



ALLEN ACADEMY

Calculus AB
2017-2018

First Trimester Topics:	Second Trimester Topics :	Third Trimester Topics :
<p>Limits and their Properties</p> <ul style="list-style-type: none"> - The Tangent Line Problem - The Area Problem - An Introduction to Limits - Limits That Fail to Exist - Properties of Limits - Strategies for Finding Limits <ul style="list-style-type: none"> Analytically Graphically Using tables to approximate limits - Continuity at a point and one sided limits - One-Sided Limits and Continuity on a Closed Interval - The Squeeze Theorem for limits - Properties of Continuity - The Intermediate Value Theorem - Definition of and determination of Infinite Limits and Vertical Asymptotes <ul style="list-style-type: none"> Limits of Infinity Limits at Infinity <p>Differentiation</p> <ul style="list-style-type: none"> - Use graphing calculators: zoom-in exercise and local linearity - The tangent line problem - Definition of the Derivative of a function - Sketching a Derivative Based on the Graph of $f(x)$ - Relationship between differentiability and continuity <ul style="list-style-type: none"> Zoom-in activity for ; Sharp turn discussion Vertical tangent discussion - Differentiation Rules <ul style="list-style-type: none"> Power Rule 	<p>Applications of Differentiations</p> <ul style="list-style-type: none"> - Extrema of a function - Relative extrema and critical numbers - Extrema on a closed interval - Rolle's Theorem and the Mean Value Theorem - Increasing and decreasing functions - The First Derivative Test <ul style="list-style-type: none"> Relative and absolute extrema The Second Derivative Test <ul style="list-style-type: none"> Concavity Points of inflection - Horizontal asymptotes - Curve-sketching techniques <ul style="list-style-type: none"> Graphing given the functional equation Relating f, f', f'' Symmetry of graphs - Applied Minimum and Maximum Problems (Optimization) - Calculating differentials - Linear approximations - Tangent line approximations - Application problems involving position, velocity, and acceleration, and rectilinear motion - Graphical analysis of position versus time, velocity versus time, and acceleration versus time <p>Integration</p> <ul style="list-style-type: none"> - Antiderivatives and indefinite integration - Notation for anti-derivatives 	<p>Logarithmic, Exponential, and other Transcendental Functions</p> <ul style="list-style-type: none"> - The natural logarithmic function - The number e as a limit - The derivative of the natural log function - Log rule for integration - Integrals of trigonometric functions - Inverse Functions <ul style="list-style-type: none"> Existence of an inverse function Derivative of an inverse function - The natural exponential functions - Derivatives of exponential functions - Integrals of exponential functions - Bases other than e - Applications of exponential functions - Differential equations and separation of variables - Growth and decay models - Newton's Law of Cooling - Slope Fields <ul style="list-style-type: none"> Geometric interpretation of slope fields and differential equations Drawing slope fields - Euler's Method as a numerical solution of a differential equation - Inverse trigonometric functions : Domains, ranges, and graphs - Derivatives of inverse trigonometric functions - Integration of inverse trigonometric functions



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<p>Constant Multiple Rule Sum and Difference Rule</p> <ul style="list-style-type: none">- Derivatives of Sine and Cosine Functions- Graphing only : f, f', f''- Approximating rates of change from graphs and tables- The product rule and quotient rule- Derivatives of trigonometric functions- Higher-Order Derivatives- Position, Velocity, Acceleration Functions- The Chain Rule- The General Power Rule- Trigonometric Functions and the Chain Rule- Implicit Differentiation- Related Rates	<ul style="list-style-type: none">- Basic Integration Rules- Initial Conditions and Particular Solutions- Area: Sigma Notation- The Area of a Plane Region- Definite integral as a limit of a Riemann Sum<ul style="list-style-type: none">Upper, Lower, Midpoint sumsUse Riemann sums and trapezoidal sums to approximate definite integrals presented analytically, graphically, or as tables of data.- Trapezoidal Rule- Definite Integrals and their properties- Use of the First Fundamental Theorem of Calculus in evaluating integrals- The Mean Value Theorem for Integrals- Average Value of a Function- The Second Fundamental Theorem of Calculus- Integration by substitution; change of variables in the integration process- The General Power Rule for integration- Change of Variables for Definite Integrals- Integration of even and odd Functions- Functions defined by integrals- Error Analysis	<p>Applications of Integration</p> <ul style="list-style-type: none">- The integral defined as the accumulation of rates of change- Area of a region between two curves- Volume of solids of revolution<ul style="list-style-type: none">the disk and washer methodsthe shell method- Volume of solids with known cross sections- Arc length in $f(x)$ form- Integration involved with motion applications of position, velocity, and acceleration.<ul style="list-style-type: none">Using initial conditions and the definite integral to calculate distance traveled.
Instructional Resources:		
<ul style="list-style-type: none">• Textbook: <i>Calculus of a Single Variable, Eighth Edition</i> by Larson, Hostetler, and Edwards		