

South Hadley High School  
AP Calculus Curriculum Guide

Big Idea/ Essential Q	Content	Sections Covered	Time Frame
Chapter 1	<ul style="list-style-type: none"> <li>• Estimate the instantaneous rate of change of the dependent variable with respect to the independent variable</li> <li>• Use a variety of methods, including the <i>Trapezoidal Rule</i> to estimate the definite integral of a function between two values of <math>x</math></li> <li>• Use the graph or the equation of a function to determine whether the function has a limit as <math>x</math> approaches a certain value</li> </ul>		5 weeks
Chapter 2	<ul style="list-style-type: none"> <li>• Use the formal definition of a limit and identify its parts as they relate to a particular function</li> <li>• Define continuity and determine whether a function is continuous at a specific point</li> <li>• Find limits of functions involving infinity</li> <li>• Understand and apply the <i>Intermediate Value Theorem</i></li> </ul>		5 weeks
Chapter 3	<ul style="list-style-type: none"> <li>• State and apply the formal definition of the derivative, both at a specific point and as a general function</li> <li>• State the relationships between the graph of a function and the graph of its derivative</li> <li>• Use the graphing calculator to find the numeric derivative at a point</li> <li>• Use the <i>power rule</i> to find the derivative of a power function</li> <li>• Understand the relationships between displacement, velocity, and acceleration of a moving object</li> <li>• State the derivatives of the sine and cosine functions</li> <li>• Use the <i>chain rule</i> to find the derivatives of composite functions</li> <li>• State the definition of antiderivative and find the antiderivative of simple functions</li> </ul>		5 weeks
Chapter 4	<ul style="list-style-type: none"> <li>▪ Use the <i>product rule</i> to find the derivative of the product of two simple functions</li> <li>▪ Use the <i>quotient rule</i> to find the derivative of the quotient of two simple functions</li> <li>▪ State and apply the derivatives of all six trigonometric functions</li> <li>▪ Differentiate each of the six inverse trigonometric functions</li> <li>▪ State the relationship between continuity and differentiability</li> <li>▪ Use implicit differentiation to find the derivative of a relation</li> </ul>		5 weeks
Chapter 5	<ul style="list-style-type: none"> <li>• Write the general equation for the antiderivative (indefinite integral) of a function</li> <li>• Find the linearization of a function at <math>x = c</math></li> <li>• Estimate the definite integral of a function using a Riemann Sum</li> <li>• Explain and apply the <i>Mean Value Theorem</i></li> <li>• Use the <i>Fundamental Theorem of Calculus</i> to evaluate definite integrals</li> <li>• Explain how the <i>Fundamental Theorem of Calculus</i> connects the concepts of derivative and integral</li> <li>• Apply the concept of the definite integral to solve a variety of problems</li> </ul>		5 weeks
Chapter 6	<ul style="list-style-type: none"> <li>• Find the derivative of a function involving the natural logarithm</li> <li>• Differentiate exponential functions</li> <li>• Find the limit of an expression with an indeterminate form by using <i>L'Hospital's Rule</i></li> <li>• Apply the concepts of derivative and definite integral to solve a variety of problems involving exponential and logarithmic functions</li> </ul>		5 weeks

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Chapter 7	<ul style="list-style-type: none"><li>• Write and solve a differential equation related to a real-world situation, especially one in which the rate of change of <math>y</math> with respect to <math>x</math> is directly proportional to <math>y</math></li><li>• Use the slope field for a differential equation to approximate a particular solution</li><li>• Use <i>Euler's Method</i> to approximate a numerical solution to a differential equation</li></ul>		5 weeks
Chapter 8	<ul style="list-style-type: none"><li>• Use the critical values of a function and the first derivative to determine the location and value of local and absolute extrema</li><li>• Use the second derivative of a function to determine the location of inflection points</li><li>• Solve problems that require the student to maximize or minimize a specific quantity</li><li>• Determine the area of a region in the plane as bounded by specific axes and/or functions</li><li>• Find the volume of a solid by plane slicing</li><li>• Find the volume of a solid of revolution using the disc method, washer method, or cylindrical shells</li></ul>		5 weeks
Chapter 10	<ul style="list-style-type: none"><li>• Use the velocity function or a table of values to find the distance traveled by a moving object and its displacement from the starting point</li><li>• Calculate the average value of a function over a specific interval</li><li>• Solve related rates problems</li><li>• Solve optimization problems</li></ul>		5 weeks