

FREEHOLD REGIONAL HIGH SCHOOL DISTRICT

OFFICE OF CURRICULUM AND INSTRUCTION

MATHEMATICS DEPARTMENT

ADVANCED ALGEBRA AND TRIGONOMETRY

Grade Level: 11-12

Credits: 5

BOARD OF EDUCATION ADOPTION DATE:

AUGUST 31, 2009

[SUPPORTING RESOURCES AVAILABLE IN DISTRICT RESOURCE SHARING](#)

APPENDIX A: ACCOMMODATIONS AND MODIFICATIONS

APPENDIX B: ASSESSMENT EVIDENCE

APPENDIX C: INTERDISCIPLINARY CONNECTIONS

Course Philosophy

In the spirit of academic rigor and excellence, this curriculum will provide our youth with a solid understanding of mathematics and the world around them. Advanced Algebra and Trigonometry creates a solid foundation for further mathematical endeavors, particularly for college bound students. The intent of this course is to enable students to move toward independent learning within the context of review and extension, as well as to provide an introduction of topics essential for further study. Attention will be given to strengthening skills learned in previous courses and using these skills to develop problem solving strategies in advanced mathematical topics.

Course Description

This course is designed for students to extend their understanding of algebra and introduce the study of trigonometry and basic statistics. A thorough understanding of functions and their graphs will be stressed. The course provides an alternative to Pre-Calculus for those students who intend on going to college, but are not likely to need Calculus for their majors.

FREEHOLD REGIONAL HIGH SCHOOL DISTRICT

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**Freehold Regional High School District
Curriculum Map**

Advanced Algebra and Trigonometry

Relevant Standards ¹	Enduring Understandings	Essential Questions	Assessments		
			Diagnostic (before)	Formative (during)	Summative (after)
4.1A	A quantity can be represented numerically in various ways. Problem solving depends upon choosing wise ways.	How do mathematical ideas interconnect and build on one another to produce a coherent whole?	Algebra II Diagnostic Pre test	Algebra II Diagnostic Pretest	Unit Test with multiple choice and open-ended
4.1B	There are multiple algorithms for finding a mathematical solution and those algorithms are frequently associated with different contexts.	What makes a computational strategy both effective and efficient? How do mathematical representations reflect the needs of society?	Daily hw quizzes	Unit quizzes	
4.1C	Context is critical when using estimation.	How can we decide when to use an exact answer and when to use an estimate?	Anticipatory Set	Review methods for graphing calculator	
4.2 B	Shape and area can be conserved during mathematical transformations.	What situations can be analyzed using transformations and symmetries?		Using white boards during guided practice	
4.2C	Coordinate geometry can be used to represent and verify geometric/algebraic relationships.	How can we best represent and verify geometric/algebraic relationships?	Unit quizzes	Review games	
4.2 E	Everyday objects have a variety of attributes, each of which can be measured in many ways. What we measure affects how we measure it. Measurements can be used to describe, compare, and make sense of phenomena.	How can measurements be used to solve problems?	Use of computer programs such as Geometer's Sketchpad and other graphing software.		
4.3.A	The symbolic language of algebra and generalize patterns in mathematics are used to communicate and understand Mathematics.	How can patterns, relations, and functions be used as tools to best describe and help explain real-life situations?			
4.3.B	Patterns, functions and relationships can be represented graphically, numerically, symbolically or verbally. The function and relationship concepts are fundamental ideas in Mathematics.	How are patterns of change related to the behavior of functions?			
4.3.C	Mathematical models can be used to describe and quantify physical relationships.	How can we use mathematical models to describe physical relationships?		Using white boards during	

¹ Including computer / information literacy, cross content work place readiness standards, and other relevant content area standards

