

**Course Title:** Calculus  
**Board Approval Date:** 06/16/14  
**Credit / Hours:** 1 credit  
**Reviewed Annually**

**Course Description:**

This course is designed for the student whose career interest may include, but are not limited to, the fields of mathematics, engineering, or the sciences. Calculus is the culmination of the high school mathematics curriculum. The major topics covered will be limits, the derivative and its applications, and the integral and its applications.

**Learning Activities / Modes of Assessment:**

Large group instruction	Tests and Quizzes
Checklists / Teacher Observation	Small group work
Projects with Rubrics	Computer simulations
Homework Assignments	

**Instructional Resources:**

*AP\* Edition Calculus of a Single Variable* (Brooks/Cole, Cengage Learning 2010)

## Course Pacing Guide

Course: **Calculus**

**Course Unit (Topic)**

**Length of Instruction (Days/Periods)**

1. Functions and Graphs

15 days

2. Limits and Continuity

20 days

3. Derivatives

30 days

4. Applications of Derivatives

30 days

5. Integration

30 days

6. Transcendental Functions

25 days

7. Applications of Integration

20 days

DAYS TOTAL

170 days

Topic: #1 Functions and Graphs

Days: 15

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

**2.2.11.F – Essential**  
Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

**2.5.11.B – Essential**  
Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

**2.6.11.F – Compact**  
Determine the degree of dependence of two quantities specified by a two-way table.

**2.8.11.T – Important**  
Analyze and categorize functions by their characteristics.

**M11.D.1.1.1 – Compact**  
Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.  
2.5.11.B - Use symbols, mathematical

The graph of a function can be determined by its properties.

**2.2.11.F – Essential**

Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

**2.5.11.B – Essential**

Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

**2.5.11.C – Essential**

Present mathematical procedures and results clearly, systematically, succinctly and correctly.

**2.8.11.H – Compact**

Select and use an appropriate strategy to solve systems of equations and inequalities using graphing calculators, symbol manipulators, spreadsheets and other software.

**2.8.11.L – Compact**

Write the equation of a line when given the graph of the line, two points on the line, or the slope of the line and a point on the line.

**2.8.11.N – Compact**

Solve linear, quadratic and exponential equations both symbolically and graphically.

**2.8.11.O – Compact**

Determine the domain and range of a relation, given a graph or set of ordered pairs.

**2.8.11.Q – Compact**

Represent functional relationships in tables, charts and graphs.

**2.8.11.T – Important**

Analyze and categorize functions by their characteristics.

**2.9.11.G – Important**

Solve problems using analytic geometry.

Topic: #1 Functions and Graphs

Days: 15

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.6.11.F - Determine the degree of dependence of two quantities specified by a two-way table.

2.8.11.T - Analyze and categorize functions by their characteristics.

M11.D.1.1.1 - Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.6.11.F - Determine the degree of dependence of two quantities specified

**2.9.11.J – Compact**

Analyze figures in terms of the kinds of symmetries they have.

**2.10.11.A – Compact**

Use graphing calculators to display periodic and circular functions; describe properties of the graphs.

**M11.D.1.1.1 – Compact**

Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.

**M11.D.2.2.3 – Compact**

Simplify algebraic fractions.

**M11.D.3.2.2 – Compact**

Given the graph of the line, 2 points on the line or the slope and a point on a line, write or identify the linear equation in point-slope, standard and/or slope-intercept form.

**M11.D.3.2.3 – Compact**

Compute the slope and/or y-intercept represented by a linear equation or graph.

**M11.D.4.1.1 – Compact**

Match the graph of a given function to its table or equation.

2.2.11.F -

Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.5.11.C - Present mathematical procedures and results clearly, systematically, succinctly and correctly.

