

NJ-CCSS AREA: MATHEMATICS

North Brunswick Township Public Schools

CP PRECALCULUS

Acknowledgements

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Date: New _____

Revision May 2012

Board Adoption _____

PRECALCULUS PACING GUIDE

Quarter I			Quarter II		
Units 1 Prerequisite Review P.1 P.3 A.1 (5 days)	Unit 2: Review P.4 1.1 1.2 1.3 1.4 1.5 1.6 (18 days)	Unit 3: Review P.5 and P.7 2.1 2.2 2.3 2.4 (12 days)	Unit 3: cont. Review P.6 2.5 2.6 2.7 2.8 (10 days)	Unit 4: 3.1 3.2 3.3 3.4 3.5 (11 days)	Unit 5: 4.1 4.2 4.8 (Applications) 4.3 (10 days) 2 day Midterm Review Midterm Exam on Units 1 - 5
Quarter III			Quarter IV		
Unit 5: cont. 4.4 4.5 4.7 (5 days)	Unit 6: 5.1 5.2 5.3 5.4 5.5 5.6 (15 days)	Unit 7: P.2 (Circles) 8.1 8.2 8.3 (10 days)	Unit 8: 6.1 6.2 (optional) 6.4 (optional) 6.5 (optional) 6.6 (optional) (2-13 days)	Unit 9: 7.1 7.2 7.3 7.4 7.5 (optional) (12-14 days)	Unit 10: 9.1 9.6 (optional) 9.2 9.7 (optional) 9.3 9.8 (optional) 9.4 9.5 (14-21 days) 2 day Final Review Final Exam on Units 5-10

New Jersey - Common Core State Standard for Mathematics

Unit 1: Prerequisite Skills Review

Grade: 11-12

Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
<p>N-RN The Real Number System</p> <ul style="list-style-type: none"> How do we express sets of real numbers and inequalities using interval notation? How do we express radicals in exponential form? Do the laws for integer exponents extend to rational exponents? 		<p>N-RN.1 Extend the properties of exponents to rational exponents. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.</p> <p>N-RN.2 Extend the properties of exponents to rational exponents. Rewrite expressions involving radicals and rational exponents using the properties of exponents.</p> <p>N-RN.3 Use properties of rational and irrational numbers. Explain why the sum or product of two rational numbers are rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.</p> <p>SMP.2 Reason abstractly and quantitatively. SMP.4 Model with mathematics.</p>		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj. P.1 Represent sets of real numbers using interval notation.</p> <p>Obj. P.3 Solve equations and inequalities in one variable.</p> <p>Obj. A.1</p>	<p>This unit will include material from the prerequisite chapter as well as the appendix.</p> <ul style="list-style-type: none"> Review properties and sets of real numbers through do nows Define types of intervals and introduce notation Briefly review solving equations and inequalities in one variable through do nows Graph and express solutions to inequalities using interval notation. Review properties of exponents through do nows 	<ul style="list-style-type: none"> Group investigations Note taking guides Previewing materials KWL strategies Small group instruction Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts 	5Days

<p>Define the meaning of rational exponents and extend the properties of exponents to rational exponents.</p>	<ul style="list-style-type: none"> • Define rational exponents using the words, “base,” “exponent,” and “index.” • Discuss how to completely reduce an expression with a rational exponent. • Practice converting between radical form and exponential form through class work. • Extend combining radicals to expressions with numbers and variables through class work examples. <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator Supplemental Worksheets</p> <p><u>Interdisciplinary Connections:</u> Physics p. 844 #83-84</p>		<p><u>Summative:</u></p> <ul style="list-style-type: none"> • Quiz P.1, P.3, A.1 	
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Unit 2: Functions and Graphs

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
F-IF Interpreting Functions <ul style="list-style-type: none"> • What is slope and how does it relate to a graph? • How do we use an algebraic model to represent data from a table and make predictions? 		F-IF.4 Interpret functions that arise in applications in terms of the context. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. F-IF.5 Interpret functions that arise in applications in terms of the context. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. F-IF.6 Interpret functions that arise in applications in terms of the context. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically.		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
Obj. P.4 Write linear equations in slope-intercept form. Use the graphing calculator to model two sets of data with a scatter plot and a line of best fit. Apply linear equations in solving real world problems using the graphing calculator.	Return to Prerequisite section 4 before starting Chapter 1. <ul style="list-style-type: none"> • Briefly review converting any linear equation to slope-intercept form • Use the graphing calculator to create a scatter plot and find a line of best fit. • Use the line of best fit to make predictions. • Discuss graphing a linear equation using the graphing calculator. Emphasize appropriate window settings. • Model real world applications with linear equations and solve by using the graphing calculator. <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator Supplemental Worksheets</p>	<ul style="list-style-type: none"> • Extended time • Alternative assessments • Group investigations • Note taking guides • KWL strategies • Graphic organizers • Small group instruction • Pair-share Stations/centers • Think-Tac-Toe • Small group instruction • Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Quiz: Linear Applications 	3 Days

	<u>Interdisciplinary Connections:</u> Social Studies p. 42 #51-53				
NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice			
F-IF Interpreting Functions <ul style="list-style-type: none"> • What is the fundamental connection between, roots, solutions, zeros, and x-intercepts? • How do we find the domain and range of a function algebraically and confirm it graphically? • How do we describe a function using its properties of continuity, intervals of increase and decrease, and boundedness? 		<p>F-IF.8a Analyze functions using different representations. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.</p> <p>F-IF.8b Analyze functions using different representations. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Use the properties of exponents to interpret expressions for exponential functions.</p> <p>F-IF.9 Analyze functions using different representations. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).</p> <p>SMP.2 Reason abstractly and quantitatively. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically.</p>			
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing	
Obj. 1.1 Establish the connection between roots, solutions, zeros, and x-intercepts. Find hidden behavior when graphing equations. Obj. 1.2 Explore functions and their properties.	<ul style="list-style-type: none"> • Discuss solving equations and how it relates to the fundamental connection between roots, solutions, zeros, and x-intercepts. • Illustrate zoombox feature on graphing calculator to find hidden behavior. • Find the domain of a function algebraically and support graphically. • Find the range of a function graphically. • Identify local extrema and intervals of increasing, decreasing, and constant behavior. • Describe a function using the properties of continuity, boundedness, and symmetry. 	<ul style="list-style-type: none"> • Extended time • Group investigations • Note taking guides • KWL strategies • Graphic organizers • Small group instruction • Pair Share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Think and Discuss • Open-ended questions • Exit prompts <p><u>Summative:</u></p>	7 Days	