Relevant Standards ¹	Enduring Understandings	Essential Questions	Assessments		
			Diagnostic (before)	Formative (during)	Summative (after)
4.3.D	Algebraic and numeric procedures are interconnected and build on one another to produce a coherent whole.	What makes an algebraic algorithm both effective and efficient?		guided practice	
4.4.A	The message conveyed by the data depends on how the data is collected, represented, and summarized. The result of a statistical investigation can be used to support or refute an argument.	How can the collection, organization, interpretation, and display of data be used to answer questions?		Unit quizzes Review games Cryptography project	
4.5A	Mathematics can be learned through problem solving, inquiry, and discovery.	How can inquiry and discovery infuse the power and usefulness of mathematics?		Review methods for graphing calculator	
4.5B	Use communication to organize and clarify mathematical thinking.	How can clear and concise organization and higher level thinking enhance the mathematics student?		Using white boards during guided practice	
4.5C	Students can translate readily between fractions and decimals, or between algebra and geometry.	How can connections in mathematics be helpful in the sciences, social sciences, and the arts; and to the everyday world?		Unit quizzes	
4.5D	With the development of mathematical reasoning, students recognize that mathematics makes sense and can be understood.	How can students use their ability to reason to conquer a wide array of mathematical problems?		Review games	
4.5E	By using various representations students will be better able to communicate their thinking and solve problems.	What type of alternate perspectives can be used to tackle the solution to a problem?		Use of computer programs such as Geometer's Sketchpad and other graphing software.	
4.5F	Tools should be used not to replace mental math and paper and pencil computation, but to enhance understanding of mathematics and the power to use mathematics.	How can the use of technology enhance the learning environment?			

Freehold Regional High School District
Course Proficiencies and Pacing
Advanced Algebra and Trigonometry

Unit Title	Unit Understandings and Goals	Recommended Duration
Unit 1: Linear and Quadratic Functions	<p>Coordinate Geometry can be used to represent and verify geometric/algebraic relationships. Mathematical models can be used to describe and quantify physical relationships. Algebraic and numeric procedures are interconnected and build on one another to produce a coherent whole.</p> <ol style="list-style-type: none"> 1. Students will understand the relationships between any two lines. 2. Students will understand that the solutions to quadratic equations relates to the graphical interpretations of quadratic functions. 	3 weeks
Unit 2: Polynomial Functions	<p>Patterns, functions, and relationships can be represented graphically, numerically, symbolically, or verbally. The function and relationship concepts are fundamental ideas in mathematics. Algebraic and numeric procedures are interconnected and build on one another to produce a coherent whole.</p> <ol style="list-style-type: none"> 1. Students will understand the characteristics of a polynomial function. 2. Students will understand how the coefficient of a polynomial function affects the behavior of the graph. 	4 weeks
Unit 3: Functions	<p>Shape and area can be conserved during mathematical transformations. Patterns, functions, and relationships can be represented graphically, numerically, symbolically, or verbally. The function and relationship concepts are fundamental ideas in mathematics.</p> <ol style="list-style-type: none"> 1. Students will understand the differences and similarities between relationships and functions. 2. Students will understand how functions can be combined to produce new functions and how simple changes in a function's rule will change its graph. 	4 weeks
Unit 4: Exponents and Logarithms	<p>Mathematical models can be used to describe and quantify physical relationships.</p> <ol style="list-style-type: none"> 1. Students will understand how to apply integral exponents, rational exponents, and logarithms to solve real world problems. 	5 weeks
Unit 5: Trigonometric Functions	<p>Everyday objects have a variety of attributes, each of which can be measured in many ways. What we measure affects how we measure it. Measurements can be used to describe, compare, and make sense of phenomena. Patterns, functions, and relationships can be represented graphically, numerically, symbolically, or verbally. The function and relationship concepts are fundamental ideas in mathematics.</p> <ol style="list-style-type: none"> 1. Students will understand that there are many methods used to find angle measures, lengths, and areas. 2. Students will understand the six trigonometric functions. 	5 weeks

