

## District Scope and Sequence

Subject: Mathematics

Course: 341 AP Calculus AB

Grade Level: 9 – 12

Concepts	Topics/Units	Content/Skills	Essential Activities/Agreements
Finding Limits of Functions (including one-sided limits)	Functions, Graphs, and Limits	<ul style="list-style-type: none"> <li>An intuitive understanding of limits</li> <li>Calculating limits algebraically.</li> <li>Estimating limits from graphs or tables of data.</li> <li>Describing asymptotic behavior in terms of limits involving infinity.</li> </ul>	
Understanding Continuity as a Property of Functions	Limits and Continuity	<ul style="list-style-type: none"> <li>Understanding continuity in terms of limits.</li> <li>Geometric understanding of graphs of continuous functions ( Intermediate Value Theorem and Extreme Value Theorem)</li> </ul>	
Understanding the Concept of Derivative	Definition of a Derivative	<ul style="list-style-type: none"> <li>Derivative presented graphically, numerically, and analytically.</li> <li>Derivative interpreted as an instantaneous rate of change.</li> <li>Derivative defined as the limit of the difference quotient.</li> <li>Relationship between differentiability and continuity.</li> </ul>	
Determining the Derivative at a Point	Derivatives I	<ul style="list-style-type: none"> <li>Slope of a curve at a point, including points at which there are vertical tangents and at which there are no tangents.</li> <li>Tangent line to a curve at a point and local linear approximation.</li> <li>Instantaneous rate of change as the limit of average rate of change.</li> <li>Approximate rate of change graphically, and numerically.</li> </ul>	
Understanding the Derivative as a Function	Derivatives I	<ul style="list-style-type: none"> <li>Corresponding characteristics of graphs of <math>f</math> and <math>f'</math>.</li> <li>Relationship between the increasing and decreasing behavior of <math>f</math> and the sign of <math>f'</math>.</li> <li>The Mean Value Theorem</li> </ul>	
Understanding and Calculating Second Derivatives	Derivatives I	<ul style="list-style-type: none"> <li>Corresponding characteristics of the graphs of <math>f</math>, <math>f'</math>, and <math>f''</math>.</li> <li>Relationship between the concavity of <math>f</math> and the sign of <math>f''</math>.</li> <li>Points of inflection as places where the</li> </ul>	

		concavity changes.	
Solving Application Problems Involving Derivatives	Curve Sketching Optimization Problems Slopefields	<ul style="list-style-type: none"> <li>• Analysis of curves</li> <li>• Absolute (global) and Relative (local) extrema.</li> <li>• Modeling rates of change and related rate problems.</li> <li>• Speed, Velocity and Acceleration</li> <li>• Interpreting differential equations via slopefields and the relationship between slopefields, and solution curves for differential equations.</li> </ul>	
Computing Derivatives	Derivatives II	<ul style="list-style-type: none"> <li>• Compute derivatives of the following basic functions: power, exponential, logarithmic, trigonometric, and inverse trigonometric functions.</li> <li>• Use the product and quotient rules, and find higher order derivatives.</li> <li>• Use the Chain rule and implicit differentiation.</li> </ul>	
Interpreting and Using Properties of Definite Integrals	Integrals	<ul style="list-style-type: none"> <li>• Definite integral as a limit of Riemann sums.</li> <li>• Definite Integral as an accumulation function.</li> <li>• Basic Properties of Definite Integrals.</li> </ul>	
Finding specific antiderivatives, and solving separable differential equations.	Techniques of Integration	<ul style="list-style-type: none"> <li>• Fundamental Theorem of Calculus</li> <li>• Indefinite vs. Definite integrals</li> <li>• Substitution Method.</li> </ul>	
Using integrals in a variety of applications to model physical, biological, or economic situations.	Applications of Integration	<ul style="list-style-type: none"> <li>• Area of a region between two curves.</li> <li>• Volumes of Solids: the disc, the washer, and the shell method.</li> <li>• Volume of a solid with known cross sections.</li> <li>• Average value of a function</li> <li>• The total distance traveled by a particle along a line.</li> </ul>	
Using numerical approximations to approximate definite integrals of functions represented algebraically, graphically, and by tables of values.	Definite Integrals by Numerical Approximations.	<ul style="list-style-type: none"> <li>• Using left, right, and midpoint Riemann Sums to compute an approximate value for a definite integral.</li> <li>• Using the Trapezoidal Rule to find area.</li> <li>• Finding the error in the Trapezoidal Rule.</li> </ul>	
	AP Test Preparation	<ul style="list-style-type: none"> <li>• Review of course</li> </ul>	Previously released AP multiple choice and free response questions