CRLS Mathematics Department

AB & BC Calculus Curriculum Map/Pacing Guide

Understanding Goals/ Essential Questions	# of Blocks AB	# of Blocks BC	Students will be able to...	Resources/Assessments book	Resources/Assessments other
	120	100			
Unit 1: Limits and Continuity	15	9	Totals Always Include 2 blocks for Review & Test	chapter 2	District Google Documents site
What is a limit?	*4*	*2*	• *find the limit of a function numerically, graphically, and analytically*	2.1,2.2	2.1#37,57,71; 2.2#55
What does it mean for a function to be continuous?	*2*	*1*	• *determine when a function is continuous (formally)*	2.3	2.3 #11,20,23,47-50
			• *determine where and what types of discontinuities a function has if any*	2.3	IVT, monk riddle (Zeitz "Art & Craft of Problem Solving")
How do you find the slope of a line tangent to a curve?	*2*	*2*	• *determine the end behavior of a function*	2.3	
			• *find the instantaneous rate of change of a function and connect it with the slope of the tangent line*	2.4	2.4 #8 http://calculus.scotthighskyhawks.com/calcab
What is the definition of a limit?	5	2	• *use epsilon-delta definition to show a limit exists or does not exist in linear situations*	A3 page 569	2.1 #77 IMSA Limits6.pdf Limits7.pdf, Foerster Exploration 6

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Unit 2: Derivatives	30	22	Totals Always Include 2 blocks for Review & Test		District Google Documents site
What is the derivative of a function?	*3*	*1*	• *explain the meaning of the derivative of a function*	3.1	
What does it mean for a function to be differentiable?	*2*	*1*	• *find the value of the derivative at a point*	3.1	cancel factors, binomial expansion, f(x+h) notation
		1	• *visually graph the derivative of a function*	3.1	simplifying expressions
			• *find when a function is differentiable*	3.2	
How do you find the derivative of a function?	*4*	*1*	• *find what types of discontinuities the derivative of a functions has if any*	3.2	implicit diff. requires solving literal equations
	15	*11*	• *find the derivative of a function using: the sum, product, quotient, and chain rules, and polynomial, implicit, trigonometric, exponential and logarithmic differentiation.*	3.3-3.9	composites f(g(x)), inverses, transcendental functions, radical & exponential simplification, unit circle, trig identities, IMSA trig(kx).pdf, Chain Rule Investigation with Mathematica FIRST CLASS ImplicitDifferentiation.pdf
		1	• *find the derivative of a parametric function*	3.6,10.1	IMSA Parametric1.pdf
How does the derivative illuminate motion?	*4*	*1*	• *use derivative to model particle motion*	3.4,10.1	
		1	• *calculate derivatives of vector motion*	10.2	IMSA
How do you find the derivative in non-euclidean coordinate systems?		*2*	• *calculate derivatives in polar coordinates*	10.3	IMSA polar1.pdf

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Unit 3: Applications of Derivatives	24	15	Totals Always Include 2 blocks for Review & Test		District Google Documents site
How do you find limits when function is indeterminate?		*1*	• *apply L'Hopital's Rule*	8.2	IMSA LimitsAgain.pdf
How do you analyze the behavior of a function?	*1*	*1*	• *apply the Mean Value Theorem*	4.2	Calculus in Motion
	5	*4*	• *analyze the behavior of a function using its first two derivatives*	4.2	
How is the tangent line useful?			• *find the critical points of a function*	4.2	
			• *find when a function is increasing or decreasing*	4.1	
How can you approximate the value of a function?			• *find the inflection points of a function*	4.3	
			• *find when a function is concave up or concave down*	4.3	
How are the rates of change of variables related?	*4*	*2*	• *optimize the value of a variable given constraint equations*	4.4	Calculus in Motion
	3	*1*	• *use the tangent line to approximate function values*	4.5	
How can you apply complete graph analysis to analyze the motion of an object?			• *apply Newton's Method*	4.5	Calculus in Motion
What are dx and dy?	*1*	*1*	• *use differentials to approximate function values*	4.5	
	5	*2*	• *find the rate of change of a variable using related rates*	4.6	Calculus in Motion
	3	*1*	• *analyze the motion of a particle along a line given its position equation*		

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Unit 4: Definite Integrals	16	10	Totals Always Include 2 blocks for Review & Test		District Google Documents site
How can you approximate the area under a curve?	*4*	*1*	• *approximate the area under a curve using the Rectangle Approximating Methods*	5.1	Calculus In Motion; KhanAcademy.org; IMSA Approx1.pdf
			• *approximate the area under a curve using Riemann sums*	5.2	*The Write Path II Math "But it's not a rectangle!"*
How can you find the exact area under a curve?		*1*	• *approximate the area under a curve using the Trapezoidal Rule*	5.5	Calculus In Motion; IMSA Approx3.pdf
		1	• *find the anti-derivative of a function*	5.4	
How do you find the equation of the anti-derivative of a function?	*5*	*2*	• *use the definite integral to find the area under a curve analytically and geometrically*	5.2	PreCal: area formulas for circle, trapezoid, triangle, trig identities
	1	*1*	• *find the average value of a function over a given interval*	5.3,5.5	
What is the connection between the area under a function and the anti-derivative of the function?	*4*	*2*	• *apply both parts of the Fundamental Theorem of Calculus*	5.3,5.4	Calculus In Motion; page 289 Exploration 2