Unit Title	Unit Understandings and Goals	Recommended Duration
Unit 6: Trigonometric Equations and Applications	<p>Everyday objects have a variety of attributes, each of which can be measured in many ways. What we measure affects how we measure it.</p> <p>Measurements can be used to describe, compare, and make sense of phenomena.</p> <p>Patterns, functions, and relationships can be represented graphically, numerically, symbolically, or verbally.</p> <p>The function and relationship concepts are fundamental ideas in mathematics.</p> <p>1. Students will understand the periodic behavior functions over its domain.</p>	6 weeks
Unit 7: Triangle Trigonometry	<p>Everyday objects have a variety of attributes, each of which can be measured in many ways. What we measure affects how we measure it.</p> <p>Measurements can be used to describe, compare, and make sense of phenomena.</p> <p>1. Students will understand how right triangle trigonometry is used to solve real world problems.</p>	3 weeks
Unit 8: Statistics *OPTIONAL	<p>The message conveyed by the data depends on how the data is collected, represented, and summarized.</p> <p>The results of a statistical investigation can be used to support or refute and argument.</p> <p>1. Students will understand how to collect and organize data and must then be able to draw conclusions or make predictions from them.</p>	4 weeks
Unit 9: Limits and an Introduction to Calculus *OPTIONAL	<p>Mathematical models can be used to describe and quantify physical relationships.</p> <p>1. Students will understand that a function can approach finite numbers for extreme values or a particular value.</p>	4 weeks

* At least one optional unit must be selected.

**Freehold Regional High School District
Advanced Algebra and Trigonometry**

Unit #1: Linear and Quadratic Functions

Enduring Understandings: Coordinate Geometry can be used to represent and verify geometric/algebraic relationships.

Mathematical models can be used to describe and quantify physical relationships.

Algebraic and numeric procedures are interconnected and build on one another to produce a coherent whole.

Essential Questions: How can we best represent and verify geometric/algebraic relationships?

How can we use mathematical models to describe physical relationships?

What makes an algebraic algorithm both effective and efficient?

Unit Goals: Students will understand the relationships between any two lines.

Students will understand that the solutions to quadratic equations relates to the graphical interpretations of quadratic functions.

Duration of Unit: 3 weeks

NJCCCS: 4.2 C 1, 4.3 C 1, 4.3 D 2, 4.5A-F

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What are the possible relationships between any two lines?	Find the intersection of two lines	Prerequisite assignment used to review topics covered in Algebra I	Use guided and independent practice activities	Diagnostic Pre-Test
Describe in words how to find the length of a segment using the distance formula.	Find the length and the coordinates of the midpoint of a segment	Textbook Ancillaries		Quizzes
Describe in words how to find the midpoint of a segment.	Find the slope of a line and determine whether two lines are parallel, perpendicular, or neither	Teacher driven worksheets	Use the board, overhead, and worksheets to reinforce concepts	Tests
What is slope and how can it be applied to linear equations?		Overheads		HW quizzes
What are the different forms of writing equations of lines?	Find the equation of a line given certain geometric properties To model real-world situations by means of linear functions	Use of computer programs such as Geometer's Sketchpad and other graphing software		
How are linear equations used to model and solve real life problems?			Use the white boards to show immediate feedback on questions	
What operations are used in the set of complex numbers?	Add, subtract, multiply, and divide complex numbers			
What are the ways to solve a quadratic equation and how would you determine which method to use?	Solve quadratic equations using different methods			
What are the necessary components needed to graph a quadratic equation?	To define and graph quadratic functions			
How can quadratic functions be used to model real life phenomena?	Model real-world situations using quadratic functions			

Suggestions on how to differentiate in this unit:

Use white boards, cooperative learning activities, and alternative assessments to meet the needs of all learners.

**Freehold Regional High School District
Advanced Algebra and Trigonometry**

Unit #2: Polynomial Functions

Enduring Understandings: Patterns, functions, and relationships can be represented graphically, numerically, symbolically, or verbally. The function and relationship concepts are fundamental ideas in mathematics.

Algebraic and numeric procedures are interconnected and build on one another to produce a coherent whole.

Essential Questions: How are patterns of change related to the behavior of functions?

What makes an algebraic algorithm both effective and efficient?

Unit Goals: Students will understand the characteristics of a polynomial function.

Students will understand how the coefficient of a polynomial function affects the behavior of the graph.