2.8.11.H - Select and use an appropriate strategy to solve systems of equations and inequalities using

Topic: #1 Functions and Graphs

Days: 15

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

by a two-way table.  
 2.8.11.T - Analyze and categorize functions by their characteristics.  
 M11.D.1.1.1 - Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.

graphing calculators, symbol manipulators, spreadsheets and other software.  
 2.8.11.L - Write the equation of a line when given the graph of the line, two points on the line, or the slope of the line and a point on the line.  
 2.8.11.N - Solve linear, quadratic and exponential equations both symbolically and graphically.  
 2.8.11.O - Determine the domain and range of a relation, given a graph or set of ordered pairs.  
 2.8.11.Q - Represent functional relationships in tables, charts and graphs.  
 2.8.11.T - Analyze and categorize functions by their characteristics.  
 2.9.11.G - Solve problems using analytic geometry.  
 2.9.11.J - Analyze figures in terms of the kinds of symmetries they have.  
 2.10.11.A - Use graphing calculators to display periodic and circular functions; describe properties of the graphs.  
 M11.D.1.1.1 - Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.  
 M11.D.2.2.3 - Simplify algebraic fractions.  
 M11.D.3.2.2 - Given the graph of the line, 2 points on the line or the slope and a point on a line, write or identify the linear equation in point-slope, standard and/or slope-intercept form.  
 M11.D.3.2.3 - Compute the slope and/or y-intercept represented by a linear equation or graph.  
 M11.D.4.1.1 - Match the graph of a given function to its table or equation.  
 2.2.11.F -  
 2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.  
 2.5.11.C - Present mathematical procedures and results clearly, systematically, succinctly and correctly.  
 2.8.11.H - Select and use an appropriate strategy to solve systems of equations and inequalities using graphing calculators, symbol manipulators, spreadsheets and other software.  
 2.8.11.L - Write the equation of a line when given the graph of the line, two points on the line, or the slope of the line and a point on the line.

Topic: #1 Functions and Graphs

Days: 15

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

2.8.11.N - Solve linear, quadratic and exponential equations both symbolically and graphically.

2.8.11.O - Determine the domain and range of a relation, given a graph or set of ordered pairs.

2.8.11.Q - Represent functional relationships in tables, charts and graphs.

2.8.11.T - Analyze and categorize functions by their characteristics.

2.9.11.G - Solve problems using analytic geometry.

2.9.11.J - Analyze figures in terms of the kinds of symmetries they have.

2.10.11.A - Use graphing calculators to display periodic and circular functions; describe properties of the graphs.

M11.D.1.1.1 - Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.

M11.D.2.2.3 - Simplify algebraic fractions.

M11.D.3.2.2 - Given the graph of the line, 2 points on the line or the slope and a point on a line, write or identify the linear equation in point-slope, standard and/or slope-intercept form.

M11.D.3.2.3 - Compute the slope and/or y-intercept represented by a linear equation or graph.

M11.D.4.1.1 - Match the graph of a given function to its table or equation.

Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

Topic: #2 Limits and Continuity

Days: 20

Subject(s): Math

Grade(s): 12th

Know:	Understand:	Do:
<p><b>2.2.11.F – Essential</b> Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.</p> <p><b>2.5.11.B – Essential</b> Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.</p> <p><b>M11.D.1.1.1 – Compact</b> Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.</p> <p>2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators. 2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.</p>	<p>Find limits graphically, numerically, and analytically.</p> <p>Determine the continuity of a function.</p>	<p><b>2.2.11.F – Essential</b> Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.</p> <p><b>2.5.11.B – Essential</b> Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.</p> <p><b>2.5.11.C – Essential</b> Present mathematical procedures and results clearly, systematically, succinctly and correctly.</p> <p><b>2.8.11.C – Compact</b> Use patterns, sequences and series to solve routine and non-routine problems.</p> <p><b>M11.D.1.1.1 – Compact</b> Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.</p> <p><b>M11.D.2.2.3 – Compact</b> Simplify algebraic fractions.</p> <p>2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators. 2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.</p> <p>2.5.11.C - 2.8.11.C - Use patterns, sequences and series to solve routine and non-routine problems. M11.D.1.1.1 -</p>

Topic: #2 Limits and Continuity

Days: 20

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

M11.D.1.1.1 - Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

M11.D.1.1.1 - Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.

