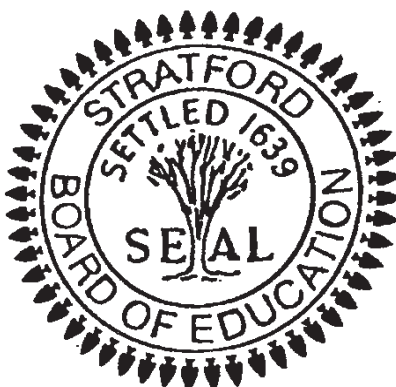


STRATFORD PUBLIC SCHOOLS

Stratford, Connecticut



“Tantum eruditi sunt liberi”
Only The Educated Are Free

AP CALCULUS BC

Adopted by the Board of Education on June 25, 2012

Irene Cornish
Superintendent

Elaine Watson
Assistant Superintendent

DISTRICT MISSION

The mission of the Stratford Public Schools is to develop a community of learners in which students acquire the knowledge, skills and confidence to meet the challenges of a changing and increasingly diverse 21st century society.

DISTRICT CORE VALUES

Students will acquire content knowledge, strengthen higher-order thinking, and develop character in order to address 21st century challenges.

BUNNELL HIGH SCHOOL BELIEFS

We believe teachers must work collaboratively in support of student learning and to model collaboration as a social skill with students. We believe that a rigorous curriculum for all students, an acceptance of diversity, and a culture that actively welcomes all learners will contribute to a more knowledgeable community and society. We believe in the value of a strong education as a means of preparing students for work and life in the remainder of the 21st century.

STRATFORD HIGH SCHOOL BELIEFS

- a safe, positive school climate that embraces diversity is essential to ensure respect and opportunity for each individual
- students should understand the world beyond their community in order to contribute to a global society
- parents and students must share responsibility and work in partnership with the school in order to improve academic performance and to develop lifelong learners
- students should use technology effectively to acquire, process, and deliver information

BUNNELL HIGH SCHOOL and STRATFORD HIGH SCHOOL

LEARNING EXPECTATIONS

All students will...

- use real-world digital and other research tools to access, evaluate and effectively apply information appropriate for authentic tasks. (Academic)
- work independently and collaboratively to solve problems and accomplish goals. (Civic-Social)
- communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes. (Academic)
- demonstrate innovation, flexibility and adaptability in thinking patterns, work habits and working/learning conditions. (Academic)
- effectively apply the analysis, synthesis and evaluation processes that enable productive problem solving. (Academic)
- value and demonstrate personal responsibility, character, cultural understanding and ethical behavior. (Civic-Social)
- show competence in all core academic subjects and other fields of interest, including the ability to clearly and effectively communicate content information in multiple formats. (Academic)

Stratford Public Schools
AP Calculus BC Unit # 1

Unit Name: Limits and Derivatives		Est. # of Weeks: 4
Synopsis: This unit deals with limits and the use of limits to develop the concept of a derivative		
STUDENT LEARNING GOALS		
<p>Content-Specific Powered Standards</p> <p>Algebraic Reasoning: Patterns and Function</p> <ul style="list-style-type: none"> • Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools and techniques. <p>Geometry and Measurement</p> <ul style="list-style-type: none"> • Shapes and structures can be analyzed, visualized, measured and transformed using a variety of strategies, tools and technology. 	<p><u>Interdisciplinary Standards (Technology Integration)</u></p> <p>Standard 1: Information Strategies Students determine their need for information and apply strategies to select, locate, and access information resources.</p> <p>Standard 2: Information Use Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests.</p> <p>Standard 3: Information and Technology Application Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information.</p> <p>Standard 4: Literacy and Literary Appreciation Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions.</p> <p>Standard 5: Personal Management Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management.</p> <hr style="border-top: 1px dashed black;"/> <p>Key Vocabulary</p> <ul style="list-style-type: none"> • Limit, left hand limits, right-hand limit, vertical asymptotes, limit of a sum, limit of a difference, limit of a constant times a function, limit of a product, limit of a quotient, limit of a constant, limit of a power, greatest integer function, continuous at a point, discontinuity, removable discontinuity, jump discontinuity, Infinite discontinuity, continuous from the right, continuous from the left, continuous on an interval, Intermediate Value Theorems, limit at infinity, horizontal asymptote, tangent line to a curve, derivative of a function at a number, average rate of change, instantaneous rate of change, differentiate at a point, differentiate on an open interval. 	
<p><u>21st Century Skills and Expectations</u></p> <p><u>Rubric: Critical Skills</u></p> <ol style="list-style-type: none"> 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes. 4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions. 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving. 6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior. 		
<p>Enduring Understandings</p> <ol style="list-style-type: none"> 1.1 Understand and describe patterns and functional relationships <ol style="list-style-type: none"> a) Describe relationships and make generalizations about patterns and functions 1.3 Use operations, properties, and algebraic symbols to determine equivalence and solve problems. <ol style="list-style-type: none"> a) Solve problems using a variety of algebraic methods. 	<p>Essential Questions</p> <ul style="list-style-type: none"> • What is the definition of a limit? • What are the different types of limits? • What is a vertical asymptote? • What are the different limit properties? • What is the greatest integer function? • When is a function continuous at a point? • What is a discontinuity of a function? • What are the types of discontinuities that a function can have? • When is a function continuous on an interval? • When is a function continuous from the right? • When is a function continuous from the left? • When is a function continuous on an interval? • What is the Intermediate Value Theorem? • What are limits at infinity? 	