Duration of Unit: 4 weeks

NJCCCS: 4.3 B1, 4.3 D 1 4.3 D 2, 4.5A-F

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
<p>What are the characteristics of a polynomial function?</p> <p>What steps are used for synthetic substitution?</p> <p>How does using synthetic substitution help you determine the zeros of a function?</p> <p>Compare the remainder and factor theorem.</p> <p>How does the sign of the leading coefficient affect the behavior of a polynomial functions' graph?</p> <p>What changes occur in the end behavior of an even function versus an odd function?</p> <p>How can the knowledge of polynomial functions be utilized to exemplify real life occurrences?</p> <p>How can using the graphing calculator be helpful in analyzing graphs of polynomial functions?</p> <p>How is factoring the related polynomial equation helpful in determining the zeros of the polynomial function?</p> <p>What is the connection between the degree of a polynomial function, its zeros, and its local maxima/minima?</p>	<p>Identify a polynomial function, evaluate using synthetic substitution, and determine its zeros</p> <p>Use synthetic division and apply the remainder and factor theorems</p> <p>Graph a polynomial function</p> <p>Determine an equation for a polynomial graph</p> <p>Write a polynomial function for a given situation and find the maximum or minimum value of the function</p> <p>Use technology to approximate the real roots of a polynomial equation</p> <p>Solve polynomial equations by various methods of factoring, including the use of the rational root theorem</p> <p>Apply general theorems about polynomial equations</p>	<p>Worksheets and samples problems to analyze step-by-step solutions of the problems</p> <p>Textbook Ancillaries</p> <p>Teacher driven worksheets</p> <p>Overheads</p> <p>Graphing Calculators</p> <p>Use of computer programs such as Geometer's Sketch pad and other graphing software.</p>	<p>Guided and independent practice activities</p> <p>Use the board, overhead, and worksheets to reinforce the concepts</p> <p>Use the graphing calculator to explore linear equations, absolute value functions, piecewise functions, and linear regressions</p> <p>Cooperative learning activities. See "Linear Regression Activity"</p> <p>White boards</p> <p>Use written analysis of algebraic work versus graphing calculator work. Compare & contrast</p>	<p>Do Now activities to reinforce previous lessons</p> <p>Closure questions</p> <p>White boards to show immediate feedback on questions</p> <p>Notebook checks</p> <p>Quizzes</p> <p>Tests</p> <p>Projects</p>

Suggestions on how to differentiate in this unit:

Use of overhead graphing calculator, white boards, pre-printed coordinate planes, cooperative learning activities, and alternative assessments to meet the needs of all learners.

**Freehold Regional High School District
Advanced Algebra and Trigonometry**

Unit #3: Functions

Enduring Understandings: Shape and area can be conserved during mathematical transformations.

Patterns, functions, and relationships can be represented graphically, numerically, symbolically, or verbally. The function and relationship concepts are fundamental ideas in mathematics.

Essential Questions: Which situations can be analyzed using transformations and symmetries?

How are patterns of change related to the behavior of functions?

Unit Goals: Students will understand the differences and similarities between relations and functions.

Students will understand how functions can be combined to produce new functions and how simple changes in a function's rule will change its graph.

Duration of Unit: 4 weeks

NJCCCS: 4.2 B 1, 4.3 B 1, 4.3 B 2, 4.3 B 3 4.5 A-F

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What are the domain and range of the function? How are the dependent and independent variables related? What characteristics make a relation a function? What are the zeros of a function? What are the different operations that can be performed on functions? What operation combines f and g to produce their composite? How would you reflect the graph of a function in the x-axis, y-axis, $y=x$? How would you find the axis of symmetry of the graph of a function? How can you use symmetry to sketch a graph of a function? How can you define a periodic function? What is the amplitude of a function? What part of the periodic function will be affected with a vertical stretching or shrinking? How do you know that two functions are inverses of each other? What test is used to determine that f is one-to one and has an inverse?	Perform operations on functions, and determine the domain of the resulting functions Graph a function, reflect graphs and use symmetry to sketch graphs Determine periodicity and amplitude from graphs Stretch and shrink graphs both vertically and horizontally Translate graphs. Find the inverse of a function, if the inverse exists Graph functions of two-variable in a two-dimensional coordinate system, and read such graphs	Worksheets and sample problems to analyze step by step solutions to problems Textbook Ancillaries Teacher driven worksheets Overheads Graphing Calculators Computer programs such as Geometer's Sketch pad and other graphing software	Use guided and independent practice Use the board, overhead, and worksheets to reinforce the concepts Use cooperative learning activities Use whiteboards to show immediate feedback on questions Use graphing calculator to perform operations, graph functions, and find estimated zeros Use written analysis of algebraic work versus graphing calculator work. Compare and Contrast	Do Now to reinforce previous lessons Closure questions Notebook checks Quizzes Tests Projects Rubrics for open-ended questions

Suggestions on how to differentiate in this unit:

The use of the graphing calculator, white boards, cooperative learning and alternate assessments that include projects will meet the needs of any diverse learner.