M11.D.2.2.3 - Simplify algebraic fractions.  
2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

2.5.11.B -

2.5.11.C -

2.8.11.C - Use patterns, sequences and series to solve routine and non-routine problems.

M11.D.1.1.1 -

M11.D.2.2.3 - Simplify algebraic fractions.

Present mathematical procedures and results clearly, systematically, succinctly and correctly.

Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.

Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

Present mathematical procedures and results clearly, systematically, succinctly and correctly.

Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.



Topic: #3 Derivatives

Days: 30

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

**2.2.11.F – Essential**  
Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

**2.5.11.B – Essential**  
Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

**M11.C.3.1.2 – Compact**  
Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).

**M11.D.3.1.1 – Important**  
Identify, describe and/or use constant or varying rates of change.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.  
2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other

Understand the relationship between a derivative, slope, and rate of change.

**2.2.11.F – Essential**  
Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

**2.5.11.B – Essential**  
Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

**2.5.11.C – Essential**  
Present mathematical procedures and results clearly, systematically, succinctly and correctly.

**M11.C.3.1.2 – Compact**  
Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).

**M11.D.3.1.1 – Important**  
Identify, describe and/or use constant or varying rates of change.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.  
2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.  
2.5.11.C - Present mathematical procedures and results clearly, systematically, succinctly and correctly.  
M11.C.3.1.2 - Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).  
M11.D.3.1.1 - Identify, describe and/or use constant or varying rates of change.  
2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.  
2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to

Topic: #3 Derivatives

Days: 30

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

M11.C.3.1.2 - Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).

M11.D.3.1.1 - Identify, describe and/or use constant or varying rates of change.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

M11.C.3.1.2 - Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).

M11.D.3.1.1 - Identify,

communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.5.11.C - Present mathematical procedures and results clearly, systematically, succinctly and correctly.

M11.C.3.1.2 - Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).

M11.D.3.1.1 - Identify, describe and/or use constant or varying rates of change.

Topic: #3 Derivatives

Days: 30

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

describe and/or use constant or varying rates of change.		
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## Topic: #4 Applications of Derivatives

Days: 30

Subject(s): Math

Grade(s): 12th

## Know:

**2.2.11.B – Compact**

Use estimation to solve problems for which an exact answer is not needed.

**2.2.11.D – Compact**

Describe and explain the amount of error that may exist in a computation using estimates.

**2.2.11.F – Essential**

Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

**2.5.11.A – Essential**

Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.

**2.5.11.B – Essential**

Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

## Understand:

Derivatives can be used to model real-life situations.

## Do:

**2.2.11.B – Compact**

Use estimation to solve problems for which an exact answer is not needed.

**2.2.11.C – Important**

Construct and apply mathematical models, including lines and curves of best fit, to estimate values of related quantities.

**2.2.11.D – Compact**

Describe and explain the amount of error that may exist in a computation using estimates.

**2.2.11.F – Essential**

Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

**2.4.11.E – Essential**

Demonstrate mathematical solutions to problems (e.g., in the physical sciences).

**2.5.11.A – Essential**

Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.

**2.5.11.B – Essential**

Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

**2.5.11.C – Essential**

Present mathematical procedures and results clearly, systematically, succinctly and correctly.

**2.5.11.D – Essential**

Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.

**2.8.11.R – Compact**

Create and interpret functional models.

Topic: #4 Applications of Derivatives

Days: 30

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

**2.5.11.D – Essential**

Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.

**2.8.11.S – Important**

Analyze properties and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic).

**2.8.11.T – Important**

Analyze and categorize functions by their characteristics.

**2.10.11.B – Compact**

Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.