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Unit 5: Differential Equations	17	13	Totals Always Include 2 blocks for Review & Test		District Google Documents site
How do you find the equation of a function given its derivative?	*6*	*4*	• *find the integral of a function using the substitution method and integration by parts*	6.2,6.3	
	3	*1*	• *solve a separable differential equation*	6.2	APCentral Module on Differential Equations
How will graphing the slope field of a function help you analyze the function?	*2*	*1*	• *graph a slope field*		P.Mili's handout, Calculus In Motion, APCentral SlopeField pdf by Nancy Stephenson, TI-84 Slope, Euler's Method GSP (FIRST CLASS), http://staff.imsa.edu/~dover/Site/Semester_Two.html, http://worrydream.com/KillMath
		1	• *apply Euler's Method*		6.1 Exer 41-48, AP FRQ
How do find integral of rational function?		*1*	• *apply Method of Partial Fractions*	6.5	
What types of real-life situations are modeled using exponents and logarithms?	*4*	*3*	• *find the model for an exponential growth or decay problem, Newton's Law of Cooling*	6.4	
		1	• *find the model for a logistic growth problem*	6.5	Calculus in Motion, AP FRQ

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Unit 6: Applications of Definite Integrals	18	12	Totals Always Include 2 blocks for Review & Test		District Google Documents site
How do you find the net change of a variable given its rate?	*5*	*1*	• *use the definite integral to discuss the net change of a variable given its rate*	7.1	Calculus in Motion, AP FRQ
How do you find the area between curves?	*5*	*1*	• *find the area between curves*	7.2	Calculus in Motion, AP FRQ
How do you find area between polar functions?		*2*	• *find area with sector-shaped differentials*	10.3	Nate Burchell's PolarFunctionsGSP (FIRSTCLASS)
How do you find the volume of an object?	*6*	*4*	• *find the volume of a solid with known cross-sections and a solid of revolution using the washer and shell methods*	7.3	Calculus in Motion, AP FRQ, Bundt cake, orange/pear, rice crispy treat models
How do you find the length of a curve		*2*	• *find the length of a rectangular curve and a parametric curve*	7.4	Calculus in Motion, AP FRQ
		2	• *find the work equation for various different physics-type problems*	7.5	Exer.#1-11 page 425

Understanding Goals/ Essential Questions	# of Blocks AB	# of Blocks BC	Students will be able to...	Resources/Assessments book	Resources/Assessments other
Unit 7: Improper Integrals, Rates of Growth		6	Totals Always Include 2 blocks for Review & Test		District Google Documents site
What is a sequence? What is convergence?		*1*	• *apply limits to understand infinite sequences*	8.1	GeometricSeries.pdf (IMSA)
What functions grow faster than others?		*1*	• *compare the relative rates of growth of functions*	8.2	
How do you find the area under the curve when you are working with infinity?		2	• *express an improper integral as a limit, evaluate the limit*	8.3	ImproperIntegrals (FIRSTCLASS)

Understanding Goals/ Essential Questions	# of Blocks AB	# of Blocks BC	Students will be able to...	Resources/Assessments book	Resources/Assessments other
Unit 8: Convergence, Infinite Series		13	Totals Always Include 2 blocks for Review & Test		District Google Documents site
How do you find the sum of an infinite geometric series?		*1*	• *find the sum and partial sum of an infinite geometric series*	9.1	APCentral Visual Proofs of Calculus
		1	• *find the power series of a function*	9.1	Calculus In Motion
How can you rewrite functions as equivalent infinite polynomials?		*3*	• *find the Taylor and Maclaurin series for a function around different values of x and the Lagrange Error*	9.2,9.3	Calculus In Motion
Does an infinite series have a finite sum?		*3*	• *test for the convergence of a function using the various testing methods*	9.3	Lagrange Pdf
What can predict convergence without actually summing the series?		*3*	• *find the radius and interval of convergence for a power series*	9.4,9.5	Convergence Test Summary, numerous IMSA pdfs
					http://staff.imsa.edu/~dover/Site/Semester_Three_files/TaylorReview.pdf

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Resource List:

- http://staff.imsa.edu/~dover/Site/Calculus.html
- Calculus in Motion
- Foerster, Calculus Explorations
- http://calculus.scotthighskyhawks.com/calcab
- Firstclass calculus desk
- APCentral teacher resources
- khanacademy.org
- burchellmath.blogspot.com
- TI programs
- Online applets
- Wolfram Alpha
- The Write Path II Math
- Amsco AP prep
- Calculus: Graphical, Numerical, Algebraic textbook
- Mathematica