**Freehold Regional High School District
Advanced Algebra and Trigonometry**

Unit #4: Exponents and Logarithms

Enduring Understanding: Mathematical models can be used to describe and quantify physical relationships.

Essential Question: How can we use mathematical models to describe physical relationships?

Unit Goal: Students will understand how to apply integral exponents, rational exponents, and logarithms to solve real world problems.

Duration of Unit: 5 weeks

NJCCCS: 4.3 C 1, 4.3 C 2, 4.3 C 3, 4.5 A-F

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
<p>What formula are growth and decay modeled by?</p> <p>How can the laws of exponents be defined to make sense for zero exponent and negative integral exponents.</p> <p>Do the laws for integral exponents hold true for rational exponents?</p> <p>What could be the reason to use the Rule of 72?</p> <p>What is the most important base for an irrational number in advanced mathematics?</p> <p>What is the common Logarithm?</p> <p>Describe the most important logarithmic function in advanced mathematics and statistics.</p> <p>How do the laws of exponents and laws of logarithms relate?</p> <p>How can you use logarithms to solve exponential equations?</p>	<p>Define and apply integral exponents</p> <p>Define and apply rational exponents</p> <p>Define and use exponential functions</p> <p>Define and apply the natural exponential function</p> <p>Define and apply logarithms. Prove and apply laws of logarithms</p> <p>Solve exponential equations</p> <p>Change logarithms from one base to another</p>	<p>Worksheets and sample problems to analyze step-by-step solutions of the problems</p> <p>Textbook Ancillaries</p> <p>Teacher driven worksheets</p> <p>Overheads</p> <p>Graphing Calculators</p> <p>Computer programs such as Geometer's Sketch pad and other graphing software</p>	<p>Use guided and independent practice</p> <p>Use the board, overhead, and worksheets to reinforce the concepts</p> <p>Use the graphing calculator to evaluate e and graph e</p> <p>Use cooperative learning activities</p> <p>Use white boards to show immediate feedback on questions</p> <p>Use written analysis of algebraic work versus graphing calculator work. Compare & contrast</p>	<p>“Do Nows” to reinforce previous lessons</p> <p>Closure questions</p> <p>Use white boards to show immediate feedback on questions</p> <p>Notebook checks</p> <p>Quizzes</p> <p>Tests</p> <p>Projects</p> <p>Rubrics for open-ended questions</p>
<p><u>Suggestions on how to differentiate in this unit:</u> Use of overhead graphing calculator, white boards, pre-printed coordinate planes, cooperative learning activities, and alternative assessments to meet the needs of all learners.</p>				

**Freehold Regional High School District
Advanced Algebra and Trigonometry**

Unit #5: Trigonometric Functions

Enduring Understandings: Everyday objects have a variety of attributes, each of which can be measured in many ways. What we measure affects how we measure it. Measurements can be used to describe, compare, and make sense of phenomena. Patterns, functions, and relationships can be represented graphically, numerically, symbolically, or verbally. The function and relationship concepts are fundamental ideas in mathematics.

Essential Questions: How can measurements be used to solve problems?
How are patterns of change related to the behavior of functions?

Unit Goals: Students will understand that there are many methods used to find angle measures, lengths, and areas.
Students will understand the six trigonometric functions.