<p>Obj. 1.3 Analyze the twelve basic functions by describing their properties. Graph piecewise-defined functions by hand.</p>	<ul style="list-style-type: none"> • Discuss the twelve families of functions. • Describe graphs using the properties introduced in section 1.2 • Graph piecewise-defined functions over given intervals. <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator Supplemental Worksheets</p>		<ul style="list-style-type: none"> • Quiz 1.1 to 1.3 	
<p align="center">NJ-CCSS Domain Essential Questions</p>		<p align="center">NJ-CCSS Cluster.Standard Standards for Mathematical Practice</p>		
<p>F-BF Building Functions</p> <ul style="list-style-type: none"> • How do we combine/compose functions? • How does combining/composing functions affect the domain and range of the new function? • How are functions and their inverses related graphically and algebraically and how do their domain and range of the original and its inverse compare? • How do we relate graphs and their function rules using transformations? 	<p>F-BF.1.c Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Compose functions.</p> <p>F-BF.4b Build new functions from existing functions. Find inverse functions. Verify by composition that one function is the inverse of another.</p> <p>F-BF.4c Build new functions from existing functions. Find inverse functions. Read values of an inverse function from a graph or a table, given that the function has an inverse.</p> <p>F-BF.4d Build new functions from existing functions. Find inverse functions. Produce an invertible function from a non-invertible function by restricting the domain.</p> <p>SMP.1 Make sense of problems and persevere in solving them SMP.3 Construct viable arguments and critique the reasoning of others. SMP.4 Model with mathematics. SMP.7 Look for and make use of structure. SMP.8 Look for and express regularity in repeated reasoning.</p>			
<p align="center">Skills/Objectives</p> <p align="center">SWBAT...</p>	<p align="center">Instructional Strategies</p> <p align="center">Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity</p>	<p align="center">Modifications</p> <p align="center">ESL / Special Education Academic Support/G&T Differentiated Instruction</p>	<p align="center">Assessments</p> <p align="center">Formative Summative Benchmarks</p>	<p align="center">Pacing</p>
<p>Obj. 1.4 Build new functions from basic functions by adding, subtracting, multiplying, dividing, and composing functions.</p>	<ul style="list-style-type: none"> • Review evaluating using function notation through do now • Outline how to find the sum, difference, product, and quotient of two functions. • Define function composition. Complete several examples including functions with radicals, exponents, and quotients. 	<ul style="list-style-type: none"> • Group investigations • Note taking guides • Small group instruction • Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts 	

<p>Use decomposition to reverse the process of composition.</p> <p>Obj. 1.5 Find the inverse of a function. verify that a function is one-one with its inverse.</p> <p>Obj. 1.6 Algebraically and graphically represent translations, reflections, stretches, and shrinks of functions.</p>	<ul style="list-style-type: none"> • Consider the domain of each original function and compare to the domain of the resulting function (especially with quotients and compositions) • Given $h(x)$ find $f(x)$ and $g(x)$ such that $h(x) = f(g(x))$. • Define inverse of a function. • Illustrate the symmetry about the line $y = x$ of a function and its inverse. • Demonstrate how to find an inverse algebraically. Discuss how the domain and range of a function relate to the range and domain of the inverse. • Use the horizontal line test to predict whether the inverse of a function is a function. • Practice using the Inverse Composition Rule to verify one-to-one. <ul style="list-style-type: none"> • Outline the rules for horizontal and vertical translations. • Outline the rules for reflections across the x- and y-axis. • Outline the rules for horizontal and vertical stretches and shrinks. • Discuss combining transformations in order. • Apply transformations to a function and support using the graphing calculator. <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator Supplemental Worksheets</p>	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Quiz 1.4-1.6 	8 Days
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Unit 3: Polynomial, Power, and Rational Functions

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions	NJ-CCSS Cluster.Standard Standards for Mathematical Practice
<p>F-IF Interpreting Functions</p> <p>A-APR Arithmetic with Polynomials and Rational Expressions</p> <p>A-CED Creating Equations</p> <ul style="list-style-type: none"> • How can we apply quadratic functions to solve real world applications? • How do we analyze polynomial functions? • How do we sketch the graph of a polynomial function using its zeros, end behavior, and multiplicity? • How do we use the division algorithm and the Rational Zeros Theorem to find the real zeros of a function? 	<p>F-IF.7c Analyze functions using different representations. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.</p> <p>F-IF.8a Analyze functions using different representations. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.</p> <p>F-IF.8b Analyze functions using different representations. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Use the properties of exponents to interpret expressions for exponential functions.</p> <p>F-IF.9 Analyze functions using different representations. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal</p> <p>A-APR.6 Rewrite rational expressions. Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.</p> <p>A-APR.2 Understand the relationship between zeros and factors of polynomials. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.</p> <p>A-APR.3 Understand the relationship between zeros and factors of polynomials. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.</p> <p>A-CED.1 Create equations that describe numbers or relationships. Create equations and inequalities in one variable and use them to solve problems.</p> <p>SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively. SMP.4 Model with mathematics.</p>

Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj. P.5 Solve quadratic equations using various algebraic methods. Solve equations graphically.</p> <p>Obj. P.7 Solve inequalities graphically and support algebraically. Solve word problems using inequalities.</p> <p>Obj. 2.1 Solve word problems using quadratic equations.</p> <p>Obj. 2.3 Describe end behavior of a function using limit notation. Find the zeros of a function and state their multiplicities. Graph a polynomial by hand using zeros, multiplicity, and end behavior. Use the Intermediate Value Theorem.</p>	<p>Throughout Chapter 2 refer to Prerequisite sections P.5-P.7 to supplement as needed.</p> <ul style="list-style-type: none"> • Briefly review algebraic methods for solving quadratic equations: factoring, extracting square roots, completing the square, quadratic formula. • Illustrate how to solve equations graphically by finding x-intercepts and intersections. • Solve quadratic and absolute value inequalities graphically and support algebraically. • Model projectile motion problems using quadratic equations and/or inequalities. • Solve volume problems (p. 65 #46). • Discuss using quadratic equations to model real world situations. • Solve border problems and maximum area. • Discuss standard form of a polynomial function. • Review rules for end behavior and illustrate how to describe end behavior using limits. • Review multiplicity of a polynomial in factored form. • Use end behavior, zeros, and multiplicity to sketch the graph of a polynomial function by hand. • Discuss Intermediate Value Theorem and how it is used to analyze polynomial functions. 	<ul style="list-style-type: none"> • Group investigations • KWL strategies • Graphic organizers • Small group instruction • Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Quiz P.5, P.7, 2.1 • Quiz 2.3 & 2.4 	12 days

<p>Obj. 2.4 Use the division algorithm. Use the Remainder and Factor Theorems. Use synthetic division. Use the Rational Zeros Theorem.</p>	<ul style="list-style-type: none"> • Review using polynomial long division. Write summary statements in polynomial and fraction form. • Link polynomial long division to synthetic division. • Use synthetic division and the Remainder Theorem to evaluate polynomial functions. • Use synthetic division and Factor Theorem to determine whether a polynomial is a factor of another polynomial. • Use the Rational Zeros Theorem to generate a list of possible rational zeros. Use the Rational Zeros Theorem, graphing calculator, synthetic division to write a polynomial function as a product of linear factors. <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator Supplemental Worksheets</p> <p><u>Interdisciplinary Connections:</u> English: p. 235 #45-48 Writing to Learn Problems</p>			
<p align="center">NJ-CCSS Domain Essential Questions</p>		<p align="center">NJ-CCSS Cluster.Standard Standards for Mathematical Practice</p>		
<p>N-CN The Complex Number System</p> <p>A-APR Arithmetic with Polynomials and Rational Expressions</p> <ul style="list-style-type: none"> • What are complex numbers and how do we determine their sum, difference, product, and quotient? • What are complex solutions and how do we find them? 	<p>N-CN.1 Perform arithmetic operations with complex numbers. Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.</p> <p>N-CN.2 Perform arithmetic operations with complex numbers. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.</p> <p>N-CN.3 Perform arithmetic operations with complex numbers. Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.</p> <p>N-CN.7 Use complex numbers in polynomial identities and equations. Solve quadratic equations with real coefficients that have complex solutions.</p> <p>N-CN.8 Use complex numbers in polynomial identities and equations. Extend polynomial identities to the complex numbers. <i>For example, rewrite $x^2 + 4$ as $(x + 2i)(x - 2i)$.</i></p> <p>N-CN.9 Use complex numbers in polynomial identities and equations. Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.</p> <p>A-APR.2 Understand the relationship between zeros and factors of polynomials. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.</p> <p>A-APR.3 Understand the relationship between zeros and factors of polynomials. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.</p>			

SMP.1 Make sense of problems and persevere in solving them.
SMP.2 Reason abstractly and quantitatively.
SMP.4 Model with mathematics.

Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj. P.6 Define complex numbers. Perform operations with complex numbers. Find complex solutions of quadratic equations.</p> <p>Obj. 2.5 Use the Fundamental Theorem and the Linear Factorization Theorem to find complex zeros of polynomial functions. Use zeros of a function and their multiplicity to sketch a graph of a polynomial function by hand.</p>	<ul style="list-style-type: none"> • Define complex numbers by using standard form. • Introduce operations with complex numbers by demonstrating examples of addition, subtraction, multiplication of two complex numbers. • Introduce raising a complex number to a power. • Define complex conjugate and illustrate the product of a complex number and its conjugate. • Use the conjugate to simplify quotients of complex numbers. • Discuss quadratic functions and their related equations. Connect solutions of the equation with zeros of the function. Analyze a function with no real zeros using the graphing calculator. Discuss how to find its complex zeros algebraically. • Discuss the fundamental polynomial connection. • Introduce the Fundamental Theorem of Algebra and extend to polynomials with complex zeros. • Discuss Linear Factorization Theorem. • Discuss complex conjugate zeros. • Use the graphing calculator to find all real zeros of a polynomial function. Then use synthetic division and the factor theorem to find the imaginary zeros. • Illustrate how to write a polynomial function in factored form. • Review the zeros of a polynomial, multiplicity, and end behavior to sketch a polynomial function by hand. <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard; Graphing Calculator; Supplemental Worksheets</p>	<ul style="list-style-type: none"> • Group investigations • Note taking guides • Small group instruction • Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts <p><u>Summative:</u></p> <ul style="list-style-type: none"> • P.6 and 2.5 	4 Days

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
<p>F-IF Interpreting Functions</p> <p>A-REI Reasoning with Equations and Inequalities</p> <ul style="list-style-type: none"> Given a rational function, how do we find the asymptotes and intercepts and use them to graph the function by hand? How do we write the intermediate and end behavior of a rational function in limit notation? How can rational functions be used to solve real world problems? How do we use sign charts to solve rational and polynomial inequalities? 		<p>F-IF.5 Interpret functions that arise in applications in terms of the context. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.</p> <p>A-REI.2 Understand solving equations as a process of reasoning and explain the reasoning. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.</p> <p>SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision. SMP.7 Look for and make use of structure.</p>		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj. 2.6 Find the asymptotes and intercepts of a rational function. Determine the domain, range, and end behavior of a rational function. Sketch the graph of a rational function. Describe intermediate and end behavior using limit notation.</p> <p>Obj. 2.7 Solve rational equations algebraically and identify extraneous solutions. Apply rational functions in solving word problems.</p>	<ul style="list-style-type: none"> Discuss rules for finding x- and y-intercepts, vertical asymptotes, and horizontal asymptotes. Determine the domain of a rational function algebraically and the range graphically. Express in interval notation. Use intercepts and asymptotes to sketch the graph of a rational function by hand. Use limit statements to describe the intermediate and end behavior of a rational function. Solve rational equations algebraically. Discuss extraneous solutions and identify as needed. Support solutions graphically. Solve word problems using rational equations. Complete problems including population and perimeter. 	<ul style="list-style-type: none"> Group investigations KWL strategies Graphic organizers Small group instruction Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p>Summative:</p> <ul style="list-style-type: none"> Quiz 2.6 Quiz 2.7 & 2.8 	6 Days

