Course Title: AP Calculus BC

Board Approved: October 2026

Monthly Curriculum Map

Month	Unit/Topics Covered

August/September	• Review of AB material (based upon AP report)
	• Unit 7: Differential Equations
	  ○ Euler's Method
	• Unit 6: Integration and Accumulation of Change
	  ○ Integration by Parts
	  ○ Integration Using Linear Partial Fractions
	• Unit 7: Differential Equations
	  ○ Logistic Models with Differential Equations

October	• Unit 8: Applications of Integration
	  ○ Arc Length of a Smooth, Planar Curve and Distance Traveled
	• Unit 6: Integration and Accumulation of Change
	  ○ Evaluating Improper Integrals
	• Unit 8: Applications of Integration (Review of AB Material)
	  ○ Connecting Position, Velocity, and Acceleration of Functions Using Integrals
	• Unit 9: Parametric Equations, Polar Coordinates, and Vector-Valued Functions
	  ○ Defining and Differentiating Parametric Equations
	  ○ Second Derivatives of Parametric Equations
	  ○ Finding Arc Lengths of Curves Given by Parametric Equations
	  ○ Defining and Differentiating Vector-Valed Functions

November	• Unit 9: Parametric Equations, Polar Coordinates, and Vector-Valued Functions
	  ○ Solving Motion Problems Using Parametric and Vector-Valued Functions
	  ○ Defining Polar Coordinates and Differentiating Polar Form
	  ○ Finding the Area of a Polar Region or the Area Bounded by a Single Polar Curve
	  ○ Finding the Area of the Region Bounded By Two Polar Curves

December	• Unit 9: Parametric Equations, Polar Coordinates, and Vector-Valued Functions
	  ○ Finding the Area of a Polar Region or the Area Bounded by a Single Polar Curve
	  ○ Finding the Area of the Region Bounded By Two Polar Curves
	• Review of AB Material
	  ○ Limits and Continuity
	  ○ Basic Derivative Rules

	○ Implicit Differentiation ○ Related Rates ○ Optimization Problems ○ Differential Equations and Initial Conditions ○ Area and Volume
January	● Review of AB and BC Material ○ Midterm exam review ● Midterm Exam ● Unit 10: Infinite Sequences and Series ○ Sequence VS Series ○ Convergence VS Divergence ○ n-th term test for divergence ○ Geometric series
February	● Unit 10: Infinite Sequences and Series ○ Harmonic Series ○ p-Series ○ Alternating Series Test ■ Conditional VS Absolute convergence ○ Alternating Series Remainder Theorem (error bound) ○ Limit Comparison Test ○ Direct Comparison Test ○ Ratio Test ○ Maclaurin Series (introduce KNOWN Maclaurin series to have memorized) ○ Taylor Polynomials ○ Power Series
March	● Unit 10: Infinite Sequences and Series ○ Power Series ○ Radius and Interval of Convergence ○ Representing Functions as Power Series
April	● AP Exam Review
May/June	● AP Test ● Finding Volume Using the Shell Method (if time)

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Unit 6/7/8: Integration Methods, Differential Equations, and Applications of Integration	**Time:** 12-14 class periods

Academic Standards:

- FUN-6.E.1
- FUN-6.F.1
- LIM-6.A.1, LIM-6.A.2
- FUN-7.C.4
- CHA-6.A.1
- FUN-7.H.1, FUN-7.H.2, FUN-7.H.3, FUN-7.H.4

Essential Content/Objective: At the end of the unit, students will be able to:

- Apply Euler's method to approximate a solution to a differential equation or a point on a solution curve
- Use integration by parts to find an antiderivative.
- Decompose rational functions into sums of linear nonrepeating factors that can be integrated using basic integration techniques.
- Use the logistic growth differential equation to identify carrying capacity and rates of change.
- Identify when a logistic growth differential equation is changing at the fastest rate.
- Find the length of a planar curve defined as a function.
- Rewrite an improper integral using limits to evaluate
- Identify when a logistic growth differential equation is changing at the fastest rate.

Assessment:

- **Chapter 6/7 Assessment** - Euler's Method, Integration by Parts, Integration by Partial Fractions, Logistic Growth
- **Chapter 7/8 Assessment** - Arc Length and Improper Integrals

Core Student Activities: Students will complete/participate in the following: • AP Classroom Progress Checks: Students will complete AP style questions to check for understanding. • Mixed 6 Integration by Parts - Students will complete integration by parts given in various question types • Mixed 6 Partial Fraction Integration - Students will complete integration by parts in various question types • Integration Techniques Circuit: Students will practice various integration techniques • Which Does Not Belong: Students will complete various interaction problems using AB and BC techniques • Skill Builder Logistic Growth: Students will complete various AP style questions on logistic growth • Improper Integrals Maze: Students will work through various improper integrals to complete the maze	