Duration of Unit: 5 weeks

NJCCCS: 4.2 E 1, 4.3 B 4, 4.5 A-F

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
How do you convert from degrees to radians and vice-versa? How do we convert decimal forms of angles into degrees, minutes, and seconds? What it meant by an angle in standard position? What are conterminal angles; What are quadrantal angles? What formula is used to find the arc length of a circle? What formula is used to find the area of a sector of a circle? How can an object's apparent size be used to estimate distance and/or height? How can a point on a circle be used to find the values of the trigonometric functions? What is a unit circle? How can the function of any size angle be expressed as a function of an acute angle? How is the calculator used to find trigonometric values?	Find the measure of an angle in either degrees or radians Find coterminal angles Find the arc length and area of a circle Solve problems involving apparent size Use the definitions of sine and cosine to find values of these functions Use reference angles, calculators or tables, and special angles to find values of the sine and cosine functions Sketch the graphs of the sine and cosine functions Find values of the tangent, cotangent, secant, and cosecant functions Sketch the graphs of the tangent, cotangent, secant, and cosecant functions Find values of the inverse trigonometric functions	Use worksheets and sample problems to analyze step-by-step solutions to the problem. Textbook Ancillaries Teacher drive worksheets Overheads Graphing Calculators	Use guided and independent practice. Use the board, overhead and worksheets to reinforce concepts. Use the graphing calculator to graph the sine and cosine functions. Use cooperative learning activities. Use white boards to show immediate feedback on questions.	Do Now to reinforce previous lessons Closure questions Use white boards to show immediate feedback on questions Notebook checks Quizzes Tests

Suggestions on how to differentiate in this unit:

Use of overhead graphing calculator, interactive mathematical software programs, white boards, pre-printed coordinate planes, cooperative learning activities, and alternative assessments to meet the needs of all learners.

**Freehold Regional High School District
Advanced Algebra and Trigonometry**

Unit #6: Trigonometric Equations and Applications

Enduring Understandings: Everyday objects have a variety of attributes, each of which can be measured in many ways. What we measure affects how we measure it. Measurements can be used to describe, compare, and make sense of phenomena. Patterns, functions, and relationships can be represented graphically, numerically, symbolically, or verbally. The function and relationship concepts are fundamental ideas in mathematics.

Essential Questions: How can measurements be used to solve problems?
How are pattern of change related to the behavior of functions.

Unit Goal: Students will understand the periodic behavior of the trigonometric functions over its domain.

Duration of Unit: 6 weeks

NJCCCS: 4.2 E 1, 4.3 B 4, 4.5 A-F

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
<p>What are some of the techniques for solving simple trigonometric equations?</p> <p>How is the periodic nature of the sine and cosine functions used to solve simple trigonometric equations?</p> <p>How can the coordinates of the quadrantal angles on a unit circle be used to sketch the graph of sine and cosine?</p> <p>Given $y = A \sin Bx$, and $y = A \cos Bx$, how do the values of A and B effect the basic sine and cosine curves?</p> <p>What causes the sine and cosine curves to be translated horizontally and/or vertically?</p> <p>What are some real world applications of the sine waves?</p> <p>How can we use reciprocal, Pythagorean, cofunctions, and negative relationships with angles to simplify trigonometric expressions?</p> <p>What does it mean to prove a trigonometric identity?</p>	<p>To solve simple trigonometric equations and apply them</p> <p>Find equations of different sine and cosine curves and to apply these equations</p> <p>Sketch the graphs of the sine and cosine functions</p> <p>Find values of the tangent, cotangent, secant, and cosecant functions</p> <p>Sketch the graphs of the tangent, cotangent, secant, and cosecant functions</p> <p>Use trigonometric functions to model periodic behavior</p> <p>Simplify trigonometric expressions</p> <p>Prove trigonometric identities</p> <p>Use trigonometric identities to technology to solve more difficult trigonometric equations</p>	<p>Use worksheets and samples problems to analyze step-by-step solutions of the problems</p> <p>Textbook Ancillaries</p> <p>Teacher driven worksheets</p> <p>Overheads</p> <p>Graphing Calculators</p> <p>Computer programs such as Geometer's Sketch pad and other graphing software.</p>	<p>Use guided and independent practice in solving quadratic equations.</p> <p>Use the board, overhead, and worksheets to reinforce the concepts.</p> <p>Use the graphing calculator to explore Trigonometric functions.</p> <p>Use cooperative learning activities to investigate real world applications of the sine waves.</p> <p>Use white boards to show immediate feedback on questions.</p> <p>Use written analysis of algebraic work versus graphing calculator work. Compare & contrast</p>	<p>Do Nows to reinforce previous lessons</p> <p>Closure questions</p> <p>Use white boards to show immediate feedback on questions</p> <p>Notebook checks</p> <p>Quizzes</p> <p>Tests</p> <p>Projects</p>

Suggestions on how to differentiate in this unit:

Use of overhead graphing calculator, white boards, interactive mathematical software programs, pre-printed coordinate planes, cooperative learning activities, and alternative assessments to meet the needs of all learners.