- What is a horizontal asymptote?
- What is a tangent line to a curve?
- What is a derivative of a function at a number?
- What is an average rate of change?
- When is a function differentiable at a point?
- When is a function differentiable on an interval?

Learning Objectives / Grade Level Expectations

Students will:

- Determine the limit of a function
- Determine if a function has a vertical asymptote
- Determine when to use a certain limit property
- Determine when a function is continuous
- Determine when a function is discontinuous
- Determine what type of discontinuity a function has
- Determine when a function is continuous at a point
- Determine when a function is continuous on an interval
- Determine when a function is continuous from the left
- Determine when a function is continuous from the right
- Determine a solution using the Intermediate Value Theorem
- Determine a limit of infinity
- Determine when a function has a horizontal asymptote
- Determine the derivative of a function at a number
- Determine an average rate of change
- Determine an instantaneous rate of change
- Determine when a function is differentiable

ASSESSMENT PLAN

Summative Assessment(s)/Performance Based Assessments including 21st Century Learning

- Quizzes
- Unit Assessments
- PBA #1

Formative and Diagnostic Assessment(s)

- Common Formative Assessments
- Verbal Assessments

LEARNING PLAN COMPONENTS

- Single Variable Calculus, James Stewart, Sections 2.1, 2.2, 2.3, 2.5, 2.6, 2.7, 2.8

Stratford Public Schools
AP Calculus BC Unit # 2

Unit Name: Differentiation Rules		Est. # of Weeks: 4
Synopsis: This unit deals with the development of differentiation rules and how to use them.		
STUDENT LEARNING GOALS		
<p><u>Content-Specific Powered Standards</u> Algebraic Reasoning: Patterns and Functions</p> <ul style="list-style-type: none"> • Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools and techniques. <p>Geometry and Measurement</p> <ul style="list-style-type: none"> • Shapes and structures can be analyzed, visualized, measured and transformed using a variety of strategies, tools and technologies. 	<p><u>Interdisciplinary Standards (Technology Integration)</u></p> <p>Standard 1: Information Strategies Students determine their need for information and apply strategies to select, locate, and access information resources.</p> <p>Standard 2: Information Use Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests.</p> <p>Standard 3: Information and Technology Application Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information.</p> <p>Standard 4: Literacy and Literary Appreciation Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions.</p> <p>Standard 5: Personal Management Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management.</p> <hr style="border-top: 1px dashed black;"/> <p>Key Vocabulary</p> <ul style="list-style-type: none"> • Derivative of a constant, power rule, constant multiply rule, sum rules, difference rule, exponential function, derivative of an exponential function, derivative of a product, derivative of a quotient, derivative of trigonometric functions, chain rule, power rule combined with the chain rule, implicit differentiation, derivative of inverse trigonometric functions, derivative of logarithmic functions, logarithmic differentiation, exponential growth and decay, half life, related rate problems. 	
<p><u>21st Century Skills and Expectations</u> Rubric: Critical Skills</p> <ol style="list-style-type: none"> 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes. 4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions. 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving. 6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior. 		
<p>Enduring Understandings</p> <ol style="list-style-type: none"> 1.1 Understand and describe patterns and functional relationship. <ol style="list-style-type: none"> a. Describe relationships and make generalizations about patterns and functions. 1.3 Use operation, properties and algebraic symbol is to determine equivalence and solve problems. <ol style="list-style-type: none"> a. Solve problems using a variety of algebraic methods. 	<p>Essential Questions</p> <ul style="list-style-type: none"> • What is the derivative of a constant? • What is the derivative of a power function? • What are the sum and difference rules? • What is an exponential function? • What is the derivative of an exponential function? • What is the derivative of a product? • What is the derivative of a quotient? • What are the derivatives of the trigonometric function? • What is the chain rule? • What is implicit differentiation? • What are the derivatives of the inverse trigonometric functions? • What are the derivatives of the exponential functions • What is logarithmic differentiation? • What is the law of experimental growth and decay? 	

