



AP®

## AP® Calculus AB and BC

# Your Course at a Glance

### Plan

The Course at a Glance provides a useful visual organization of the AP Calculus AB and AP Calculus BC curricular components, including:

- Sequence of units, along with approximate weighting and suggested pacing. Please note, pacing is based on 45-minute class periods, meeting five days each week for a full academic year.
- Progression of topics within each unit.
- Spiraling of the big ideas and mathematical practices across units.

### Teach

#### MATHEMATICAL PRACTICES

Mathematical practices spiral throughout the course.

1 Implementing Mathematical Processes	3 Justification
2 Connecting Representations	4 Communication and Notation

#### BIG IDEAS

Big ideas spiral across topics and units.

CHA Change	FUN Analysis of Functions
LIM Limits	

**BC ONLY** The purple shading represents BC only content.

### Assess

Assign the Progress Checks—either as homework or in class—for each unit. Each Progress Check contains formative multiple-choice and free-response questions. The feedback from the Progress Checks shows students the areas where they need to focus.

### UNIT 1

#### Limits and Continuity

AP EXAM WEIGHTING	10–12% AB	4–7% BC
CLASS PERIODS	~22–23 AB	~13–14 BC

CHA 1.1 Introducing Calculus: Can Change Occur at an Instant?	
LIM 1.2 Defining Limits and Using Limit Notation	
LIM 1.3 Estimating Limit Values from Graphs	
LIM 1.4 Estimating Limit Values from Tables	
LIM 1.5 Determining Limits Using Algebraic Properties of Limits	
LIM 1.6 Determining Limits Using Algebraic Manipulation	
LIM 1.7 Selecting Procedures for Determining Limits	
LIM 1.8 Determining Limits Using the Squeeze Theorem	
LIM 1.9 Connecting Multiple Representations of Limits	
LIM 1.10 Exploring Types of Discontinuities	
LIM 1.11 Defining Continuity at a Point	
LIM 1.12 Confirming Continuity over an Interval	
LIM 1.13 Removing Discontinuities	
LIM 1.14 Connecting Infinite Limits and Vertical Asymptotes	
LIM 1.15 Connecting Limits at Infinity and Horizontal Asymptotes	
FUN 1.16 Working with the Intermediate Value Theorem (IVT)	

#### Progress Check 1

Multiple-choice: ~45 questions  
Free-response: 3 questions (partial)

### UNIT 2

#### Differentiation: Definition and Basic Derivative Rules

AP EXAM WEIGHTING	10–12% AB	4–7% BC
CLASS PERIODS	~13–14 AB	~9–10 BC

CHA 2.1 Defining Average and Instantaneous Rates of Change at a Point	
CHA 2.2 Defining the Derivative of a Function and Using Derivative Notation	
CHA 2.3 Estimating Derivatives of a Function at a Point	
FUN 2.4 Connecting Differentiability and Continuity: Determining When Derivatives Do and Do Not Exist	
FUN 2.5 Applying the Power Rule	
FUN 2.6 Derivative Rules: Constant, Sum, Difference, and Constant Multiple	
FUN 2.7 Derivatives of $\cos x$ , $\sin x$ , $e^x$ , and $\ln x$	
FUN 2.8 The Product Rule	
FUN 2.9 The Quotient Rule	
FUN 2.10 Finding the Derivatives of Tangent, Cotangent, Secant, and/or Cosecant Functions	

#### Progress Check 2

Multiple-choice: ~30 questions  
Free-response: 3 questions (partial)

### UNIT 3

### UNIT 4

#### Differentiation: Composite, Implicit, and Inverse Functions

AP EXAM WEIGHTING	9–13% AB	4–7% BC
CLASS PERIODS	~10–11 AB	~8–9 BC

CHA 3.1 The Chain Rule	
FUN 3.2 Implicit Differentiation	
CHA 3.3 Differentiating Inverse Functions	
FUN 3.4 Differentiating Inverse Trigonometric Functions	
FUN 3.5 Selecting Procedures for Calculating Derivatives	
FUN 3.6 Calculating Higher-Order Derivatives	

#### Progress Check 3

Multiple-choice: ~15 questions  
Free-response: 3 questions (partial)