**Freehold Regional High School District
Advanced Algebra and Trigonometry**

Unit #7: Triangle Trigonometry

Enduring Understandings: Everyday objects have a variety of attributes, each of which can be measured in many ways. What we measure affects how we measure it. Measurements can be used to describe, compare, and make sense of phenomena.

Essential Question: How can measurements be used to solve problems?

Unit Goal: Students will understand how right triangle trigonometry is used to solve real world problems.

Duration of Unit: 3 weeks

NJCCCS: 4.2 E 1, 4.2 E 2, 4.5 A-E

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
<p>State the six trigonometric functions.</p> <p>When you are asked to solve a triangle, what are you looking for?</p> <p>What are the formulas for area of a triangle using trigonometric functions?</p> <p>When would it be beneficial to use the trigonometric formulas for area of a triangle?</p> <p>When is the law of sines useful?</p> <p>When do mathematicians use the law of cosines?</p> <p>What given information is necessary to be able to use law of sines to find missing side lengths or angle measures of a triangle?</p>	<p>Use trigonometry to find unknown sides or angles of right triangles</p> <p>Find the area of a triangle given the lengths of two sides and the measure of the included angle</p> <p>Use the law of sines to find unknown parts of a triangle</p> <p>Use the law of cosines to find unknown parts of a triangle</p> <p>Use trigonometry to solve navigation and surveying problems</p>	<p>Use worksheets and samples problems to analyze step-by-step solutions of the problems</p> <p>Textbook Ancillaries</p> <p>Teacher driven worksheets</p> <p>Overheads</p> <p>Graphing Calculators</p>	<p>Use guided and independent practice</p> <p>Use the board, overhead, and worksheets to reinforce the concepts</p> <p>Use the graphing calculator to solve equations</p> <p>Use cooperative learning activities</p> <p>Use white boards to show immediate feedback on questions</p> <p>Use written analysis of algebraic work versus graphing calculator work. Compare & contrast</p>	<p>Do Nows to reinforce previous lessons</p> <p>Closure questions</p> <p>Use white boards to show immediate feedback on questions</p> <p>Notebook checks</p> <p>Quizzes</p> <p>Tests</p> <p>Projects</p>

Suggestions on how to differentiate in this unit:

Use of overhead graphing calculator, white boards, interactive mathematical software programs, pre-printed coordinate planes, cooperative learning activities, and alternative assessments to meet the needs of all learners.

**Freehold Regional High School District
Advanced Algebra and Trigonometry**

Unit #8: Statistics (OPTIONAL)

Enduring Understandings: The message conveyed by the data depends on how the data is collected, represented, and summarized.

The results of a statistical investigation can be used to support or refute an argument.

Essential Question: How can the collection, organization, interpretation, and display of data be used to answer questions?

Unit Goal: Students will understand how to collect and organize data and must then be able to draw conclusions or make predictions from them.