- What is half life?
- What is a related rates problem?

Learning Objectives / Grade Level Expectations

Students will:

- Determine the derivative of a constant function
- Determine the derivative of a power function
- Determine the derivative of a constant multiple function
- Determine the derivative of a sum of functions
- Determine the derivative of an exponential function
- Determine the derivative of a product of a function
- Determine the derivative if a quotient of functions
- Determine the derivative of a trigonometric function
- Determine an implicit derivative
- Determine the derivative of an inverse trigonometric function
- Determine the derivative of a logarithmic function
- Determine the derivative using logarithmic differentiation
- Determine a solution using the law of exponential growth and decay
- Determine the half life of an element
- Determine the solution of a related rates problem

ASSESSMENT PLAN

Summative Assessment(s)/Performance Based Assessments including 21st Century Learning

- Quizzes
- Unit Assessments
- PBA #2

Formative and Diagnostic Assessment(s)

- Common Formative Assessments
- Verbal Assessments

LEARNING PLAN COMPONENTS

- Single Variable Calculus, James Stewart, Sections 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.8, 3.9, 3.10
- TI84 Graphing Calculator

Stratford Public Schools
AP Calculus BC Unit # 3

Unit Name: Application of Derivatives		Est. # of Weeks: 5
Synopsis: This unit deals with applications of the derivative in calculus		
STUDENT LEARNING GOALS		
<p><u>Content-Specific Powered Standards</u></p> <p>Algebraic Reasoning: Patterns and Functions</p> <ul style="list-style-type: none"> • Patterns and functional relationship can be represented and analyzed using a variety of strategies, tools and techniques <p>Geometry and Measurement</p> <ul style="list-style-type: none"> • Shapes and structures can be analyzed, visualized measured and transformed using a variety of strategies, tools and technologies 	<p><u>Interdisciplinary Standards (Technology Integration)</u></p> <p>Standard 1: Information Strategies Students determine their need for information and apply strategies to select, locate, and access information resources.</p> <p>Standard 2: Information Use Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests.</p> <p>Standard 3: Information and Technology Application Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information.</p> <p>Standard 4: Literacy and Literary Appreciation Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions.</p> <p>Standard 5: Personal Management Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management.</p> <hr style="border-top: 1px dashed black;"/> <p>Key Vocabulary</p> <ul style="list-style-type: none"> • Absolute maximum, Absolute minimum, Local maximum, Local minimum, Critical numbers, Rolle’s Theorem, Mean Value Theorem, Increasing function, Decreasing function, First Derivative test, Second Derivative test, point of inflection. L’Hospitals rule, indeterminate form, Curve sketching, optimization problems, antidifferentiate, differential equation 	
<p><u>21st Century Skills and Expectations</u></p> <p><u>Rubric: Critical Skills</u></p> <ol style="list-style-type: none"> 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes. 4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions. 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving. 6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior. 		
<p>Enduring Understandings</p> <ol style="list-style-type: none"> 1.1 Understand and describe pattern and functional Relationships <ol style="list-style-type: none"> a) Describe relationships and make generalization about patterns and functions 1.2 Use operations, properties and algebraic symbols to determine equivalence and solve problems <ol style="list-style-type: none"> a) Solve problems using a variety of algebraic methods 	<p>Essential Questions</p> <ul style="list-style-type: none"> • What are an absolute maximum and absolute minimum of a function? • What are a local maximum and local minimum of a function? • What is a critical number of a function? • What does Rolle’s Theorem say? • What does the Mean Value Theorem say? • What is an increasing function? • What is a decreasing function? • What is the First Derivative test? • What does concave up mean? • What does concave down mean? • What is a point of inflection? • What is the Second Derivative test? 	