<p>Obj. 2.8 Use sign charts to solve polynomial and rational inequalities.</p>	<ul style="list-style-type: none">• Analyze a polynomial function. Use a sign chart to determine where it is greater than, less than, or equal to zero. Support analysis graphically.• Solve a polynomial inequality using a sign chart. Write solutions in interval notation.• Discuss rational inequalities. Make a sign chart using asymptotes and zeros. Express solutions in interval notation. Support graphically. <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator Supplemental Worksheets</p>			
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Unit 4: Exponential and Logarithmic Functions

Grade: 11-12

Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
<p>F-IF Interpreting Functions</p> <ul style="list-style-type: none"> How do we describe graphs of exponential and logarithmic functions and their transformations? How do we use exponential and logarithmic equations to solve real world problems of growth and decay? 		<p>F-IF.7e Analyze functions using different representations. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.</p> <p>SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively. SMP.3 Construct viable arguments and critique the reasoning of others. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically.</p>		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj. 3.1 Recognize an exponential function. Identify exponential growth and decay. Describe the transformations of the graph of an exponential function as compared to its parent function. Write the equation of an exponential function.</p> <p>Obj. 3.2 Apply exponential growth and decay models to solve word problems.</p>	<ul style="list-style-type: none"> Introduce standard form of a basic exponential function. Compare exponential growth and decay graphically and algebraically. Describe the sequence of transformations of the graph of an exponential function given its parent function. Write the equation of an exponential function given a series of transformations. Write the equation of an exponential function given a table or a graph including its y-intercept. Apply exponential functions to word problems in section 3.2. <ul style="list-style-type: none"> Introduce models for exponential growth and decay. Identify rate of growth and initial value given an exponential function. Write the equation of an exponential function given the rate of decay and initial value. Apply exponential functions to solving word problems including population growth and radioactive decay p. 297-298 #29-33, 45, 46. Write an exponential model and solve graphically. 	<ul style="list-style-type: none"> Group investigations KWL strategies Graphic organizers Small group instruction Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts <p>Summative:</p> <ul style="list-style-type: none"> Quiz 3.1 & 3.2 	4 Days

	<p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator Supplemental Worksheets</p> <p><u>Interdisciplinary Connections:</u> Science p.297-298</p>			
NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
<p>F-LQE Linear, Quadratic, and Exponential Models</p> <ul style="list-style-type: none"> How do we apply the properties of logarithms to evaluate expressions and solve equations? 		<p>F-LQE.4 Construct and compare linear and exponential models and solve problems. For exponential models, express as a logarithm the solution to $a b^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.</p> <p>SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively. SMP.3 Construct viable arguments and critique the reasoning of others. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically.</p>		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj. 3.3 Evaluate common logs and natural logs. Apply properties of logarithms to evaluate logarithmic expressions. Graph a basic logarithmic function by hand.</p>	<ul style="list-style-type: none"> Review exponential functions and introduce logarithms as inverses of exponential functions. Analyze the graph of a logarithm. Discuss its domain, range, end behavior, intercepts, and boundedness. Sketch the graph of a basic logarithmic function. Discuss how to convert between exponential and logarithmic form. Practice converting between forms. Explain how to evaluate logarithmic expressions by rewriting them in exponential form. Introduce basic properties of logarithms. Discuss common logs and their basic properties. Evaluate base 10 logarithmic expressions. Discuss the number e and introduce natural logarithms. Discuss basic properties of natural logs. 	<ul style="list-style-type: none"> Group investigations KWL strategies Graphic organizers Small group instruction Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts Study Island 	7 Days

<p>Obj. 3.4 Apply the properties of logarithms. Use change of base formula to evaluate logarithms.</p> <p>Obj. 3.5 Solve exponential and logarithmic equations by applying the properties of logarithms. Apply properties of logarithms to solve word problems.</p>	<ul style="list-style-type: none"> • Evaluate base e logarithmic expressions. • Illustrate how to evaluate common logs and natural logs using the graphing calculator. <ul style="list-style-type: none"> • Introduce and illustrate product rule, quotient rule, and power rule. Complete examples of applying properties to expand and condense logarithmic expressions. • Apply change of base formula to evaluate logarithms. <ul style="list-style-type: none"> • Solve simple exponential and logarithmic equations by converting between forms. • Solve complex logarithmic equations by applying properties of logarithms. • Apply properties of logarithms to solve word problems using Newton's Law of Cooling. <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator Supplemental Worksheets</p>		<p>assignments</p> <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Mini Quiz 3.3 & 3.4 • Quiz 3.3-3.5 	
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Unit 5: Right Triangle Trigonometry

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions	NJ-CCSS Cluster.Standard Standards for Mathematical Practice
<p>F-TF Trigonometric Functions</p> <ul style="list-style-type: none"> • How do we find missing side lengths or angle measures of right triangles using trigonometry? • How do we apply trigonometry to indirect measurement? • How do we use the unit circle to evaluate a trigonometric ratio for a given angle or to find an angle given a trigonometric ratio? • What are the characteristics of the graphs of trigonometric functions and their transformations? • Why do the inverses of trigonometric functions have restricted domains? 	<p>F-TF.1 Extend the domain of trigonometric functions using the unit circle. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.</p> <p>F-TF.2 Extend the domain of trigonometric functions using the unit circle. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.</p> <p>F-TF.3 Extend the domain of trigonometric functions using the unit circle. Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for $\pi-x$, $\pi+x$, and $2\pi-x$ in terms of their values for x, where x is any real number.</p> <p>F-TF.4 Extend the domain of trigonometric functions using the unit circle. Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.</p> <p>F-TF.5 Model periodic phenomena with trigonometric functions. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.</p> <p>F-TF.6 Model periodic phenomena with trigonometric functions. Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.</p> <p>F-TF.7 Model periodic phenomena with trigonometric functions. Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.</p> <p>F-TF.9 Prove and apply trigonometric identities. Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.</p> <p>SMP.2 Reason abstractly and quantitatively. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision. SMP.7 Look for and make use of structure.</p>

Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj. 4.1 Convert between radian and degree measure and find arc length.</p> <p>Obj. 4.2 Define the six trigonometric functions using the lengths of the sides of a right triangle.</p> <p>Obj. 4.8 Apply the concepts of trigonometry to solve real world problems.</p> <p>Obj. 4.3 Derive the values of the unit circle using special right triangles. Use the unit circle to evaluate a trigonometric ratio for a given angle or to find an angle given a trigonometric ratio.</p>	<ul style="list-style-type: none"> • Discuss degree measurement. Illustrate how to use the graphing calculator to convert between degrees, minutes, seconds, and decimal form. • Define radian measure. Use arc length formula to connect radian measure to degree measure. Practice converting between radians and degrees. • Review the sine, cosine, and tangent ratios and introduce their reciprocals. (Use SOHCAHTOA) • Demonstrate how to find the other five ratios given one. • Use the graphing calculator to evaluate trigonometric functions and their inverses. • Find missing sides and angles of right triangles using trigonometric ratios. • Use text examples to illustrate how to solve real world problems using trigonometry and indirect measurement. (Solve word problems in 4.2 and 4.8) • Discuss coterminal angles. Calculate and draw positive and negative coterminal angles in degrees and radians. (Supplement with worksheet) • Discuss reference angles. Find and draw reference angles in degrees and radians. • Use points on the terminal side of an angle in the coordinate plane and reference triangles to find the sine, cosine, and tangent ratios of the angle. Develop a generalization of which quadrants have positive ratios. Use ASTC- All Students Take Calculus. (Supplement with chart worksheet) • Use special right triangles to derive the values of the unit circle. • Demonstrate how to use the unit circle to evaluate a trigonometric ratio for a given angle or to find an angle given a trigonometric ratio. • Complete examples of finding specified trigonometric ratios given one ratio and the sign of another. 	<ul style="list-style-type: none"> • Group investigations • Note taking guides • Previewing materials • Graphic organizers • Mnemonics • Color coding • Highlighting/and underlining • Manipulatives • Small group instruction • Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Quiz 4.1 & 4.2 • Quiz 4.3 • Quiz 4.4 & 4.5 • Mini Quiz 4.7 	15 Days

<p>Obj. 4.4 Graph one period of a sinusoid curve and its transformations.</p> <p>Obj. 4.5 Graph one period of secant and cosecant curves. Graph two periods of tangent and cotangent curves.</p> <p>Obj. 4.7 Derive the graphs of inverse sine, inverse cosine, and inverse tangent.</p>	<ul style="list-style-type: none"> • Use the unit circle to derive the shape of the sine and cosine curves. • Discuss amplitude, frequency, and period, and their effects on graphs. • Discuss and graph x-axis reflections. • Draw one period of sine and cosine curves with horizontal and vertical stretches and shrinks. • Given the graph of a sinusoid curve, write the equation by identifying amplitude, period, and frequency. • Discuss horizontal and vertical translations of sinusoid curves. • Draw one period of a translated sinusoid curve. <ul style="list-style-type: none"> • Use the sine and cosine curves to derive the shape of cosecant and secant graphs. Discuss how the zeros of sine and cosine curves become asymptotes of the cosecant and secant graphs. • Discuss vertical shrinks and stretches, frequency, and period, and their effects on graphs. • Discuss and graph x-axis reflections. • Draw one period of cosecant and secant curves with horizontal and vertical stretches and shrinks. • Use the unit circle to derive the shape of the tangent and cotangent graphs. Discuss how the zeros and asymptotes of the tangent graph become asymptotes and zeros of the cotangent graph respectively. (ZAZAZ vs AZAZA; CATZ) • Emphasize that we always graph two complete periods of tangent and cotangent graphs. • Discuss vertical shrinks and stretches, frequency, and period, and their effects on graphs. • Discuss and graph x-axis reflections. • Draw two periods of tangent and cotangent graphs with horizontal and vertical stretches and shrinks. <ul style="list-style-type: none"> • Review definition of inverse function and the properties of a one-to-one function. 			
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<p>Evaluate inverse trigonometric functions using unit circle values or graphing calculator.</p>	<ul style="list-style-type: none">• Use the sine, cosine, and tangent graphs to derive the shape of inverse sine, inverse cosine, and inverse tangent graphs. Discuss limiting the domain of the trigonometric function to make it one-to-one.• Remind students that the domain and range of the trigonometric function become the range and domain of the inverse function respectively.• Discuss inverse notation \sin^{-1} or arcsin and how this restricts the domain. <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator Supplemental Worksheets</p> <p><u>Interdisciplinary Connections:</u> Navigation, Engineering, Land Measure p.431-434</p>			
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Unit 6: Analytic Trigonometry

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
F-TF Trigonometric Functions <ul style="list-style-type: none"> How do we simplify trigonometric expressions using identities? How do we prove trigonometric identities? How do we solve trigonometric equations using the trigonometric identities? 		F-TF.8. Prove and apply trigonometric identities. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant. SMP.1 Make sense of problems and persevere in solving them. SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision. SMP.7 Look for and make use of structure.		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
Obj. 5.1 Introduce and apply basic, Pythagorean, cofunction, and odd/even trigonometric identities. Obj. 5.2 Prove trigonometric identities. Obj. 5.3 Find the sine, cosine, and tangent of a sum or difference.	<ul style="list-style-type: none"> Introduce and explain basic, Pythagorean, cofunction, and odd/even trigonometric identities, which students must memorize. Use identities to simplify trigonometric expressions. Supplement with worksheets. Solve trigonometric equations in section 5.1 along with equations in section 5.4. Apply basic, Pythagorean, cofunction, and odd/even trigonometric identities and algebraic properties to prove trigonometric identities. Discuss strategies for proving trigonometric identities p. 455-457. Discuss identities for the sine, cosine, or tangent of a sum or difference. Note similarities and differences between the identities. Illustrate how to use sum or difference identities to find an exact value. Briefly review unit circle values. Illustrate how to write an expression as the sine, cosine, or tangent of a single angle. Use sum or difference formulas to confirm cofunction identities and reduction formulas. 	<ul style="list-style-type: none"> Group investigations KWL strategies Graphic organizers Small group instruction Pair-share 	Formative: <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts Summative: <ul style="list-style-type: none"> Quiz 5.1 & 5.2 Quiz 5.3 & 5.4 	8 Days