**M11.C.3.1.2 – Compact**

Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).

**M11.D.3.1.1 – Important**

Identify, describe and/or use constant or varying rates of change.

**2.8.11.S – Important**

Analyze properties and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic).

**2.8.11.T – Important**

Analyze and categorize functions by their characteristics.

**2.9.11.E – Compact**

Solve problems involving inscribed and circumscribed polygons.

**2.9.11.G – Important**

Solve problems using analytic geometry.

**2.9.11.I – Compact**

Model situations geometrically to formulate and solve problems.

**2.10.11.B – Compact**

Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.

**2.11.11.A – Essential**

Determine maximum and minimum values of a function over a specified interval.

**2.11.11.B – Essential**

Interpret maximum and minimum values in problem situations.

**M11.C.3.1.2 – Compact**

Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).

**M11.D.3.1.1 – Important**

Identify, describe and/or use constant or varying rates of change.

Topic: #4 Applications of Derivatives

Days: 30

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

2.2.11.B - Use estimation to solve problems for which an exact answer is not needed.

2.2.11.D - Describe and explain the amount of error that may exist in a computation using estimates.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

2.5.11.A - Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.5.11.D - Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and

**M11.D.3.1.2 – Important**

Determine how a change in one variable relates to a change in a second variable (e.g.,  $y=4/x$ , if  $x$  doubles, what happens to  $y$ ?).

**M11.D.3.2.1 – Compact**

Apply the formula for the slope of a line to solve problems (formula given on reference sheet).

**M11.D.4.1.1 – Compact**

Match the graph of a given function to its table or equation.

2.2.11.B - Use estimation to solve problems for which an exact answer is not needed.

2.2.11.C - Construct and apply mathematical models, including lines and curves of best fit, to estimate values of related quantities.

2.2.11.D - Describe and explain the amount of error that may exist in a computation using estimates.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

2.4.11.E - Demonstrate mathematical solutions to problems (e.g., in the physical sciences).

2.5.11.A - Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.5.11.C - Present mathematical procedures and results clearly, systematically, succinctly and correctly.

2.5.11.D - Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.

2.8.11.R - Create and interpret functional models.

2.8.11.S - Analyze properties and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic).

Topic: #4 Applications of Derivatives

Days: 30

Subject(s): Math

Grade(s): 12th

Know:	Understand:	Do:
<p>why the reasoning is valid.</p> <p>2.8.11.S - Analyze properties and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic).</p> <p>2.8.11.T - Analyze and categorize functions by their characteristics.</p> <p>2.10.11.B - Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.</p> <p>M11.C.3.1.2 - Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).</p> <p>M11.D.3.1.1 - Identify, describe and/or use constant or varying rates of change.</p> <p>2.2.11.B - Use estimation to solve problems for which an exact answer is not needed.</p> <p>2.2.11.D - Describe and explain the amount of error that may exist in a computation using estimates.</p> <p>2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing</p>		<p>2.8.11.T - Analyze and categorize functions by their characteristics.</p> <p>2.9.11.E - Solve problems involving inscribed and circumscribed polygons.</p> <p>2.9.11.G - Solve problems using analytic geometry.</p> <p>2.9.11.I -</p> <p>Model situations geometrically to formulate and solve problems.</p> <p>2.10.11.B - Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.</p> <p>2.11.11.A - Determine maximum and minimum values of a function over a specified interval.</p> <p>2.11.11.B - Interpret maximum and minimum values in problem situations.</p> <p>M11.C.3.1.2 - Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).</p> <p>M11.D.3.1.1 - Identify, describe and/or use constant or varying rates of change.</p> <p>M11.D.3.1.2 - Determine how a change in one variable relates to a change in a second variable (e.g., <math>y=4/x</math>, if <math>x</math> doubles, what happens to <math>y</math>?).</p> <p>M11.D.3.2.1 - Apply the formula for the slope of a line to solve problems (formula given on reference sheet).</p> <p>M11.D.4.1.1 - Match the graph of a given function to its table or equation.</p> <p>2.2.11.B - Use estimation to solve problems for which an exact answer is not needed.</p> <p>2.2.11.C - Construct and apply mathematical models, including lines and curves of best fit, to estimate values of related quantities.</p> <p>2.2.11.D - Describe and explain the amount of error that may exist in a computation using estimates.</p> <p>2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.</p> <p>2.4.11.E - Demonstrate mathematical solutions to problems (e.g., in the physical sciences).</p> <p>2.5.11.A - Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine</p>