	<ul style="list-style-type: none"> • When is L'Hospital's rule used? • What is the process of curve sketching? • What is an optimization problem? • What is an antiderivative? • What is a differential equation?
--	--

<p>Learning Objectives / Grade Level Expectations <i>Students will:</i></p> <ul style="list-style-type: none"> • Determine the extrema of a function • Determine the critical number of a function • Determine where a function satisfies the Mean Value Theorem • Determine a graph using the First Derivative test • Determine a graph using the Second Derivative test • Determine where a point of inflection is • Determine if L'Hospital's Rule applies to a function • Determine the graph of a function using derivatives • Determine the solution of an optimization problem • Determine the antiderivative of a function • Determine the solution of a differential equation 	
---	--

ASSESSMENT PLAN

<p>Summative Assessment(s)/Performance Based Assessments including 21st Century Learning</p> <ul style="list-style-type: none"> • Quizzes • Unit Assessments • PBA #3 	<p>Formative and Diagnostic Assessment(s)</p> <ul style="list-style-type: none"> • Common Formative Assessments • Verbal Assessments
--	---

LEARNING PLAN COMPONENTS

<ul style="list-style-type: none"> • <u>Single Variable Calculus</u>, James Stewart, Sections 4.1, 4.2, 4.3, 4.4, 4.5, 4.7 4.9 • TI 84 Graphing Calculator
--

Stratford Public Schools
AP Calculus BC Unit # 4

Est. # of Weeks: 4

Unit Name: Integration

Synopsis: This unit deals with the connection between integration and differentiation

STUDENT LEARNING GOALS

Content-Specific Powered Standards

- Algebraic Reasoning : Patterns and Functions
- Patterns and functions relationships can be represented and analyzed using a variety of strategies, tools and techniques

Geometry and Measurement

- Shapes and structures can be analyzed, visualized, measured and transformed using a variety of strategies, tools and technologies

Interdisciplinary Standards (Technology Integration)

Standard 1: Information Strategies

Students determine their need for information and apply strategies to select, locate, and access information resources.

Standard 2: Information Use

Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests.

Standard 3: Information and Technology Application

Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information.

Standard 4: Literacy and Literary Appreciation

Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions.

Standard 5: Personal Management

Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management.

21st Century Skills and Expectations

Rubric: Critical Skills

1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks.
2. Work independently and collaboratively to solve problems and accomplish goals.
3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.
4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions.
5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving.
6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior.

Key Vocabulary

- Rectangle approximation method area under a curve definite integral, Riemann sum, net area, integrable, Midpoint rule, Fundamental Theorem of Calculus, indefinite integral, net change theorem, substitution rule.

Enduring Understandings

- 1.1 Understand and describe patterns and functional Relationships.
 - a) Describe relationships and make generalization about patterns and functions.
- 1.3 Use operations, properties and algebraic symbols to determine equivalence and solve problems.
 - a) Solve problems using a variety of algebraic methods.

Essential Questions

- What is the Rectangle Approximation Method
- What is the definition of the definite integral?
- What is the Riemann sum?
- What is the net area?
- What does the Fundamental Theorem of Calculus say?
- What is an indefinite integral?
- What is the net change theorem?
- What is the substitution rule for integration?

