CollegeBoard AP

AP CALCULUS AB

AP Pacing Guide for Flipped Classrooms: Jan.–April 2021

Overview

Due to the challenges associated with hybrid and remote learning in 2020-21, a significant amount of the content and skills colleges are requiring for credit will likely need to be assigned to students as homework or independent learning. This guide allows students who are currently behind to complete all course topics from the course and exam description by May. This guide assumes students will complete approximately 30 minutes of AP Daily videos (~10 minutes each) and topic questions each day in lieu of, or addition to, assignments the teacher would ordinarily give.

How to Implement

This guide assumes students covered only 25% of the course content and skills in the fall of 2020. For classes that have been forced off schedule, there may not be time for teacher-led instruction of all remaining topics.

- Teachers should **assign the AP Daily videos and topic questions** listed below as student assignments each week.
- Using the reports generated by the topic questions, teachers should focus their limited, direct class time on the Learning Objectives where students need more help.
- If students are ahead of the pace indicated below, teachers will be able to incorporate additional days or weeks to spend more time on challenging topics, practicing course skills, or reviewing for the exam.

Week 1: Jan. 4–8

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
3.1	The Chain Rule	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	FUN-3.C: Calculate derivatives of compositions of differentiable functions.	Topic Questions
3.2	Implicit Differentiation	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	FUN-3.D: Calculate derivatives of implicitly defined functions.	Topic Questions
3.3	Differentiating Inverse Functions	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	FUN-3.E: Calculate derivatives of inverse and inverse trigonometric functions.	Topic Questions

*Prioritize the most challenging Learning Objectives for your students for direct, synchronous instruction.

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
3.4	Differentiating Inverse Trigonometric Functions	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	FUN-3.E: Calculate derivatives of inverse and inverse trigonometric functions.	Topic Questions

Week 2: Jan. 11–15

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
3.5	Selecting Procedures for Calculating Derivatives	AP Daily Video 1 AP Daily Video 2	FUN-3.E: Calculate derivatives of inverse and inverse trigonometric functions.	Topic Questions
3.6	Calculating Higher-Order Derivatives	AP Daily Video 1 AP Daily Video 2	FUN-3.F: Determine higher order derivatives of a function.	Topic Questions Personal Progress Check
4.1	Interpreting the Meaning of the Derivative in Context	AP Daily Video 1	CHA-3.A: Interpret the meaning of a derivative in context.	Topic Questions
4.2	Straight-Line Motion: Connecting Position, Velocity, and Acceleration	AP Daily Video 1 AP Daily Video 2	CHA-3.B: Calculate rates of change in applied contexts.	Topic Questions
4.3	Rates of Change in Applied Contexts Other Than Motion	AP Daily Video 1 AP Daily Video 2	CHA-3.C: Interpret rates of change in applied contexts.	Topic Questions

Week 3: Jan. 18–22

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
4.4	Introduction to Related Rates	AP Daily Video 1	CHA-3.D: Calculate related rates in applied contexts.	Topic Questions
4.5	Solving Related Rates Problems	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	CHA-3.E: Interpret related rates in applied contexts.	Topic Questions
4.6	Approximating Values of a Function Using Local Linearity and Linearization	AP Daily Video 1 AP Daily Video 2	CHA-3.F: Approximate a value on a curve using the equation of a tangent line.	Topic Questions
4.7	Using L'Hospital's Rule for Determining Limits of Indeterminate Forms	AP Daily Video 1 AP Daily Video 2	LIM-4.A: Determine limits of functions that result in indeterminate forms.	Topic Questions Personal Progress Check

Week 4: Jan. 25–29

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
5.1	Using the Mean Value Theorem	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	FUN-1.B: Justify conclusions about functions by applying the Mean Value Theorem over an interval.	Topic Questions
5.2	Extreme Value Theorem, Global Versus Local Extrema, and Critical Points	AP Daily Video 1 AP Daily Video 2	FUN-1.C: Justify conclusions about functions by applying the Extreme Value Theorem.	Topic Questions
5.3	Determining Intervals on Which a Function Is Increasing or Decreasing	AP Daily Video 1 AP Daily Video 2	FUN-4.A: Justify conclusions about the behavior of a function based on the behavior of its derivatives.	Topic Questions
5.4	Using the First Derivative Test to Determine Relative (Local) Extrema	AP Daily Video 1 AP Daily Video 2	FUN-4.A: Justify conclusions about the behavior of a function based on the behavior of its derivatives.	Topic Questions