Topic: #4 Applications of Derivatives

Days: 30

Subject(s): Math

Grade(s): 12th

Know:	Understand:	Do:
<p>calculators.</p> <p>2.5.11.A - Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.</p> <p>2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.</p> <p>2.5.11.D - Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.</p> <p>2.8.11.S - Analyze properties and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic).</p> <p>2.8.11.T - Analyze and categorize functions by their characteristics.</p> <p>2.10.11.B - Identify,</p>		<p>and multi-step problems.</p> <p>2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.</p> <p>2.5.11.C - Present mathematical procedures and results clearly, systematically, succinctly and correctly.</p> <p>2.5.11.D - Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.</p> <p>2.8.11.R - Create and interpret functional models.</p> <p>2.8.11.S - Analyze properties and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic).</p> <p>2.8.11.T - Analyze and categorize functions by their characteristics.</p> <p>2.9.11.E - Solve problems involving inscribed and circumscribed polygons.</p> <p>2.9.11.G - Solve problems using analytic geometry.</p> <p>2.9.11.I -</p> <p>2.10.11.B - Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.</p> <p>2.11.11.A - Determine maximum and minimum values of a function over a specified interval.</p> <p>2.11.11.B - Interpret maximum and minimum values in problem situations.</p> <p>M11.C.3.1.2 - Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).</p> <p>M11.D.3.1.1 - Identify, describe and/or use constant or varying rates of change.</p> <p>M11.D.3.1.2 - Determine how a change in one variable relates to a change in a second variable (e.g., <math>y=4/x</math>, if <math>x</math> doubles, what happens to <math>y</math>?).</p> <p>M11.D.3.2.1 - Apply the formula for the slope of a line to solve problems (formula given on reference sheet).</p> <p>M11.D.4.1.1 - Match the graph of a given function to its table or equation.</p>



Topic: #4 Applications of Derivatives

Days: 30

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.  
M11.C.3.1.2 - Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).  
M11.D.3.1.1 - Identify, describe and/or use constant or varying rates of change.

Model situations geometrically to formulate and solve problems.

Topic: #5 Integration

Days: 30

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

**2.2.11.B – Compact**

Use estimation to solve problems for which an exact answer is not needed.

**2.2.11.D – Compact**

Describe and explain the amount of error that may exist in a computation using estimates.

**2.2.11.F – Essential**

Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

**2.5.11.B – Essential**

Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.2.11.B - Use estimation to solve problems for which an exact answer is not needed.  
 2.2.11.D - Describe and explain the amount of error that may exist in a computation using estimates.  
 2.2.11.F - Demonstrate skills for using computer spreadsheets and

Integration can be described as the limit of the sum of quantities, or antidifferentiation.

**2.2.11.A – Unranked**

Develop and use computation concepts, operations and procedures with real numbers in problem-solving situations.

**2.2.11.B – Compact**

Use estimation to solve problems for which an exact answer is not needed.

**2.2.11.D – Compact**

Describe and explain the amount of error that may exist in a computation using estimates.

**2.2.11.F – Essential**

Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

**2.5.11.B – Essential**

Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

**2.5.11.C – Essential**

Present mathematical procedures and results clearly, systematically, succinctly and correctly.

**2.11.11.D – Essential**

Determine sums of finite sequences of numbers and infinite geometric series.