Learning Objectives / Grade Level Expectations*Students will:*

- Determine the approximation of an area under a curve using a rectangle approximation
- Determine the value of a Riemann sum
- Determine the value of a definite integral
- Determine the value of a derivative using the Fundamental Theorem of Calculus
- Determine the indefinite integral of a function
- Determine an indefinite integral using substitution

ASSESSMENT PLAN**Summative Assessment(s)/Performance Based Assessments including 21st Century Learning**

- Quizzes
- Unit Assessments
- PBA #4

Formative and Diagnostic Assessment(s)

- **Common Formative Assessments**
- **Verbal Assessments**

LEARNING PLAN COMPONENTS

- Single Variable Calculus, James Stewart, Sections 5.1, 5.2, 5.3, 5.4, 5.5
- TI 84 Graphing Calculator

Stratford Public Schools
AP Calculus BC Unit # 5

Unit Name: Applications of Integration **Est. # of Weeks: 7**

Synopsis: This unit is an extension of Unit 4. Students will apply rules of integration to real-world scenarios in order to solve problems

STUDENT LEARNING GOALS

Content-Specific Powered Standards

- Algebraic Reasoning: Patterns and Functions
- Patterns and functional relationship can be represented and analyzed using a variety of strategies, tools and technologies.
- Geometry and Measurement
- Shapes and structures can be analyzed, visualized, measured and transformed using a variety of strategies, tools and technologies.

21st Century Skills and Expectations
Rubric: Critical Skills

1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks.
2. Work independently and collaboratively to solve problems and accomplish goals.
3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.
4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions.
5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving.
6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior.

Interdisciplinary Standards (Technology Integration)

Standard 1: Information Strategies

Students determine their need for information and apply strategies to select, locate, and access information resources.

Standard 2: Information Use

Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests.

Standard 3: Information and Technology Application

Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information.

Standard 4: Literacy and Literary Appreciation

Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions.

Standard 5: Personal Management

Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management.

Key Vocabulary

- Integration, definite integral, vertical slicing, horizontal slicing, cross section, disc method, washer method, cylindrical shell method, average value, arc length

Enduring Understandings

- 1.1 Understand and describe patterns and functional relationships.
 - a) Model real-world situations and make generalization about mathematical relationships using a variety of patterns and functions
- 1.2 Represent and analyze quantitative relationships in a variety of ways.
 - a) Relate the behavior of functions and relations to specific parametric and determine functions to modal real-world situations.
- 3.2 Use spatial reasoning location and geometric relationships to solve problems.
 - a) Use a variety of coordinate systems and

Essential Questions

- What is the meaning of the value of a definite integral?
- How can the area of a curved region be determined?
- How can the volume of a curved shape be determined?
- How can the average value of a function on a closed interval be determined?
- How can the arc length of a function on a closed interval be determined?

transformations to solve geometric problems in two and three dimensions using appropriate tools and technologies.	
<p>Learning Objectives / Grade Level Expectations <i>Students will:</i></p> <ul style="list-style-type: none"> • Determine area between two curves • Determine the volume of a solid using the disc method • Determine the volume of a solid using the washer method • Determine the volume of a solid using the shell method • Determine the average value of a function on a closed interval • Determine the arc length of a function on a closed interval 	
ASSESSMENT PLAN	
<p>Summative Assessment(s) / Performance Based</p> <ul style="list-style-type: none"> • Quizzes • Unit Assessment • PBA #5 	<p>Formative and Diagnostic Assessment(s)</p> <ul style="list-style-type: none"> • Common formative assessments as prescribed • Verbal assessments
LEARNING PLAN COMPONENTS	
<ul style="list-style-type: none"> • <u>Calculus</u>, Stewart, Sections 6-1 to 6-3, 6-5, 8-1 • T1 84 Graphing calculator 	

Stratford Public Schools
AP Calculus BC Unit # 6

Est. # of Weeks: 3

Unit Name: Techniques of Integration

Synopsis: This unit serves as an extension of unit 4. Further techniques of integration will be developed and used to solve real world problems.

STUDENT LEARNING GOALS

Content-Specific Powered Standards

Algebraic Reasoning & Patterns and Functions

- Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools and technologies

Interdisciplinary Standards (Technology Integration)

Standard 1: Information Strategies

Students determine their need for information and apply strategies to select, locate, and access information resources.

Standard 2: Information Use

Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests.

Standard 3: Information and Technology Application

Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information.

Standard 4: Literacy and Literary Appreciation

Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions.

Standard 5: Personal Management

Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management.

21st Century Skills

1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks.
2. Work independently and collaboratively to solve problems and accomplish goals.
3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.
4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions.
5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving.

Key Vocabulary

- Integration by parts, trigonometric integrals, trigonometric substitution, partial fractions, midpoint rule, trapezoidal rule, Simpson's rule, improper integral convergent, divergent, comparison theorem, differential equation, solution of differential equation, initial condition, direction field, separable differential equation.

