

SUBJECT: AP Calculus BC		GRADE: 9-12	
Unit 6: Differential Equations and Methods of Integration		Time Frame: 6 weeks	
UNIT OVERVIEW			
- What are slope fields and how are they used to determine solution graphs? - How are differentiable equations solved? - What are antiderivatives and how are they used? - How are integrals evaluated using u-substitution? - How is Euler’s Method used? - How are integrals of products evaluated using Integration by Parts? - How is separation used to solve differential equations? - How are exponential differential equations solved and applied? - How are integrals of quotients evaluated using Partial Fraction Decomposition? - How are logistic differential equations solved and applied?			
LRG SKILLS AND DISPOSITIONS		PA STANDARDS	
COMPETENCIES		LEARNING TARGETS	
Derivatives and Integrals I can find, interpret, and use derivatives and integrals to solve problems.		Solving Differential Equations - I can analyze differential equations to obtain general and specific solutions. (K1MAB13T29) Estimating Solutions of Differential Equations - I can verify and estimate solutions of differential equations. (K1MAB13T30) Slope Fields	

- I can analyze differential equations by identifying characteristics of their slope fields. (K1MAB13T31)

Find Antiderivatives

- I can find antiderivatives. (K1MAB13T32)

U-Substitution

- I can evaluate indefinite and definite integrals using u-substitution (K1MAB13T33)

Euler's Method

- I can use Euler's Method. (K1MAB13T34)

Integration by Parts

- I can evaluate integrals using integration by parts and partial fraction decomposition. (K1MAB13T41)

Separation of Variables

- I can analyze differential equations to obtain general and specific solutions using separation of variables. (K1MAB13T34)

Exponential Growth

- I can interpret, create, and solve differential equations from problems in context (specifically exponential growth) (K1MAB13T35)

Partial Fraction Decomposition

- I can analyze differential equations to obtain general and specific solutions involving logistic growth. (K1MAB13T42)

Logistic Growth

- I can interpret, create, and solve differential equations from problems in context (specifically logistic growth). (K1MAB13T43)

SUBJECT: AP Calculus BC		GRADE: 9-12	
Unit 7: Applications of Integration		Time Frame: 6 weeks	
UNIT OVERVIEW			
- How are integrals used to evaluate net change? - How are integrals used to find the average value of a function? - How are integrals used to calculate areas - How are integrals used to calculate volumes? - How are lengths of curves calculated?			
LRG SKILLS AND DISPOSITIONS		PA STANDARDS	
- Collaboration and Teamwork 9-12: Applications of Integration Presentation (S1C) - Critical Thinking and Problem Solving 9-12: Applications of Integration Presentation (S4C)			
COMPETENCIES		LEARNING TARGETS	
Derivatives and Integrals I can find, interpret, and use derivatives and integrals to solve problems.		Integrals as Net Change - I can interpret a definite integral as net change of a quantity. (K1MAB13T36) Linear Motion - I can apply definite integrals to problems involving linear motion. (K1MAB13T37) Average Value of a Function - I can apply definite integrals to problems involving average value of a function. (K1MAB13T38) Area and Volume - I can apply definite integrals to problems involving area and volume. (K1MAB13T39) Lengths of Curves	

- I can apply definite integrals to problems involving length of curves. (K1MAB13T44)

SUBJECT: AP Calculus BC		GRADE: 9-12	
Unit 8: L'Hopital's Rule and AP Exam Preparation		Time Frame: 4 week	
UNIT OVERVIEW			
- How are limits of indeterminant forms evaluated? - How are function growth rates compared? - How are improper integrals evaluated?			
LRG SKILLS AND DISPOSITIONS		PA STANDARDS	
- Collaboration and Teamwork 9-12: Improper Integrals Presentation (S1C) - Critical Thinking and Problem Solving 9-12: Improper Integrals Presentation (S4C)			
COMPETENCIES		LEARNING TARGETS	
Limits and Continuity I can determine limits and identify continuity of functions.		L'Hopital's Rule - I can find limits of indeterminate forms using L'Hopital's Rule. (K1MAB12T9) Function Growth Rates - I can use limits to compare function rates of change. (K1MAB12T10)	
Derivatives and Integrals I can find, interpret, and use derivatives and integrals to solve problems.		Improper Integral I can evaluate an improper integral or show that it diverges. (K1MAB13T45)	

