



# Gulfport School District

## *HIGH SCHOOL PACING GUIDE*

### **CALCULUS**

QTR	COMPETENCY/OBJECTIVES
<b>NUMBER AND OPERATIONS</b>	
	<b>1. Compute and determine the reasonableness of results in mathematical and real world situations.</b>
1.1	a. Estimate limits from graphs or tables. (DOK 2)
1.1	b. Estimate numerical derivatives from graphs or tables of data. (DOK 2)
1.1/1.2	c. Prove statements using mathematical induction. (DOK 3)
<b>ALGEBRA</b>	
	<b>2. Demonstrate basic knowledge of functions, including their behavior and characteristics.</b>
1.1	a. Predict and explain the characteristics and behavior of functions and their graphs (domain, range, increasing/decreasing intervals, intercepts, symmetry, and end behavior). (DOK 2)
1.1	b. Investigate, describe, and determine asymptotic behavior using tables, graphs, and analytical methods. (DOK 2)
1.1	c. Determine and justify the continuity and discontinuity of functions. (DOK 2)
	<b>3. Evaluate limits and communicate an understanding of the limiting process.</b>
2.1/3.2	a. Solve mathematical situations and application problems involving or using derivatives, including exponential, logarithmic, and trigonometric functions. (DOK 2)
1.1	b. Calculate limits using algebraic methods. (DOK 2)
1.1	c. Verify the behavior and direction of non-determinable limits. (DOK 2)
	<b>4. Use the definition and formal rules of differentiation to compute derivatives.</b>
1.2	a. State and apply the formal definition of a derivative. (DOK 1)
1.2	b. Apply differentiation rules to sums, products, quotients, and powers of functions. (DOK 2)
2.1	c. Use the chain rule and implicit differentiation. (DOK 2)
1.2/2.1	d. Describe the relationship between differentiability and continuity. (DOK 2)
	<b>5. Apply derivatives to find solutions in a variety of situations.</b>
1.2	a. Define a derivative and explain the purpose/utility of the derivative. (DOK 2)
2.1	b. Apply the derivative as a rate of change in varied contexts, including velocity, speed, and acceleration. (DOK 2)
1.2/2.1	c. Apply the derivative to find tangent lines and normal lines to given curves at given points. (DOK 2)



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<b>ALGEBRA</b>	
<b>5. Apply derivatives to find solutions in a variety of situations. (continued)</b>	
1.2	d. Predict and explain the relationships between functions and their derivatives. (DOK 2)
2.2	e. Model rates of change to solve related rate problems. (DOK 2)
2.2	f. Solve optimization problems. (DOK 2)
<b>6. Employ various integration properties and techniques to evaluate integrals.</b>	
3.1	a. State and apply the First and Second Fundamental Theorem of Calculus. (DOK 2)
3.1	b. Apply the power rule and u-substitution to evaluate indefinite integrals. (DOK 2)
<b>GEOMETRY</b>	
<b>7. Use geometric concepts to gain insights into, answer questions about, and graph various implications of differentiation.</b>	
2.1	a. Demonstrate and explain the differences between average and instantaneous rates of change. (DOK 2)
2.1	b. Apply differentiation techniques to curve sketching. (DOK 2)
2.2	c. Apply Rolle's Theorem and the Mean Value Theorem and their geometric consequences. (DOK 2)
3.1	d. Identify and apply local linear approximations. (DOK 1)
2.1	e. Analyze curves with attention to non-decreasing functions (monotonicity) and concavity. (DOK 2)
<b>MEASUREMENT</b>	
<b>8. Adapt integration methods to model situations to problems.</b>	
4.1	a. Apply integration to solve problems of area. (DOK 2)
4.1	b. Utilize integrals to model and find solutions to real-world problems such as calculating displacement and total distance traveled. (DOK 2)
<b>9. Apply appropriate techniques, tools, and formulas to determine values for the definite integral.</b>	
3.1	a. Interpret the concept of definite integral as a limit of Riemann sums over equal subdivisions. (DOK 3)
<b>GSD OBJECTIVES (In accordance with AP syllabus)</b>	
3.1	a. Develop and use properties of the natural logarithmic function.
3.1	b. Understand the definition of the number e.



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QTR	COMPETENCY/OBJECTIVES
<b>GSD OBJECTIVES (In accordance with AP syllabus) continued...</b>	
3.1	c. Find derivatives of functions involving the natural logarithmic function.
3.1	d. Use the Log Rule for Integration to integrate a rational function.
3.1	e. Integrate trigonometric functions.
3.1	f. Verify that one function is the inverse function of another function.
4.1	g. Determine whether a function has an inverse function.
4.1	h. Find the derivative of an inverse function.
4.1	i. Differentiate natural exponential functions.
4.1	j. Integrate natural exponential functions.
4.1	k. Differentiate and integrate exponential functions that have bases other than e.
4.1	l. Use exponential functions to model compound interest and exponential growth.
4.1	m. Develop properties of the six inverse trigonometric functions.
4.1	n. Differentiate an inverse trigonometric function.
4.1	o. Integrate functions whose antiderivatives involve inverse trigonometric functions.
4.1	p. Use initial conditions to find particular solutions of differential equations.
4.1	q. Use slope fields to approximate solutions of differential equations.
4.1	r. Use separation of variables to solve a simple differential equation.
4.1	s. Use exponential functions to model growth and decay in applied problems.
4.2	t. Find the volume of a solid of revolution using the disk method.
4.2	u. Find the volume of a solid of revolution using the washer method.
4.2	v. Find the volume of a solid with known cross sections.
4.2	w. Find the volume of a solid of revolution using the shell method.

1.1 indicates the first 4.5 weeks of the first 9 weeks test.  
 1.1 and 1.2 combined indicate a comprehensive 1<sup>st</sup> 9 weeks test.  
 2.1 indicates the first 4.5 weeks of the second 9 weeks test.  
 2.1 and 2.2 combined indicate a comprehensive 2<sup>nd</sup> 9 weeks test.