Enduring Understandings

- 1.1 Understanding and describe patterns and functional relationships
 - a) Describe relationships and make generalizations about patterns and functions
- 2.1 Understand that a variety of numerical representation scan be used to describe quantitative relationships

Essential Questions

- What is the integration by parts method?
- What are the methods of trigonometric integrals?
- What is the method of trigonometric substitution?
- What is the method of partial fraction integration?
- What are the methods of numerical integration?
- What is the definition of an improper integral - Type 1?
- What is the definition of an improper integral – Type 2?

Learning Objectives / Grade Level Expectations

Students will:

- Determine an integral by integration by parts
- Determine an integral by trigonometric techniques
- Determine an integral by trigonometric substitution
- Determine an integral by partial fractions
- Determine the value of an integral by the Trapezoidal Rule
- Determine the value of an integral by Simpson's Rule
- Determine the convergence/divergence of an improper integral - type 1
- Determine the convergence/divergence of an improper integral – type 2
- Determine the solution of a differential equation

ASSESSMENT PLAN

<p>Summative Assessment(s)/Performance Based Assessments including 21st Century Learning</p> <ul style="list-style-type: none"> • Quizzes • Unit Assessments • PBA #6 	<p>Formative and Diagnostic Assessment(s)</p> <ul style="list-style-type: none"> • Common Formative Assessments • Verbal Assessments • PBA
LEARNING PLAN COMPONENTS	
<ul style="list-style-type: none"> • <u>Single Variable Calculus</u>, James, Stewart, Sections 7.1, 7.2, 7.3, 7.4, 7.5, 7.7, 7.8, and 9.1 • T1 84 Graphing Calculator 	

Stratford Public Schools
AP Calculus BC Unit # 7

Unit Name: Sequences and Infinite Series		Est. # of Weeks: 6
Synopsis: This unit deals with sequences which are used to develop infinite service. Properties of infinite series are studied.		
STUDENT LEARNING GOALS		
<p><u>Content-Specific Powered Standards</u> <u>Algebraic Reasoning : Patterns and Functions</u></p> <ul style="list-style-type: none"> • Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools and techniques 	<p><u>Interdisciplinary Standards (Technology Integration)</u></p> <p>Standard 1: Information Strategies Students determine their need for information and apply strategies to select, locate, and access information resources.</p> <p>Standard 2: Information Use Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests.</p> <p>Standard 3: Information and Technology Application Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information.</p> <p>Standard 4: Literacy and Literary Appreciation Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions.</p> <p>Standard 5: Personal Management Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management.</p> <hr style="border-top: 1px dashed black;"/> <p>Key Vocabulary Sequence, limit of a sequence, convergent, divergent, monotonic, bounded above, bounded below, bounded sequences, infinite series, partial sums, sum of a series, geometric series, harmonic series, test for divergences, integral test, p series, comparison test, limit comparison test, alternating series, alternating series test, absolutely convergent, conditionally convergent, ratio test, root test, power series, power series centered at a, radius of convergence, interval of convergence, integration and differentiation of power series, Taylor series, MacLaurin series, Taylor polynomial</p>	
<p><u>21st Century Skills and Expectations</u> <u>Rubric: Critical Skills</u></p> <ol style="list-style-type: none"> 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes. 4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions. 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving. 6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior. 		
<p>Enduring Understandings</p> <ol style="list-style-type: none"> 1.1. Understand and describe patterns and functional relationships <ol style="list-style-type: none"> a) Describe relationships and make generalization about patterns and functions 1.3 Use operations, properties and algebraic symbols to determine equivalence and solve problems <ol style="list-style-type: none"> b) Solve problems using a variety of algebraic methods 	<p>Essential Questions</p> <ul style="list-style-type: none"> • What are the properties of a sequence? • What is an infinite series? • What is a convergent series? • What is a divergent series? • What is the Integral Test? • What is the Comparison Test? • What is the Limit Comparison Test? • What is an alternating series? • What is the Alternating Series Test? • What are the different types of convergence? • What is the Ratio Test? • What is the Root Test? • What are the properties of a power series? • What is a Taylor Series? • What is a MacLaurin series? • What is a Taylor polynomial? 	

