Calculus AP Syllabus (Second Semester)

Unit 10: Area under a curve: Using geometry to compute definite integrals

Lesson 01: The meaning of a definite integral with regard to area
(Initial geometric view of the function)

Lesson 02: The meaning of a definite integral with regard to area
(Initial algebraic view of the function)

Lesson 03: An application of definite integrals (integrating rates)

Cumulative review
Unit 10 review
Unit 10 test

Unit 11: Riemann sums

Lesson 01: Riemann left, right, and midpoint sums

Lesson 02: Riemann sums applied to abstract data

Lesson 03: Riemann sum application: finding accumulated rates

Lesson 04: Definite Integrals as the limit of Riemann sums
Riemann sum forensics

Lesson 05: The trapezoid rule

Cumulative review
Unit 11 review
Unit 11 test

Unit 12: Fundamental Theorem of Calculus (FTC)

Lesson 01: Fundamental theorem of calculus; definite integral properties
Definite integrals on a graphing calculator

Lesson 02: Average of a function over an interval

Lesson 03: More practice with definite integrals
Function averages

Lesson 04: The integral as a function of the limits

Lesson 05: A graphical look at the Fundamental Theorem of Calculus

Cumulative review
Unit 12 review
Unit 12 test

Unit 13: Differentials and Newton's method

Lesson 01: Fundamentals of differentials

Lesson 02: Approximations using differentials

Lesson 03: Newton's method for approximating roots

Cumulative review
Unit 13 review
Unit 13 test

Unit 14: Integration by algebraic substitution (u-substitution)

Lesson 01: Integration by algebraic substitution (u-substitution fundamentals)

Lesson 02: More u-substitution practice: wise choices of *u*

Lesson 03: Definite integrals using u-substitution

Lesson 04: Even and odd function integrals with symmetrical limits

Cumulative review
Unit 14 review
Unit 14 test

Unit 15: Integration involving logarithms and exponentials

Lesson 01: Integrals that produce or involve logarithms

Lesson 02: Integration of exponential functions

Lesson 03: Mixed practice with logs and exponentials

Lesson 04: Definite integrals involving exponentials and logs
            Integrals of non-sinusoidal trig functions

Cumulative review
Unit 15 review
Unit 15 test

Unit 16: Applications of integration (plane areas, volumes of solids)

Lesson 01: Area between two curves

Lesson 02: Volumes of solids of revolution… disk method

Lesson 03: Volumes of solids of revolution… washer method

Lesson 04: Volumes of solids of revolution… shell method

Lesson 05: Volumes of other solids: volumes by cross-sections

Cumulative review
Unit 16 review
Unit 16 test

Unit 17: Differential equations

Lesson 01: Slope fields

Lesson 02: Separation of variables method

Lesson 03: More practice with separation of variables

Lesson 04: Verifying solutions of differential equations

Lesson 05: Growth and decay problems

Cumulative review
Unit 17 review
Unit 17 test

Unit 18: Integrals that produce inverse sine and tangent

Lesson 01: Integrals that produce inverse sine and tangent (simplest form)

Lesson 02: Completing the square with integrals that produce inverse sine and tangent

Cumulative review
Unit 17 test

Unit 19: Arc length, surface area, physics applications of integration

Lesson 01: Lengths of plane curves

Lesson 02. Surface areas of solids of revolution

Lesson 03: Fluid pressure

Lesson 04: Work (as defined in physics)

Cumulative review
Unit 18 review
Unit 18 test

Unit 20: Additional integration methods

Lesson 01: Integration by parts

Lesson 02. Integration using trig substitution

Lesson 03: Integration using partial fractions

Unit 19 review
Unit 19 test

Semester summary
Semester review
Semester test

Enrichment Topics
Topic A: Special sine and cosine limits

Topic B: Formal definition of continuity

Topic C: Verification of the power rule

Topic D: Verification of the product and quotient rules

Topic E: Verification of rules for derivative of sine and cosine functions

Topic F: Verification of the Chain Rule

Topic G: Verification of derivatives of exponential functions

Topic H: Verification of derivatives of logarithm functions

Topic I: Verification of derivatives of inverse trig functions

Topic J: An argument in support of the Fundamental Theorem of Calculus

Topic k: Why the absolute value for the integral of 1/x?

Topic L: Partial fractions