Materials and Resources:
• AP Classroom
• Delta Math
  ○ Euler's Method
  ○ Integration by Parts (level 1 and 2)
  ○ Integration by Parts (Tabular Method)
  ○ Integration with Partial Fraction Decomposition
  ○ Logistic Differential Equations
  ○ Modeling Logistic Differential Equations
  ○ Arc Length (level 1 and 2)
  ○ Improper Integrals Graphically (level 1 and 2)
  ○ Improper Integrals (Infinite Bounds)
	Remediation:
	• Integration Flow Chart (option 1)
	• Integration Flow Chart (option 2)
	• Delta Math
	  ○ Partial Fraction Decomposition
	• Khan Academy
	  ○ Integration by parts
	  ○ Integration with partial fractions
	  ○ Improper integrals
	  ○ Euler's Method
	  ○ Differential Equations: logistic model word problems
	  ○ Arc Length

Instructional Methods:

- Direct Instruction
    - Review integration methods taught in AP Calculus AB
    - Introduce some new integrands for students to try using the integration methods they currently know
    - Teach the new forms of integration such as integration by parts and integration with partial fraction decomposition
    - Look at the logistic growth model students saw in AP Pre-Calculus. Talk about carrying capacity (tie into AP Biology here) and the calculus behind logistic growth rates.
    - Introduce the formula for finding the arc length of a smooth, planar curve. Expand formula to function of y also.
    - Teach infinite bounds on integrals and points of discontinuity being a bound on an integral. Look at how the area under the curve increases using delta math (improper integrals graphically). Show students how using the limit can help us solve these types of integrals.
- Guided Practice - Students will use the improper integral maze as practice.
- Independent Practice - Students will complete various problems (homework, AP classroom progress checks, etc.) to master the content in this chapter
- Group work - Students will complete problems in which they first have to identify the method of integration needed before solving the problem.

Unit 9: Parametric Equations, Polar Coordinates, and Vector-Valued Functions	**Time:** 16-18 class periods

Academic Standards:

- CHA-3.G.1, CHA-3.G.2
- CHA-3.G.3
- CHA-6.B.1
- CHA-3.H.1
- FUN-8.A.1
- FUN-8.B.1, FUN-8.B.2
- FUN-3.G.1, FUN-3.G.2
- CHA-5.D.1
- CHA-5.D.2

Essential Content/Objective: At the end of the unit, students will be able to:

- Extend the method for calculating of real-valued functions to parametric functions
- Find the second derivative of a parametric function
- Find the length of a curve using the definite integral formula
- Find position, velocity, and acceleration of vector-valued functions
- Solve an initial value problem in parametric or vector-valued form
- Find the speed and total distance of a parametric or vector-valued function
- Find the first and second derivative of a polar function
- Find tangents to a polar function
- Calculate the area of a polar curve
- Calculate the area bounded by two polar curves

Core Student Activities: Students will complete/participate in the following:

- AP Classroom Progress Checks: Students will complete AP style questions to check for understanding.
- 5 for 5 Parametrics: Students will answer 5 AP style questions on Parametrics

Assessment:

- Parametric Assessment
- Polar Assessment

• Parametric Stations Activity: Students will work in small groups to answer questions at each station. • Graphic Organizer - All About Polars! : Students will fill in the main concepts of polar calculus as they complete the notes. This will serve as a study guide. • Polar Card Match: Students will match a graph to an integral • Polar Circuit: Students will use their knowledge of polar calculus to complete the circuit	

Materials and Resources:
• AP Classroom
• Envelopes filled with card sort pieces
• Delta Math
  ○ Derivative of Parametric Curves
  ○ Second Derivative of Parametric Curves and Vector-Valued Functions
  ○ Tangent Lines to Parametric Curves
  ○ Parametric Arc Length
  ○ Tangent Lines to Polar Curves
  ○ Interpreting Polar Derivatives
  ○ Absolute Extreme Values in Polar
  ○ Polar Area with Two Curves (Type 1 and 2)
 	
Instructional Methods:
• Direct Instruction
  ○ Review rectangular vs polar coordinates from AP Precalculus
  ○ Formula for the derivative of a polar function and how to find the derivative
  ○ Writing equations of tangent lines at a polar coordinate
  ○ Horizontal Tangents, Vertical Tangents, and when there is no conclusion on type of tangents
  ○ Maximizing or minimizing distance from the pole
	Extensions:
	• Worksheet on doubly improper integrals
	
	Remediation:
	• Khan Academy
	  ○ Parametric equations differentiation
	  ○ Second derivatives (parametric functions)
	  ○ Parametric curve arc length
	  ○ Vector-valued functions differentiation
	  ○ Second derivatives (vector-valued functions)
	  ○ Motion along a curve (differential calc)
	  ○ Planar motion (with integrals)
	  ○ Differentiate polar functions
	  ○ Area bounded by polar curves intro
	  ○ Area bounded by polar curves
	  ○ Area with polar functions (calculator-active)