Learning Objectives / Grade Level Expectations*Students will:*

- Determine the convergence/divergence of a sequence
- Determine the convergence/divergence of a series
- Determine how to use the Integral Test
- Determine how to use the Comparison Test and the Limit Comparison test
- Determine the convergence/divergence of an alternating series
- Determine how to use the Ratio test
- Determine how to use the Root test
- Determine how to work with a power series
- Determine how to find the radius of convergence and interval of convergence of a power series
- Determine how to write a Taylor series or MacLaurin series of a function

ASSESSMENT PLAN**Summative Assessment(s)/Performance Based Assessments including 21st Century Learning**

- Quizzes
- Unit Assessments
- PBA #7

Formative and Diagnostic Assessment(s)

- Common Formative Assessments
- Verbal Assessments

LEARNING PLAN COMPONENTS

- Single Variable Calculus, James Stewart, Sections 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.8, 11.9, 11.10
- T1 84 Graphing Calculator

Stratford Public Schools
AP Calculus BC Unit # 8

Unit Name: Parametric and Polar Curves		Est. # of Weeks: 2
Synopsis: This unit deals with parametric and polar coordinates and their uses in calculus		
STUDENT LEARNING GOALS		
<p>Content-Specific Powered Standards Algebraic Reasoning : Patterns and Functions Patterns and Functional relationships can be represented and analyzed using a variety of strategies, tools and techniques</p> <p>Geometry and Measurements Shapes and structures can be analyzed, visualized, measured and transformed using a variety of strategies, tools and technologies</p>	<p><u>Interdisciplinary Standards (Technology Integration)</u></p> <p>Standard 1: Information Strategies Students determine their need for information and apply strategies to select, locate, and access information resources.</p> <p>Standard 2: Information Use Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests.</p> <p>Standard 3: Information and Technology Application Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information.</p> <p>Standard 4: Literacy and Literary Appreciation Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions.</p> <p>Standard 5: Personal Management Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management.</p> <hr style="border-top: 1px dashed black;"/> <p>Key Vocabulary</p> <ul style="list-style-type: none"> • Parametric equations, calculus with parametric curves, polar coordinates, areas and lengths in polar coordinates, parametric curve, initial point, terminal point, area, arc length, surface area, tangent line to a polar curve 	
<p><u>21st Century Skills and Expectations</u> Rubric: Critical Skills</p> <ol style="list-style-type: none"> 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes. 4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions. 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving. 6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior. 		
<p>Enduring Understandings</p> <ol style="list-style-type: none"> 1.1 Understand and describe patterns and functional relationships <ol style="list-style-type: none"> a) Describe relationships and make generalizations about patterns and functions 1.3 Use operations, properties, and algebraic symbols to determine equivalence and solve problems <ol style="list-style-type: none"> a) Solve problems using a variety of algebraic methods 	<p>Essential Questions</p> <ul style="list-style-type: none"> • What are parametric equations? • What are parametric curves? • What method is used to find a derivative to a parametric curve? • What method is used to find the arc length of a parametric curve? • What are polar equations? • What are polar coordinates? • What method is used to find a tangent to a polar curve? • What methods are used to find areas and lengths in polar coordinates? 	

Learning Objectives / Grade Level Expectations	
<i>Students will:</i>	
<ul style="list-style-type: none"> • Determine the initial and terminal points of a parametric curve • Determine the parametric graph • Determine the equation of a tangent to a parametric curve • Determine the arc length of a parametric curve • Determine the surface area of a parametric surface • Determine how to graph polar coordinates • Determine the graph of a polar shape • Determine the equation of a tangent to a polar curve 	
ASSESSMENT PLAN	
Summative Assessment(s)/Performance Based Assessments including 21st Century Learning <ul style="list-style-type: none"> • Quizzes • Unit Assessments • PBA #8 	Formative and Diagnostic Assessment(s) <ul style="list-style-type: none"> • Common Formative Assessments • Verbal Assessments
LEARNING PLAN COMPONENTS	
<ul style="list-style-type: none"> • <u>Single Variable Calculus</u>, James Stewart, Sections 10.1, 10.2, 10.3, 10.4 • T1 84 Graphing Calculator 	