Week 5: Feb. 1–5

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
5.5	Using the Candidates Test to Determine Absolute (Global) Extrema	AP Daily Video 1 AP Daily Video 2	FUN-4.A: Justify conclusions about the behavior of a function based on the behavior of its derivatives.	Topic Questions
5.6	Determining Concavity of Functions over Their Domains	AP Daily Video 1 AP Daily Video 2	FUN-4.A: Justify conclusions about the behavior of a function based on the behavior of its derivatives.	Topic Questions
5.7	Using the Second Derivative Test to Determine Extrema	AP Daily Video 1	FUN-4.A: Justify conclusions about the behavior of a function based on the behavior of its derivatives.	Topic Questions
5.8	Sketching Graphs of Functions and Their Derivatives	AP Daily Video 1	FUN-4.A: Justify conclusions about the behavior of a function based on the behavior of its derivatives.	Topic Questions

Week 6: Feb. 8–12

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
5.9	Connecting a Function, Its First Derivative, and Its Second Derivative	AP Daily Video 1 AP Daily Video 2	FUN-4.A: Justify conclusions about the behavior of a function based on the behavior of its derivatives.	Topic Questions
5.10	Introduction to Optimization Problems	AP Daily Video 1 AP Daily Video 2	FUN-4.B: Calculate minimum and maximum values in applied contexts or analysis of functions.	Topic Questions
5.11	Solving Optimization Problems	AP Daily Video 1	FUN-4.C: Interpret minimum and maximum values calculated in applied contexts.	Topic Questions
5.12	Exploring Behaviors of Implicit Relations	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	FUN-4.D: Determine critical points of implicit relations. FUN-4.E: Justify conclusions about the behavior of an implicitly defined function based on evidence from its derivatives.	Topic Questions Personal Progress Check

Week 7: Feb. 15–19

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
6.1	Exploring Accumulations of Change	AP Daily Video 1 AP Daily Video 2	CHA-4.A: Interpret the meaning of areas associated with the graph of a rate of change in context.	Topic Questions
6.2	Approximating Areas with Riemann Sums	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	LIM-5.A: Approximate a definite integral using geometric and numerical methods.	Topic Questions
6.3	Riemann Sums, Summation Notation, and Definite Integral Notation	AP Daily Video 1 AP Daily Video 2	LIM-5.B: Interpret the limiting case of the Riemann sum as a definite integral. LIM-5.C: Represent the limiting case of the Riemann sum as a definite integral.	Topic Questions

Week 8: Feb. 22–26

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
6.4	The Fundamental Theorem of Calculus and Accumulation Functions	AP Daily Video 1 AP Daily Video 2	FUN-5.A: Represent accumulation functions using definite integrals.	Topic Questions
6.5	Interpreting the Behavior of Accumulation Functions Involving Area	AP Daily Video 1 AP Daily Video 2	FUN-5.A: Represent accumulation functions using definite integrals.	Topic Questions
6.6	Applying Properties of Definite Integrals	AP Daily Video 1 AP Daily Video 2	FUN-6.A: Calculate a definite integral using areas and properties of definite integrals.	Topic Questions

Week 9: Mar. 1–5

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
6.7	The Fundamental Theorem of Calculus and Definite Integrals	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	FUN-6.B: Evaluate definite integrals analytically using the Fundamental Theorem of Calculus.	Topic Questions
6.8	Finding Antiderivatives and Indefinite Integrals: Basic Rules and Notation	AP Daily Video 1 AP Daily Video 2	FUN-6.C: Determine antiderivatives of functions and indefinite integrals, using knowledge of derivatives.	Topic Questions
6.9	Integrating Using Substitution	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	FUN-6.D: For integrands requiring substitution or rearrangements into equivalent forms: (a) Determine indefinite integrals. (b) Evaluate definite integrals.	Topic Questions