<p>Obj. 5.4 Apply half-angle identities to find an exact sine, cosine, or tangent value. Apply power reducing identities. Solve trigonometric equations. Apply double-angle identities to solve trigonometric equations.</p>	<ul style="list-style-type: none"> • Discuss half-angle identities. Note similarities and differences between the identities. • Illustrate how to use half-angle identities to find an exact sine, cosine, or tangent value. • Return to section 5.1 and illustrate how to solve basic trigonometric equations. Discuss the difference between finding solutions in the interval $[0, 2\pi)$ and finding all solutions. Use p. 452 #51-62 • Discuss double-angle identities. Discuss the multiple forms of the cosine identity. Illustrate why they are equivalent and how to decide when to use each form. • Use sum or difference identities to prove double-angle identities p. 471 example 1. • Use double-angle identities to solve trigonometric equations use example 4 p. 474. • Discuss power-reducing identities. Illustrate how to apply power reducing identities example 4 p. 472. <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator</p> <p><u>Interdisciplinary Connections:</u> Physics p. 470 #74, 75; p. 476 #56; p. 485 #39 Meteorology p. 485 #38</p>			
<p align="center">NJ-CCSS Domain Essential Questions</p>		<p align="center">NJ-CCSS Cluster.Standard Standards for Mathematical Practice</p>		
<p>G-SRT Similarity, Right Triangles, and Trigonometry</p> <ul style="list-style-type: none"> • How do we use the Law of Sines and the Law of Cosines to find missing sides and/or angles of a triangle? • How do we apply the Law of Sines and the Law of Cosines to solving real world problems? 	<p>G-SRT.9 Apply trigonometry to general triangles Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.</p> <p>G-SRT.10 Apply trigonometry to general triangles. Prove the Laws of Sines and Cosines and use them to solve problems.</p> <p>G-SRT.11 Apply trigonometry to general triangles. Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles.</p> <p>SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically.</p>			

		SMP.6 Attend to precision. SMP.7 Look for and make use of structure.		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj. 5.5 Apply the Law of Sines to solve triangles, including the ambiguous case.</p> <p>Obj. 5.6 Apply the Law of Cosines to solve triangles. Apply formulas for area of a triangle and Heron's Formula.</p>	<ul style="list-style-type: none"> • Introduce and discuss Law of Sines. • Discuss solving triangles given AAS or ASA. Explain why these two cases are very similar and complete one problem illustrating each. • Discuss and illustrate the ambiguous case SSA. Explain how to determine the number of possible triangles in an ambiguous case problem. Complete examples determining the possible number of triangles. • Illustrate how to solve an ambiguous case problem. Emphasize drawing the diagram consistently, each time placing the given angle measurement in the same vertex of the triangle. • Apply Law of Sines to solve word problems, use examples 4 and 5 p. 482-483. <ul style="list-style-type: none"> • Introduce and discuss Law of Cosines. • Contrast Law of Cosines with Law of Sines and explain that Law of Cosines is used when given SSS or SAS. Complete one problem illustrating each case. • Introduce and discuss the formula for finding area of a triangle and illustrate with an example. • Introduce and discuss Heron's Formula for finding area of a triangle and illustrate with an example. • Emphasize that for the SSS case in Law of Cosines or Heron's formula, first check that the side lengths will form a triangle by using the triangle inequality theorem. • Apply Law of Cosines to solve word problems, use example 5 p. 491. <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator</p> <p><u>Interdisciplinary Connections:</u> Engineering p. 495 #39 Architecture p. 495 #42</p>	<ul style="list-style-type: none"> • Group investigations • KWL strategies • Graphic organizers • Small group instruction • Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts • Study Island assignments <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Quiz 5.5 & 5.6 	7 Days

Unit 7: Analytic Geometry in Two and Three Dimensions

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
G-GPE Expressing Geometric Properties with Equations <ul style="list-style-type: none"> How do we express a conic section, such as a circle, parabola, ellipse, or hyperbola as a second degree equation? How do we use the properties of a conic section to make a graph by hand and translate the graph away from the origin? 		G-GPE.3 Translate between the geometric description and the equation for a conic section. Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant. SMP.1 Make sense of problems and persevere in solving them. SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics SMP.6 Attend to precision. SMP.7 Look for and make use of structure. SMP.8 Look for and express regularity in repeated reasoning.		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
Obj. 8.1 Define the conic sections. Graph and write the equations of parabolas with vertex (0, 0) and (h, k). Obj. 8.2 Graph and write the equations of	<ul style="list-style-type: none"> Introduce and illustrate the four conic sections. Refer to P 2 for circles. Define and illustrate parabola and its key components: focus, directrix, and vertex. Discuss standard form of a parabola with vertex (0, 0). Define and illustrate focal length, chord, and focal width. Illustrate how to graph parabolas of the form $x^2 = 4py$ and $y^2 = 4px$. Emphasize labeling key characteristics on the graph. Discuss standard form of a parabola with vertex (h, k). Illustrate how to graph parabolas of the form $(x - h)^2 = 4p(y - k)$ and $(y - k)^2 = 4p(x - h)$. Emphasize labeling key characteristics on the graph. Discuss how to write the equation of a parabola given characteristics of the graph including vertex, focus, directrix, and focal width. Illustrate how to convert between standard forms of a parabola by completing the square. Apply properties of parabolas to solve word problems. Define and illustrate ellipse and its key components: center, foci, focal axis, vertices, major axis, and minor axis. 	<ul style="list-style-type: none"> Group investigations KWL strategies Graphic organizers Small group instruction Pair-share 	Formative: <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts Summative: <ul style="list-style-type: none"> Mini Quizzes on each conic Quiz 8.1-8.3 	10 days