SUBJECT: AP Calculus BC		GRADE: 10-12	
Unit 9: Infinite Series		Time Frame: 12 weeks	
UNIT OVERVIEW			
- How are arithmetic and geometric sequences different and used? - How is sequence divergence and convergence determined? - What are series and how is the sum evaluated? - How is series convergence and divergence determined? - How are power series created and used? - How are Taylor Polynomials and Taylor Series generated? - What are the Maclaurin series? - How are error bounds determined? - What are the tests for convergence?			
LRG SKILLS AND DISPOSITIONS		PA STANDARDS	
- Collaboration and Teamwork 9-12: Series Convergence Presentation (S1C) - Critical Thinking and Problem Solving 9-12: Series Convergence Presentation (S4C)			
COMPETENCIES		LEARNING TARGETS	
Sequences and Series I can identify, describe, and represent various types of sequences and series.		Sequences - I can distinguish between arithmetic and geometric sequences. (K1MAB14T1) Rules for Sequences - I can write explicit and recursive rules for the nth term of arithmetic and geometric sequences. (K1MAB14T2) Sequence Convergence/Divergence	

- I can determine whether a sequence converges or diverges. (K1MAB14T3)

Series Convergence/Divergence

- I can determine whether a series converges or diverges. (K1MAB14T4)

Sum of a Series

- I can determine or estimate the sum of a series. (K1MAB14T5)

Algebraic Power Series Creation

- I can create a power series by algebraic processes, substitution, and properties of geometric series. (K1MAB14T6)

Calculus Power Series Creation

- I can create a power series by operations on known series such as term-by-term differentiation or integration. (K1MAB14T7)

Taylor Series

- I can write a power series representing a given function using Maclaurin and Taylor series. (K1MAB14T8)

Taylor Polynomials

- I can construct and use Taylor polynomials. (K1MAB14T9)

Maclaurin Series

- I can recognize and use geometric series, Maclaurin series for $\sin x$, $\cos x$, and e^x . (K1MAB14T10)

Lagrange Error Bound

- I can bound the error of a Taylor polynomial using a Lagrange error bound or an alternating series error bound. (K1MAB14T11)

Ratio Test

- I can determine the radius and interval of convergence of a power series using the ratio test. (K1MAB14T12)

Alternating Series Error Bound

- I can bound the error of a Taylor polynomial using an alternating series error bound. (K1MAB14T13)

SUBJECT: AP Calculus BC		GRADE: 10-12	
Unit 10: Parametric, Vector, and Polar Functions		Time Frame: 6 weeks	
UNIT OVERVIEW			
- How are parametric, vector, and polar functions differentiated? - How is vector differentiation applied to planar motion? - How is vector integration applied to planar motion? - How is polar integration applied to find areas between polar curves?			
LRG SKILLS AND DISPOSITIONS		PA STANDARDS	
- Collaboration and Teamwork 9-12: AP Calculus AB MC random group boardwork practice (D4C) - Critical Thinking and Problem Solving 9-12: AP Calculus AB FRQs (S4C) - Resilience and Grit 9-12: AP Calculus AB Sim Exam (D4C)			
COMPETENCIES		LEARNING TARGETS	
Derivatives and Integrals I can find, interpret, and use derivatives and integrals to solve problems.		Parametric, Vector, and Polar Functions - I can find derivatives of vector-valued functions, polar functions, and parametric functions. (K1MAB13T46) Vector Differentiation - I can solve applications of derivatives involving planar motion. (K1MAB13T47) Vector Integration - I can apply definite integrals to problems involving planar motion represented by parametric or vector-valued functions. (K1MAB13T48) Polar Area - I can apply definite integrals to problems involving the area between polar curves. (K1MAB13T49)	