**2.11.11.E – Essential**

Estimate areas under curves using sequences of areas.

2.2.11.A - Develop and use computation concepts, operations and procedures with real numbers in problem-solving situations.  
 2.2.11.B - Use estimation to solve problems for which an exact answer is not needed.  
 2.2.11.D - Describe and explain the amount of error that may exist in a computation using estimates.  
 2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

Topic: #5 Integration

Days: 30

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

scientific and graphing calculators.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.2.11.B - Use estimation to solve problems for which an exact answer is not needed.

2.2.11.D - Describe and explain the amount of error that may exist in a computation using estimates.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.5.11.C - Present mathematical procedures and results clearly, systematically, succinctly and correctly.

2.11.11.D - Determine sums of finite sequences of numbers and infinite geometric series.

2.11.11.E - Estimate areas under curves using sequences of areas.

2.2.11.A - Develop and use computation concepts, operations and procedures with real numbers in problem-solving situations.

2.2.11.B - Use estimation to solve problems for which an exact answer is not needed.

2.2.11.D - Describe and explain the amount of error that may exist in a computation using estimates.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.5.11.C - Present mathematical procedures and results clearly, systematically, succinctly and correctly.

2.11.11.D - Determine sums of finite sequences of numbers and infinite geometric series.

2.11.11.E - Estimate areas under curves using sequences of areas.

Topic: #6 Transcendental Functions

Days: 25

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

**2.2.11.F – Essential**

Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

**2.5.11.A – Essential**

Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.

**2.5.11.B – Essential**

Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

**2.5.11.D – Essential**

Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

We can solve a differential equation using the process of integration.

**2.2.11.C – Important**

Construct and apply mathematical models, including lines and curves of best fit, to estimate values of related quantities.

**2.2.11.F – Essential**

Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

**2.4.11.A – Compact**

Use direct proofs, indirect proofs or proof by contradiction to validate conjectures.

**2.4.11.E – Essential**

Demonstrate mathematical solutions to problems (e.g., in the physical sciences).

**2.5.11.A – Essential**

Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.

**2.5.11.B – Essential**

Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

**2.5.11.C – Essential**

Present mathematical procedures and results clearly, systematically, succinctly and correctly.

**2.5.11.D – Essential**

Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.

**2.6.11.C – Compact**

Determine the regression equation of best fit (e.g., linear, quadratic, exponential).

**2.11.11.C – Important**

Graph and interpret rates of growth/decay.

Topic: #6 Transcendental Functions

Days: 25

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

2.5.11.A - Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.5.11.D - Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

2.5.11.A - Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step

2.2.11.C - Construct and apply mathematical models, including lines and curves of best fit, to estimate values of related quantities.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

2.4.11.A - Use direct proofs, indirect proofs or proof by contradiction to validate conjectures.

2.4.11.E - Demonstrate mathematical solutions to problems (e.g., in the physical sciences).

2.5.11.A - Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.5.11.C - Present mathematical procedures and results clearly, systematically, succinctly and correctly.

2.5.11.D - Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.

2.6.11.C - Determine the regression equation of best fit (e.g., linear, quadratic, exponential).

2.11.11.C - Graph and interpret rates of growth/decay.

2.2.11.C - Construct and apply mathematical models, including lines and curves of best fit, to estimate values of related quantities.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

2.4.11.A - Use direct proofs, indirect proofs or proof by contradiction to validate conjectures.

2.4.11.E - Demonstrate mathematical solutions to problems (e.g., in the physical sciences).

2.5.11.A - Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and

Topic: #6 Transcendental Functions

Days: 25

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

problems.  
 2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.  
 2.5.11.D - Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.

other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.  
 2.5.11.C - Present mathematical procedures and results clearly, systematically, succinctly and correctly.  
 2.5.11.D - Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.  
 2.6.11.C - Determine the regression equation of best fit (e.g., linear, quadratic, exponential).  
 2.11.11.C - Graph and interpret rates of growth/decay.