### UNIT 5

#### Contextual Applications of Differentiation

AP EXAM WEIGHTING	10–15% AB	6–9% BC
CLASS PERIODS	~10–11 AB	~6–7 BC

CHA 4.1 Interpreting the Meaning of the Derivative in Context	
FUN 4.2 Straight-Line Motion: Connecting Position, Velocity, and Acceleration	
FUN 4.3 Rates of Change in Applied Contexts Other Than Motion	
CHA 4.4 Introduction to Related Rates	
FUN 4.5 Solving Related Rates Problems	
FUN 4.6 Approximating Values of a Function Using Local Linearity and Linearization	
CHA 4.7 Using L'Hospital's Rule for Determining Limits of Indeterminate Forms	

#### Progress Check 4

Multiple-choice: ~15 questions  
Free-response: 3 questions (partial/full)

### UNIT 6

#### Analytical Applications of Differentiation

AP EXAM WEIGHTING	15–18% AB	8–11% BC
CLASS PERIODS	~15–16 AB	~10–11 BC

CHA 5.1 Using the Mean Value Theorem	
FUN 5.2 Extreme Value Theorem, Global Versus Local Extrema, and Critical Points	
FUN 5.3 Riemann Sums, Summation Notation, and Definite Integral Notation	
FUN 5.4 Determining Intervals on Which a Function is Increasing or Decreasing	
FUN 5.5 Using the First Derivative Test to Determine Relative (Local) Extrema	
FUN 5.6 Approximating Solutions Using Euler's Method BC ONLY	
FUN 5.7 Interpreting the Behavior of Accumulations	
FUN 5.8 Using the Candidates Test to Determine Absolute (Global) Extrema	
FUN 5.9 Determining Concavity of Functions over Their Domains	
CHA 6.1 Exploring Accumulations of Change	
FUN 6.2 Approximating Areas with Riemann Sums	
FUN 6.3 Sketching Slope Fields	
FUN 6.4 Using Accumulation Functions and Definite Integrals in Applied Contexts	
FUN 6.5 Reasoning Using Slope Fields	
FUN 6.6 Determining the Area Between Curves Expressed as Functions of $x$	
FUN 6.7 Finding the Area Between Curves Expressed as Functions of $y$	
FUN 6.8 Applying Properties of Definite Integrals	
CHA 6.9 Defining and Differentiating Vector-Valued Functions	
FUN 6.10 Integrating Vector-Valued Functions	
FUN 6.11 Finding the Area Between Curves That Intersect at More Than Two Points	
FUN 6.12 Sketching Graphs of Functions and Their Derivatives	
FUN 6.13 Using the Second Derivative Test to Determine Extrema	
FUN 6.14 Finding Antiderivatives and Indefinite Integrals: Basic Rules and Notation	
CHA 7.1 Modeling Situations with Differential Equations	
FUN 7.2 Verifying Solutions for Differential Equations	
FUN 7.3 Sketching Slope Fields	
FUN 7.4 Using Accumulation Functions and Definite Integrals in Applied Contexts	
FUN 7.5 Approximating Solutions Using Euler's Method	
FUN 7.6 Finding General Solutions Using Separation of Variables	
FUN 7.7 Finding Particular Solutions Using Initial Conditions and Separation of Variables	
FUN 7.8 Determining Concavity of Functions over Their Domains	
CHA 8.1 Finding the Average Value of a Function on an Interval	
FUN 8.2 Connecting Position, Velocity, and Acceleration of Functions Using Integrals	
FUN 8.3 Sketching Slope Fields	
FUN 8.4 Using Accumulation Functions and Definite Integrals in Applied Contexts	
FUN 8.5 Approximating Solutions Using Euler's Method	
FUN 8.6 Finding the Area Between Curves Expressed as Functions of $x$	
FUN 8.7 Finding the Area Between Curves Expressed as Functions of $y$	
FUN 8.8 Applying Properties of Definite Integrals	
CHA 8.9 Defining Polar Coordinates and Differentiating in Polar Form	
FUN 8.10 Integrating Using Polar Coordinates	
FUN 8.11 Sketching Graphs of Functions in Polar Coordinates	
FUN 8.12 Finding the Area of a Polar Region or the Area Bounded by a Single Polar Curve	
FUN 8.13 Using the Second Derivative Test to Determine Extrema	
FUN 8.14 Finding Antiderivatives and Indefinite Integrals: Basic Rules and Notation	
CHA 9.1 Defining and Differentiating Parametric Equations	
FUN 9.2 Second Derivatives of Parametric Equations	
FUN 9.3 Finding Arc Lengths of Curves Given by Parametric Equations	
FUN 9.4 Defining and Differentiating Vector-Valued Functions	
FUN 9.5 Integrating Vector-Valued Functions	
FUN 9.6 Solving Motion Problems Using Parametric and Vector-Valued Functions	
FUN 9.7 Finding Particular Solutions Using Initial Conditions and Separation of Variables	
FUN 9.8 Determining Concavity of Functions over Their Domains	
CHA 10.1 Defining and Differentiating Power Series	
FUN 10.2 Working with Geometric Series	
FUN 10.3 The nth Term Test for Divergence	
FUN 10.4 Integral Test for Convergence	
FUN 10.5 Harmonic Series and p-Series	
FUN 10.6 Comparison Tests for Convergence	
FUN 10.7 Alternating Series Test for Convergence	
FUN 10.8 Ratio Test for Convergence	
FUN 10.9 Alternating Series Error Bound	
FUN 10.10 Determining Absolute or Conditional Convergence	
FUN 10.11 Finding Taylor Polynomials and Approximating Functions	
FUN 10.12 Lagrange Error Bound	
FUN 10.13 Radius and Interval of Convergence for Power Series	
FUN 10.14 Finding Taylor MacLaurin Series for Functions	
FUN 10.15 Representing Functions as Power Series	