<p>ellipses with center $(0, 0)$ and (h, k).</p> <p>Obj. 8.3 Graph and write the equations of hyperbolas with center $(0, 0)$ and (h, k).</p>	<ul style="list-style-type: none"> • Discuss the Pythagorean relation in ellipses. • Discuss standard form of an ellipse with center $(0, 0)$. Discuss how to determine the major and minor axes. • Illustrate how to graph ellipses with center $(0, 0)$. Emphasize labeling key characteristics on the graph. • Discuss standard form of an ellipse with center (h, k). • Illustrate how to graph an ellipse with center (h, k). Emphasize labeling key characteristics on the graph. • Discuss how to write the equation of an ellipse given characteristics of the graph including center, vertices, length of major/minor axis, and foci. • Discuss eccentricity of an ellipse. • Illustrate how to convert between standard forms of an ellipse by completing the square. • Apply properties of ellipses to solve word problems. <ul style="list-style-type: none"> • Define and illustrate hyperbola and its key components: center, foci, vertices, focal axis, transverse axis, and conjugate axis. • Discuss the Pythagorean relation in hyperbolas. • Discuss asymptotes and how to find their equations. • Discuss standard form of a hyperbola with center $(0, 0)$. Compare and contrast with standard form of an ellipse. Discuss how to determine the transverse and conjugate axes. • Illustrate how to graph hyperbolas with center $(0, 0)$. Emphasize labeling key characteristics on the graph. • Discuss standard form of a hyperbola with center (h, k). • Illustrate how to graph a hyperbola with center (h, k). Emphasize labeling key characteristics on the graph. • Discuss how to write the equation of a hyperbola given characteristics of the graph including center, vertices, length of transverse axis, and foci. • Discuss eccentricity of an ellipse. • Illustrate how to convert between standard forms of a hyperbola by completing the square. • Apply properties of hyperbolas to solve word problems. <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator</p> <p><u>Interdisciplinary Connections:</u> Physics: p. 655 #72-74, p. 665 #70</p>			
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Unit 8: Applications of Trigonometry

Grade: 11-12Date: May 2012

<p style="text-align: center;">NJ-CCSS Domain Essential Questions</p>	<p style="text-align: center;">NJ-CCSS Cluster.Standard Standards for Mathematical Practice</p>
<p>N-VM Vector and Matrix Quantities</p> <ul style="list-style-type: none"> • How do we perform operations using vector quantities? • How can we best represent forces acting on objects? 	<p>N-VM.1 Represent and model with vector quantities. Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes.</p> <p>N-VM.2 Represent and model with vector quantities. Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.</p> <p>N-VM.3 Represent and model with vector quantities. Solve problems involving velocity and other quantities that can be represented by vectors.</p> <p>N-VM.4a Perform operations on vectors. Add and subtract vectors. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.</p> <p>N-VM.4b Perform operations on vectors. Add and subtract vectors. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.</p> <p>N-VM.4c Perform operations on vectors. Add and subtract vectors. Understand vector subtraction $v - w$ as $v + (-w)$, where $-w$ is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.</p> <p>N-VM.5a Perform operations on vectors. Multiply a vector by a scalar. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise.</p> <p>N-VM.5b Perform operations on vectors. Multiply a vector by a scalar. Compute the magnitude of a scalar multiple cv using $\ cv\ = c v$. Compute the direction of cv knowing that when $c v \neq 0$, the direction of cv is either along v (for $c > 0$) or against v (for $c < 0$).</p> <p>SMP.1 Make sense of problems and persevere in solving them SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision SMP.7 Look for and make use of structure</p>

Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj. 6.1 Apply the arithmetic of vectors and use vectors to solve real-world problems</p> <p>Obj. 6.2 Calculate the dot product of vectors</p>	<ul style="list-style-type: none"> • Definitions, examples and notes of 2 dimensional vectors, vector operations, unit vectors, “HMT” rule • Calculating the magnitude of a vector • Determining a unit vector • Determining the direction angles • Finding the components of a vector • Discuss applications – converting from a “bearing” (compass) to a direction angle – calculating the effect of wind velocity. <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator</p> <p><u>Interdisciplinary Connections:</u> Physics p. 521 #48-56</p>	<ul style="list-style-type: none"> • Extended time • Assignment modification • Group investigations • KWL strategies • Mnemonics • Color coding • Highlighting/and underlining • Simulations • Pair-share Small group instruction • Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts • Study Island assignments <p>Summative:</p> <ul style="list-style-type: none"> • Mini Quiz 	4 days
NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
<p>N-CN The Complex Number System</p> <ul style="list-style-type: none"> • How can you graph non-functions in polar mode? 		<p>N-CN.4 Represent complex numbers and their operations on the complex plane. Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.</p> <p>SMP.1 Make sense of problems and persevere in solving them SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision</p>		

Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj. 6.4 Convert points and equations from polar to rectangular coordinates and vice versa.</p> <p>Obj. 6.5 Graph polar equations and determine the maximum 4-value and symmetry of a graph.</p>	<ul style="list-style-type: none"> • Definitions, examples and notes • Demonstrate use of calculator in polar mode • Apply symmetry tests 	<ul style="list-style-type: none"> • Extended time • Assignment modification • Group investigations • Mnemonics • Color coding • Highlighting/and underlining • Simulations • Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts • Study Island assignments <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Mini Quiz • Quiz 	5 days
NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
<p>N-CN The Complex Number System</p> <ul style="list-style-type: none"> • How can you raise a complex number $(a + bi)$ to the nth power, or find the mth root of the complex number? 	<p>N-CN.4 Represent complex numbers and their operations on the complex plane. Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.</p> <p>SMP.1 Make sense of problems and persevere in solving them SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.6 Attend to precision</p>			

Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj. 6.6 Represent complex numbers in the complex plane and write them in trigonometric form. Use trigonometric form to simplify some algebraic operations with complex numbers.</p>	<ul style="list-style-type: none"> • Plot complex numbers in the coordinate plane. • Discuss trigonometric form of a complex number. • Discuss the product, quotient, and power rules for complex numbers. • Discuss De Moivre's Theorem and practice applying it. • Discuss finding nth roots of complex numbers. <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator</p>	<ul style="list-style-type: none"> • Extended time • Assignment modification • Group investigations • Mnemonics • Color coding • Highlighting/and underlining • Simulations • Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts • Study Island assignments <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Mini Quiz • Quiz 	4 days