○ Use area if a sector from geometry and how it relates to the area of a polar function ○ Find the area of a polar function ○ Polar curve intersection points ○ Area between two polar curves ● Guided Practice - Students will complete previously released free-response questions as practice ● Independent Practice - Students will complete various problems (homework, AP classroom progress checks, etc.) to master the content in this chapter ● Group work - Students will complete a card sort and a stations activity to practice the material learned	

Unit 10: Infinite Sequences and Series	**Time:** 25-28 class periods

Academic Standards:

- LIM-7.A.1, LIM-7.A.2, LIM-7.A.3, LIM-7.A.4, LIM-7.A.5, LIM-7.A.6, LIM-7.A.7, LIM-7.A.8, LIM-7.A.9, LIM-7.A.10, LIM-7.A.11, LIM-7.A.12, LIM-7.A.13, LIM-7.A.14; LIM-7.B.1
- LIM-8.A.1, LIM-8.A.2, LIM-8.A.2; LIM-8.B.1; LIM-8.C.1, LIM-8.C.2; LIM-8.D.1, LIM-8.D.2, LIM-8.D.3, LIM-8.D.4, LIM-8.D.5, LIM-8.D.6 LIM-8.E.1; LIM-8.F.1, LIM-8.F.2
- LIM-8.G.1

Essential Content/Objective: At the end of the unit, students will be able to:

- Determine whether a series converges or diverges
- Find the sum for which a series converges to
- Identify the constant ratio between terms in a geometric series
- Find the sum of a convergent geometric series
- Use the n-th term test for divergence
- Use the integral test to determine if a series converges or diverges
- Identify common series such as the harmonic series, the alternating harmonic series and a p-series
- Use the limit comparison test to determine if a series converges or diverges
- Use the alternating series test to determine if an alternating series converges
- Use the ratio test to determine if a series converges or diverges
- Determine if a series converges absolutely or conditionally
- Apply the alternating series bound to a convergent alternating series
- Write a nth degree Taylor polynomial for a function centered at x = c
- Use a nth degree Taylor polynomial to approximate the function near x = a
- Use Lagrange error bound to determine

Assessment:

- **9.1 Assessment** - Sequence and Series Tests, Alternating Series Remainder Theorem
- **9.2 - 9.4 Assessment** - Taylor Polynomials, Maclaurin Polynomials, Radius of Convergence, Interval of Convergence, Power Series
- **Chapter 9 Assessment** - All topics listed above AND Lagrange Error Bound

Core Student Activities: Students will complete/participate in the following:

- AP Classroom Progress Checks: Students will complete AP style questions to check for understanding.
- Graphic Organizer - Series Tests: Students will fill in using the many different series test
- Big 10- Convergence: Students will apply the tests for convergence and divergence of a series
- 5 for 5: Taylor Series: Students will answer 5 AP style questions on Taylor series
- Card Sort - Series Test for Convergence/Divergence for students to practice the tests they have learned
- Card Sort - Students will match function/expanded series/series notation for general term for KNOWN Taylor Polynomials
- Circuit: Series: Students will apply their knowledge of chapter 10 to complete the circuit.

Materials and Resources:

- AP Classroom
- Envelopes filled with card sort pieces
- Blank Graphic Organizer for convergence/divergence of a sequence and series tests
- Delta Math
  - Convergence and Divergence of a Series
  - Geometric Series (Level 1 & 2)
  - Direct Comparison Test
  - Ratio Test
  - Alternating Series Bound
  - Radius of Convergence
  - Interval of convergence
  - Lagrange Error Bound

Extensions:

- Polar Arc Length
  - Lesson
  - Practice Problems

Remediation:

- Series test (foldable)
- Khan Academy
  - Defining convergent and divergent infinite series
  - Integral test for convergence
  - Lagrange error bound
  - Representing functions as power series

Instructional Methods: ● Direct Instruction ○ Introduce terminology for sequences and series. ○ Teach students how to use specific tests for determining convergence of divergence. ○ Show students how a series can be expressed as a Maclaurin or Taylor polynomial and how calculus can be applied to these polynomials. ○ Teach students how certain polynomials can be written as power series. ○ Address with students that lower degree polynomials can be less accurate and use error bounds to get a reliable interval that a functions value can reside in. ● Guided Practice - Students will use the flow chart created to help identify the test needed to prove convergence or divergence of a series. ● Independent Practice - Students will complete various problems (homework, AP classroom progress checks, etc.) to master the content in this chapter ● Group work - Students will complete card sorts to practice the material learned.	