Topic: #7 Applications of Integration

Days: 20

Subject(s): Math

Grade(s): 12th

Know:

**2.2.11.B – Compact**

Use estimation to solve problems for which an exact answer is not needed.

**2.2.11.F – Essential**

Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

**2.5.11.A – Essential**

Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.

**2.5.11.B – Essential**

Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

**2.5.11.D – Essential**

Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.

Understand:

The concept of integration can be applied to a variety of situations in the physical and social sciences.

Do:

**2.2.11.B – Compact**

Use estimation to solve problems for which an exact answer is not needed.

**2.2.11.C – Important**

Construct and apply mathematical models, including lines and curves of best fit, to estimate values of related quantities.

**2.2.11.F – Essential**

Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

**2.4.11.E – Essential**

Demonstrate mathematical solutions to problems (e.g., in the physical sciences).

**2.5.11.A – Essential**

Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.

**2.5.11.B – Essential**

Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

**2.5.11.C – Essential**

Present mathematical procedures and results clearly, systematically, succinctly and correctly.

**2.5.11.D – Essential**

Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.

**2.6.11.C – Compact**

Determine the regression equation of best fit (e.g., linear, quadratic, exponential).

**2.8.11.R – Compact**

Create and interpret functional models.

Topic: #7 Applications of Integration

Days: 20

Subject(s): Math

Grade(s): 12th

Know:	Understand:	Do:
<p>2.2.11.B - Use estimation to solve problems for which an exact answer is not needed.</p> <p>2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.</p> <p>2.5.11.A - Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.</p> <p>2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.</p> <p>2.5.11.D - Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.</p> <p>2.2.11.B - Use estimation to solve problems for which an</p>		<p><b>2.9.11.G – Important</b> Solve problems using analytic geometry.</p> <p><b>M11.D.4.1.1 – Compact</b> Match the graph of a given function to its table or equation.</p> <p>2.2.11.B - Use estimation to solve problems for which an exact answer is not needed.</p> <p>2.2.11.C - Construct and apply mathematical models, including lines and curves of best fit, to estimate values of related quantities.</p> <p>2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.</p> <p>2.4.11.E - Demonstrate mathematical solutions to problems (e.g., in the physical sciences).</p> <p>2.5.11.A - Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.</p> <p>2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.</p> <p>2.5.11.C - Present mathematical procedures and results clearly, systematically, succinctly and correctly.</p> <p>2.5.11.D - Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.</p> <p>2.6.11.C - Determine the regression equation of best fit (e.g., linear, quadratic, exponential).</p> <p>2.8.11.R - Create and interpret functional models.</p> <p>2.9.11.G - Solve problems using analytic geometry.</p> <p>M11.D.4.1.1 - Match the graph of a given function to its table or equation.</p> <p>2.2.11.B - Use estimation to solve problems for which an exact answer is not needed.</p> <p>2.2.11.C - Construct and apply mathematical models, including lines and curves of best fit, to estimate values of related quantities.</p> <p>2.2.11.F - Demonstrate skills for using computer</p>



Topic: #7 Applications of Integration

Days: 20

Subject(s): Math

Grade(s): 12th

Know:

Understand:

Do:

exact answer is not needed.

2.2.11.F - Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

2.5.11.A - Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.5.11.D - Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.

spreadsheets and scientific and graphing calculators.

2.4.11.E - Demonstrate mathematical solutions to problems (e.g., in the physical sciences).

2.5.11.A - Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.

2.5.11.B - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.5.11.C - Present mathematical procedures and results clearly, systematically, succinctly and correctly.

2.5.11.D - Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.

2.6.11.C - Determine the regression equation of best fit (e.g., linear, quadratic, exponential).

2.8.11.R - Create and interpret functional models.

2.9.11.G - Solve problems using analytic geometry.

M11.D.4.1.1 - Match the graph of a given function to its table or equation.