Teacher: CORE AP Calculus BC
Year: 2017-18
Course: AP Calculus BC
Month: All Months

Sept Techniques of Integration

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Integral formulas	Review integral formulas					
	Integration by substitution	Review computing definite and indefinite integrals by substitution					
	Integration by parts	Evaluate indefinite and definite integrals using integration by parts					
		Use tabular integration to evaluate integrals requiring repeated use of integration by parts					
	Integrating powers of sine and cosine	Integrate products of powers of sine and cosine					
	Trig substitutions	Evaluate integrals using trig substitutions					
	Integrating rational functions	Evaluate integrals of rational functions using partial fractions					
	Numerical integration	Review rectangular and trapezoidal approximations					
		Approximate the definite integral using Simpson's rule					
		Estimate error in using the trapezoidal and Simpson's rule					

Oct Differential Equations and Applications

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Slope Fields and Euler's method	Review constructing slope fields				Text: Finney, Demana, Waits, Kennedy	
		Interpret slope fields as visualizations of differential equations				*Calculus Graphical, Numerical, Algebraic*	
		Solve initial value problems				Pearson Prentice Hall 2007	
		Use Euler's method for graphing a solution to an initial value problem					
						Supplemental Text: Anton *Calculu*	

Supplemental Resources:
· Solow *Learning By Discovery A Lab Manual for Calculus* MAA 1997
· Lab 25 Differential Equations and Euler's Method
· Lab 16 Exploring Exponentials
· Fishbeck *AP Calculus with the TI 83* Venture Publishing 1998
· Activities and problems from Chapter 6

		First order differential equations	Review solving first order differential equations					
		Separable differential equations	Review solving first order separable differential equations Solve first order linear differential equations					
		Exponential growth and decay	Write and solve differential equations representing exponential growth and decay					
		Logistic growth model	Write and solve differential equations representing logistic growth					
N o v e m b e r	Unit 3 Applications of the Integral							
	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
		Integral as net change	Determine the net change over time by integrating a rate Solve problems involving the integral as net change in linear motion, consumption over time, and net change from data					
		Area and Volume	Review finding area and volume					
		Surface Area	Find the surface area of a solid of revolution					
		Lengths of curves	Calculate lengths of curves in a plane using integration					

		Applications from science and statistics	Use integral calculus to model problems involving rates of change in a variety of applications including work, fluid force and pressure, and normal probabilities					
D e c e m b e r	Unit 4 Sequences, L'Hopital's Rule, and Improper I							
	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
		Sequences	Define sequences explicitly or recursively Determine whether a sequence converges or diverges Determine the limit of a sequence using the SandwichTheorem or the Absolute Value Theorem					
		L'Hopital's Rule	Find the limits of indeterminate forms using L"Hopital's Rule					
		Relative Rates of Growth	Compare rates of growth of functions using L"Hopital's Rule					
		Improper Integrals	Evaluate improper integrals using limits Use the direct comparison test or the limit comparison test to determine convergence or divergence of improper integrals					
J a n u a r y	Unit 5 Infinite Series							
	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
		Power Series	Apply properties of geometric series					
		Taylor series	Differentiate, integrate, or substitute into a known power series to find additional power series representations Use derivatives to find the Maclaurin series or Taylor series generated by a differentiable function					
		Taylor’s Theorem	Approximate a function with a Taylor polynomial					

		Radius of Convergence	Analyze the truncation error of a series using graphical methods or the Remainder Estimation Theorem					
		Testing convergence at endpoints						
			Use Euler's formula to relate the functions sinx, cosx, and e^x Use the nth-term test, the direct comparison test, and the ratio test to determine the convergence or divergence of a series of numbers or the radius of convergence of a power series Use the integral test or the alternating series test to determine the convergence or divergence of p-series, including the harmonic series Determine the absolute convergence, conditional convergence, or divergence of a power series at the endpoints of its interval of convergence					
F e b r u a r y	Unit 6 Conic Sections, Parametric Functions and Polar Coordinates							
	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
		Conic Sections	Define each conic section: circle, parabola, ellipse and hyperbola Determine equations of each conic section Classify conic sections by their eccentricity					
		Parametric Equations	Determine the quadratic equation of a conic section after rotation Graph curves described parametrically					
		Calculus of parametric functions	Find parameterizations of circles, ellipses, and line segments					
		Polar coordinates						

			Find derivatives and second derivatives of parametric and polar functions					
		Calculus of polar functions						
			Calculate the length of parametrically defined curves Graph polar equations and determine symmetry of polar graphs Convert Cartesian coordinates into polar form Calculate slopes of polar curves Determine the area of a region bounded by polar curves Determine the length of polar curves					
M	Unit 7 Calculus of Vector Functions							
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r	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
		Vectors in the plane	Define and describe two dimensional vectors, magnitude and direction					
c			Perform operations on vectors including vector addition and scalar multiplication, and finding the length of a vector					
h		Derivatives of vector functions						
			Determine the derivative of vector functions					
		Integrals of vector functions	Determine the integral of vector functions					
			Solve problems on planar motion Solve problems involving velocity, speed and acceleration Solve problems by finding displacement and distance traveled					

April

AP Calculus Exam Review

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Review for AP Calculus BC exam using released items and practice tests from the College Board						

May

Unit 8 Hyperbolic Functions

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	Definitions	Define and graph the hyperbolic sine and hyperbolic cosine functions				· Text: Finney, Demana, Waits, Kennedy *Calculus Graphical, Numerical, Algebraic* Pearson Prentice Hall 2007 Supplemental Text: Anton *Calculus*	
	Derivatives and Integrals						
	Inverse Hyperbolic Functions	Define other hyperbolic trig functions in terms of sinh and cosh					
	Derivatives and Integrals						
	Applications	Simplify expressions using hyperbolic identities Determine and use derivative and integrals for hyperbolic functions Define inverse hyperbolic functions Determine derivatives and integrals of inverse hyperbolic functions Solve application problems using hyperbolic functions					