowledge - Students will: Definition of the Derivative Derivative Notation First and Second Derivative Test for Extrema Concavity Test Position, velocity, and acceleration Related Rates Normal and Tangent Lines Derivatives on a calculator Increasing/Decreasing functions Mean Value Theorem 	Reasoning - Students will:• Determine when to use which differentiation rule• Classify extrema using derivatives and sign chart• Identify inflection points using second derivatives• Analyze position, velocity, and acceleration• Interpret the meaning of different rates of change• Interpret the meaning of a tangent or normal line.• Classify behavior of a graph using a derivative• Understand the conditions for which the Mean VaSkills - Students will:• AB2-1: Use differentiation rules and techniques• AB2-2: Use derivatives to find position, velocity,• AB2-3: Use derivatives to solve related rates pro• AB2-4: Write the equation for a tangent and/or a• AB2-5: Use derivatives to identify and classify external
	 AB2-4: Write the equation for a tangent and/or a AB2-5: Use derivatives to identify and classify ex AB2-6: Use derivatives to calculate the mean value

Common Misunderstandings	Essential new vocabular	Ŷ
 Students have trouble interpreting graphs of velocity and acceleration Students have trouble with compound chain rule Students have trouble with implicit differentiation Students have trouble with related rate problems 	 Acceleration Concavity Corner Critical Points Cusp Derivative 	 Differentiable Displacement Extrema Implicit Differentiation Jerk Mean Value Theorem

uestion(s):

nd slope?

ts s (concavity test)

alue Theorem applies

to calculate derivatives

and acceleration

oblems

a normal line to a curve

xtrema and inflection points

lue of a function over an interval

	Normal Line
	Related Rates
	Tangent Line
on	Vertical Tangent
	Velocity
em	