Week 10: Mar. 8–12

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
6.10	Integrating Functions Using Long Division and Completing the Square	AP Daily Video 1 AP Daily Video 2	FUN-6.D: For integrands requiring substitution or rearrangements into equivalent forms: (a) Determine indefinite integrals. (b) Evaluate definite integrals.	Topic Questions
6.14	Selecting Techniques for Antidifferentiation	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	See page 128 of the course and exam description for more information on Topic 6.14.	Topic Questions Personal Progress Check
7.1	Modeling Situations with Differential Equations	AP Daily Video 1	FUN-7.A: Interpret verbal statements of problems as differential equations involving a derivative expression.	Topic Questions
7.2	Verifying Solutions for Differential Equations	AP Daily Video 1	FUN-7.B: Verify solutions to differential equations.	Topic Questions

Week 11: Mar. 15–19

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
7.3	Sketching Slope Fields	AP Daily Video 1 AP Daily Video 2	FUN-7.C: Estimate solutions to differential equations.	Topic Questions
7.4	Reasoning Using Slope Fields	AP Daily Video 1	FUN-7.C: Estimate solutions to differential equations.	Topic Questions
7.6	Finding General Solutions Using Separation of Variables	AP Daily Video 1 AP Daily Video 2	FUN-7.D: Determine general solutions to differential equations.	Topic Questions
7.7	Finding Particular Solutions Using Initial Conditions and Separation of Variables	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	FUN-7.E: Determine particular solutions to differential equations.	Topic Questions
7.8	Exponential Models with Differential Equations	AP Daily Video 1	FUN-7.F: Interpret the meaning of a differential equation and its variables in context. FUN-7.G: Determine general and particular solutions for problems involving differential equations in context.	Topic Questions Personal Progress Check

Week 12: Mar. 22–26

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
8.1	Finding the Average Value of a Function on an Interval	AP Daily Video 1 AP Daily Video 2	CHA-4.B: Determine the average value of a function using definite integrals.	Topic Questions
8.2	Connecting Position, Velocity, and Acceleration of Functions Using Integrals	AP Daily Video 1 AP Daily Video 2	CHA-4.C: Determine values for positions and rates of change using definite integrals in problems involving rectilinear motion.	Topic Questions
8.3	Using Accumulation Functions and Definite Integrals in Applied Contexts	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	CHA-4.D: Interpret the meaning of a definite integral in accumulation problems. CHA-4.E: Determine net change using definite integrals in applied contexts.	Topic Questions

Week 13: Mar. 29–Apr. 2

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
8.4	Finding the Area Between Curves Expressed as Functions of x	AP Daily Video 1 AP Daily Video 2	CHA-5.A: Calculate areas in the plane using the definite integral.	Topic Questions
8.5	Finding the Area Between Curves Expressed as Functions of y	AP Daily Video 1	CHA-5.A: Calculate areas in the plane using the definite integral.	Topic Questions
8.6	Finding the Area Between Curves That Intersect at More Than Two Points	AP Daily Video 1	CHA-5.A: Calculate areas in the plane using the definite integral.	Topic Questions

Week 14: Apr. 5–9

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
8.7	Volumes with Cross-Sections: Squares and Rectangles	AP Daily Video 1 AP Daily Video 2 AP Daily Video 3	CHA-5.B: Calculate volumes of solids with known cross sections using definite integrals.	Topic Questions
8.8	Volumes with Cross-Sections: Triangles and Semicircles	AP Daily Video 1 AP Daily Video 2	CHA-5.B: Calculate volumes of solids with known cross sections using definite integrals.	Topic Questions
8.9	Volume with Disc Method: Revolving Around the x- or y-Axis	AP Daily Video 1 AP Daily Video 2	CHA-5.C: Calculate volumes of solids of revolution using definite integrals.	Topic Questions
8.10	Volume with Disc Method: Revolving Around Other Axes	AP Daily Video 1	CHA-5.C: Calculate volumes of solids of revolution using definite integrals.	Topic Questions

Week 15: Apr. 12–16

Topic		Recommended Asynchronous Student Assignments	Options for Synchronous Instructional Focus*	Check for Understanding
8.11	Volume with Washer Method: Revolving Around the x- or y-Axis	AP Daily Video 1 AP Daily Video 2	CHA-5.C: Calculate volumes of solids of revolution using definite integrals.	Topic Questions
8.12	Volume with Washer Method: Revolving Around Other Axes	AP Daily Video 1	CHA-5.C: Calculate volumes of solids of revolution using definite integrals.	Topic Questions Personal Progress Check