#### Progress Check 5

Multiple-choice: ~15 questions  
Free-response: 3 questions

### UNIT 7

#### Integration and Accumulation of Change

AP EXAM WEIGHTING	17–20% AB	17–20% BC
CLASS PERIODS	~18–20 AB	~15–16 BC

CHA 7.1 Modeling Situations with Differential Equations	
FUN 7.2 Verifying Solutions for Differential Equations	
FUN 7.3 Sketching Slope Fields	
FUN 7.4 Using Accumulation Functions and Definite Integrals in Applied Contexts	
FUN 7.5 Approximating Solutions Using Euler's Method	
FUN 7.6 Finding General Solutions Using Separation of Variables	
FUN 7.7 Finding Particular Solutions Using Initial Conditions and Separation of Variables	
FUN 7.8 Determining Concavity of Functions over Their Domains	
CHA 8.1 Finding the Average Value of a Function on an Interval	
FUN 8.2 Connecting Position, Velocity, and Acceleration of Functions Using Integrals	
FUN 8.3 Sketching Slope Fields	
FUN 8.4 Using Accumulation Functions and Definite Integrals in Applied Contexts	
FUN 8.5 Approximating Solutions Using Euler's Method	
FUN 8.6 Finding the Area Between Curves Expressed as Functions of $x$	
FUN 8.7 Finding the Area Between Curves Expressed as Functions of $y$	
FUN 8.8 Applying Properties of Definite Integrals	
CHA 8.9 Defining Polar Coordinates and Differentiating in Polar Form	
FUN 8.10 Integrating Using Polar Coordinates	
FUN 8.11 Sketching Graphs of Functions in Polar Coordinates	
FUN 8.12 Finding the Area of a Polar Region or the Area Bounded by a Single Polar Curve	
FUN 8.13 Using the Second Derivative Test to Determine Extrema	
FUN 8.14 Finding Antiderivatives and Indefinite Integrals: Basic Rules and Notation	
CHA 9.1 Defining and Differentiating Parametric Equations	
FUN 9.2 Second Derivatives of Parametric Equations	
FUN 9.3 Finding Arc Lengths of Curves Given by Parametric Equations	
FUN 9.4 Defining and Differentiating Vector-Valued Functions	
FUN 9.5 Integrating Vector-Valued Functions	
FUN 9.6 Solving Motion Problems Using Parametric and Vector-Valued Functions	
FUN 9.7 Finding Particular Solutions Using Initial Conditions and Separation of Variables	
FUN 9.8 Determining Concavity of Functions over Their Domains	
CHA 10.1 Defining and Differentiating Power Series	
FUN 10.2 Working with Geometric Series	
FUN 10.3 The nth Term Test for Divergence	
FUN 10.4 Integral Test for Convergence	
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FUN 10.6 Comparison Tests for Convergence	
FUN 10.7 Alternating Series Test for Convergence	
FUN 10.8 Ratio Test for Convergence	
FUN 10.9 Alternating Series Error Bound	
FUN 10.10 Determining Absolute or Conditional Convergence	