

Calculus

Calculus					
(revised 2008)	Levels: I - introduced; P - practiced; M - mastered	Current Text			
CONCEPT	SKILLS	LEVEL	Chapter	Teaching Notes	FATE GOAL
I. Prerequisites					
<i>per teacher discretion</i> (can be skipped)	1. Determine viewing window with calculator	P, M	(Chapter P		
	2. Estimate intercepts, max, min graphically	P, M	and		
	3. Write equation of line	P, M	appendices		
	4. Identify relation, domain, range	P, M	and		
	5. Use properties to write composition of functions	P, M	supplement		
	6. Use properties to find inverses of functions	P, M	if		
	7. Interpret, find functions for piecewise functions	P, M	needed)		
	8. Families of functions	P, M			
	9. Analyze transformations	P, M			
	10. Determine algebraic/geometric representation of functions and inverses	P, M			
	11. Convert between radians/degrees	P, M			
	12. Find values of the six trig functions	P, M			
	13. Explore trig identities	P, M			
	14. Graph trig functions using transformations	P, M			
II. Limits and the Definition of Derivative	1. Families of Functions (Graphing Gateway Exam) (include Piecewise, Step, and Rational Functions)	M		Graphing Gateway Exam	
	2. The Tangent Line Problem	I	1.1		
	3. Calculate limits graphically, numerically, algebraically and algebraically	I, P	1.2,1.3		
	4. Properties of limits	I, P	1.4		
	5. Continuity and One-sided limits	I, P	1.4		
	6. Infinite limits	I, P	1.5		
	7. End-behavior and horizontal asymptotes	I, P			
	8. The Velocity Problem (average versus instantaneous velocity)	I, P	2.1		
	9. Definitions of derivative (calculate slope of tangent lines and instantaneous velocities)	I, P	2.1		
III. Derivative Short-Cuts	1. construct graphs of derivatives	I, P	2.1		
	2. use rules of differentiation to find derivatives (power, product, quotient rules)	I, P	2.2, 2.3		
	3. applications: straight line motion, rates of change	I, P	2.2, 2.3		

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	4. derivatives of the six trig functions and $y=e^x$	I, P		
IV. More Differentiation	1. differentiate composite functions w/ chain rule	I, P	2.4	
Techniques, Related Rates	2. use implicit differentiation	I, P	2.5	
	3. find derivatives of inverse trig functions and logarithmic functions	I, P		
	4. set up and solve related rates problems	I, P	2.6	
				Derivative Gateway Exam
V. Curve Sketching	1. find absolute extrema	I, P	3.1	
	2. Rolle's Theorem, Mean Value Theorem	I, P	3.2	
	3. find local (relative) extrema and find intervals where function increases/decreases	I, P	3.3	
	4. determine concavity and inflection points	I, P	3.4	
	5. use 1st and 2nd derivative tests	I, P	3.3,3.4	
	6. sketch functions given graphs or data about 1st or 2nd derivative	P		
	7. curve sketching techniques	I, P	3.6	
	8. use L'hospital's Rule	I, P		
<i>(may start separate unit here)</i>	9. use Newton's method	I, P	3.8	
	10. solve optimization (max/min) problems	I, P	3.7	
	11. differentials	I	3.9	
VI. Antiderivatives and Integrals	1. Find antiderivatives for power functions and sine/cosine functions	I, P	4.1	
	2. Solve initial value problems	I, P	4.1	
	3. Express antiderivatives as indefinite integrals	I, P	4.1	
	4. Estimate area under a curve using left-hand, right-hand, and midpoint sums (Riemann Sums)	I, P	4.2	
	5. Express area under a curve as a definite integral	I, P	4.3	
	6. Properties of integrals	I, P	4.3	
	7. Compute definite integrals	I, P	4.4	
	8. Find average value of a function	I, P	4.4	
	9. Use Fundamental Theorem of Calculus	I, P	4.4	
VII. Integration Techniques	1. Use substitution method	I, P	4.5	
	2. Use integration by parts	I, P	7.2	
	3. Approximate integrals using Trapezoid Rule and Simpson's Rule (discuss error)	I, P	4.6	
				Integral Gateway Exam
VIII. Applications of Integrals	1. find area between curves	I, P	6.1	

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	2. find volume using slicing method	I, P	6.2		
	3. find volume using disk, washer, and shell methods	I, P	6.2,6.3		
IX. Differential equations	1. definition and properties of exponential functions	P	5.6		
	2. solve applied problems with exponential change	P	5.6		
	3. solve differential equations by separation of variables	I,P	5.7		
	4. draw slope fields	I,P			
	5. hyperbolic functions (if time permits)	I,P	5.1		
X. Exam Review	AP and Parkland College exam review period				
	(3 to 4 weeks)				