Duration of Unit: 4 weeks

NJCCCS: 4.4 A 1-5, 4.5 A-F

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
<p>What is meant by the word “probability?” Compare the differences between permutation and combination. How can Pascal’s triangle be used to find the answers for combinations? What is meant by “odds” and mathematical expectation?” What two parts can the subject of statistics be divided into? What is the difference between descriptive statistics and inferential statistics? What type of plot is useful in order to make sense out of a large set of data? How are the stem-and-leaf, histogram, and frequency tables similar? How can you construct a frequency polygon from a frequency table? What are the measures of central tendency? Why are the mean, median, and mode called the measures of central tendency? How would you explain creating a Box-and-Whisker plot? What are the divisions labeled as when creating the Box-and Whisker plot? Where is the box placed on the plot? What is a statistic? What are the measures of dispersion? What are the two statistics used to describe the spread of data about the mean? How do the variance and standard deviation relate to one another? What does the standard value determine? How do you recognize uniform, skewed, and normal distributions? How do you determine the percent of data within a given interval for a normal distribution? How can you find the percentiles for a normal distribution? What are the different types of sampling procedures? How can you estimate population characteristics based on samples? What is a confidence interval? How can you use a sample proportion to find a confidence interval for the corresponding population proportion?</p>	<p>Understand what is meant by the word “probability” Analyze permutations and combinations Learn about “odds” and “mathematical expectation” Display a set of data using a stem-and-leaf plot, a histogram, a frequency polygon, or a cumulative frequency polygon Find the mean, median, and mode Draw a box-and whisker plot for a set of data Use box-and-whisker and stem-and-leaf plots to compare sets of data Find the variance and standard deviation of a set of data Convert data to standard values To recognize uniform, skewed, and normal distributions To determine for a normal distribution the percent of data within a given interval, and to find percentiles To recognize different types of sampling procedures and to identify their limitations To estimate population characteristics based on samples To use a sample proportion to find a confidence interval for the corresponding population proportion</p>	<p>Use worksheets and sample problems to analyze step-by-step solutions of the problems Textbook Ancillaries Teacher driven worksheets Overheads Graphing Calculators</p>	<p>Use guided and independent practice Use the board, overhead, and worksheets to reinforce the concepts Use the graphing calculator to simulate probability events Use cooperative learning activities Use white boards to show immediate feedback on questions Use written analysis of algebraic work versus graphing calculator work. Compare and contrast</p>	<p>“Do Nows” to reinforce previous lessons Closure questions Use white boards to show immediate feedback on questions Notebook checks Quizzes Tests Projects (research the differences of how polynomial functions were used in the 1100s versus now) Rubrics for open-ended questions</p>
<p>Suggestions on how to differentiate in this unit: Use of overhead graphing calculator, white boards, pre-printed coordinate planes, cooperative learning activities, and alternative assessments to meet the needs of all learners.</p>				

**Freehold Regional High School District
Advanced Algebra and Trigonometry**

Unit #9: Limits and an Introduction to Calculus (OPTIONAL)

Enduring Understanding: Mathematical models can be used to describe and quantify physical relationships.

Essential Question: How can we use mathematical models to describe physical relationships?

Unit Goal: Students will understand that a function can approach finite numbers for extreme values or a particular value.

Duration of Unit: 4 weeks

NJCCCS: 4.1 A, 4.1B, 4.1C, 4.2A, 4.2C, 4.3 A–C, 4.5 A-F

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
<p>What methods are available to evaluate limits?</p> <p>How can the graph of a function be useful in determining the limit of the function at a given point?</p>	<p>Estimate limits and use properties and operations of limits</p> <p>Approximate slopes of tangent lines, use the limit definition of slope, and use derivatives to find slopes of graphs (optional)</p> <p>Evaluate limits at infinity and find limits of sequences (optional)</p> <p>Find limits of summations and use them to find areas of regions bounded by graphs of functions (optional)</p> <p>Use the definitions, properties, and direct substitution to evaluate limits</p> <p>Use varied techniques for evaluating limits of functions for which direct substitution fails</p>	<p>Worksheets and sample problems to analyze step-by-step solutions of problems</p> <p>Textbook ancillaries</p>	<p>Use guided and independent practice</p> <p>Use the board, overhead, and worksheets to reinforce concepts</p>	<p>Do Nows to reinforce previous lessons</p> <p>Use white boards to show immediate feedback on questions</p>
<p>What is the value of limits in finding the exact slope of a graph?</p> <p>Do sequences have limits?</p> <p>Is it possible to find the limit of a function at infinity?</p> <p>What is the value of calculus in determining areas of plane regions?</p>	<p>Find the slope of a graph at a point</p> <p>Evaluate limits of functions at infinity</p> <p>Find limits of sequences and summations</p> <p>Approximate and find areas of plane regions</p>	<p>Teacher driven worksheets</p> <p>Graphing calculators</p>	<p>Use cooperative learning activities</p> <p>Use white board activities to show immediate feedback on questions</p>	<p>Closure questions</p> <p>Quizzes</p> <p>Tests</p> <p>Projects</p>
<p>Suggestions on how to differentiate in this unit: Use of adjustments in assessment standards, one-to-one teacher support, additional testing time, and technological, visual, and auditory teaching methods.</p>				