Unit 9: Systems and Matrices

Grade: 11-12Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
A-REI Reasoning with Equations and Inequalities <ul style="list-style-type: none"> How do you determine the best way to solve a system of equations? 		A-REI.8 Solve systems of equations. Represent a system of linear equations as a single matrix equation in a vector variable. SMP.1 Make sense of problems and persevere in solving them SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics SMP.6 Attend to precision SMP.7 Look for and make use of structure		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
Obj. 7.1 Solve systems of equations graphically and algebraically	<ul style="list-style-type: none"> Definitions, examples and notes Review solving a system by graphing, substitution, addition/subtraction elimination method <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator</p> <p><u>Interdisciplinary Connections:</u> Business</p>	<ul style="list-style-type: none"> Extended time Assignment modification Group investigations Mnemonics Color coding Highlighting/and underlining Simulations Pair-share Small group instruction Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts Study Island assignments <p><u>Summative:</u></p> <ul style="list-style-type: none"> Mini Quiz Quiz 	2 days

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
<p>N-VM Vector and Matrix Quantities</p> <ul style="list-style-type: none"> How can you solve systems of equations using matrices? How can you determine the equation of a 2nd or 3rd degree polynomial given 3 points which lie on the curve? 		<p>N-VM.6 Perform operations on matrices and use matrices in applications. Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.</p> <p>N-VM.7 Perform operations on matrices and use matrices in applications. Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.</p> <p>N-VM.8 Perform operations on matrices and use matrices in applications. Add, subtract, and multiply matrices of appropriate dimensions</p> <p>N-VM.10 Perform operations on matrices and use matrices in applications. Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.</p> <p>N-VM.11 Perform operations on matrices and use matrices in applications. Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.</p> <p>A-REL.8 Solve systems of equations. Represent a system of linear equations as a single matrix equation in a vector variable.</p> <p>SMP.1 Make sense of problems and persevere in solving them SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.7 Look for and make use of structure</p>		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj. 7.2 Find sums, differences, products and inverses of matrices</p> <p>Obj. 7.3 Solve systems of linear equations using Gaussian elimination, the row echelon form of a matrix, or an inverse matrix</p>	<ul style="list-style-type: none"> Definitions of basic functions such as add, subtract, multiplication by a scalar, and product of 2 matrices, examples and notes Demonstrate solving matrices on the calculator and by hand Discuss the algorithm to calculate by hand the determinant of a 3x3 and nxn matrix, check by using the calculator Curve fitting application (we know how to find the equation of a line thru 2 points – find the quadratic or cubic equation thru 3 or 4 points). 	<ul style="list-style-type: none"> Extended time Assignment modification Group investigations Mnemonics Color coding Highlighting/and underlining Simulations Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts Study Island 	6 days

			assignments <u>Summative:</u> <ul style="list-style-type: none"> • Mini Quiz • Quiz 	
NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
A-APR Arithmetic with Polynomials and Rational Expressions <ul style="list-style-type: none"> • What makes a computational strategy both effective and efficient? 		A-APR.7 Rewrite rational expressions. Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. SMP.1 Make sense of problems and persevere in solving them SMP.3 Construct viable arguments and critique the reasoning of others. SMP.4 Model with mathematics. SMP.7 Look for and make use of structure SMP.8 Look for and express regularity in repeated reasoning		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
Obj. 7.4 Decompose rational expressions into partial fractions	<ul style="list-style-type: none"> • Definitions, examples and notes • Finding the original fractions that when added or subtracted yield the given rational expression with denominators that have: <ul style="list-style-type: none"> ○ Linear factors ○ Repeated linear factors ○ Quadratic factors ○ Repeated quadratic factors 	<ul style="list-style-type: none"> • Extended time • Assignment modification • Group investigations • Mnemonics • Color coding • Highlighting/and underlining • Simulations • Pair-share 	<u>Formative:</u> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts <u>Summative:</u> <ul style="list-style-type: none"> • Mini Quiz 	4 days

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
A-REI Reasoning with Equations and Inequalities <ul style="list-style-type: none"> How can you determine the maximum or minimum value to obtain a targeted goal? 		A-REI.11 Represent and solve equations and inequalities graphically. Explain why the x -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, radical, absolute value, and exponential functions SMP.1 Make sense of problems and persevere in solving them SMP.2 Reason abstractly and quantitatively SMP.3 Construct viable arguments and critique the reasoning of others. SMP.4 Model with mathematics. SMP.7 Look for and make use of structure		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
Obj. 7.5 Solve linear programming problems and systems of inequalities using graphical methods.	<ul style="list-style-type: none"> Definitions, examples and notes Demonstrate use of shading on the grapher & by hand Solve an inequality by finding the max & min values of an objective function which represents the vertex or corner points of a linear programming problem with a solution <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator</p>	<ul style="list-style-type: none"> Extended time Assignment modification Group investigations Mnemonics Color coding Highlighting/and underlining Simulations Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework Problem solving activities Think and Discuss Open-ended questions Exit prompts Study Island assignments <p>Summative:</p> <ul style="list-style-type: none"> Mini Quiz 	2 days

Unit 10: Discrete Mathematics

Grade: 11-12

Date: May 2012

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
<p>S-MD Using Probability to Make Decisions</p> <ul style="list-style-type: none"> • How many 11 letter words can be made from “Mississippi”? • What counting strategy works best here? 		<p>.S-MD-1 Calculate expected values and use them to solve problems. Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.</p> <p>SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics. SMP.6 Attend to precision SMP.7 Look for and make use of structure SMP.8 Look for and express regularity in repeated reasoning.</p>		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj. 9.1 Use the multiplication principle of counting, permutations, or combinations to count the number of ways that a task can be done</p>	<ul style="list-style-type: none"> • Definitions, examples and notes • Applying counting principle • Extra practice problems/worksheets • Use of the calculator • Developing difference in use of combinations and permutations <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator</p> <p><u>Interdisciplinary Connections:</u> Business, Social Sciences, Statistics</p>	<ul style="list-style-type: none"> • Extended time • Assignment modification • Group investigations • Mnemonics • Color coding • Highlighting/and underlining • Simulations • Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts • Study Island assignments <p>S Summative:</p> <ul style="list-style-type: none"> • Mini-quiz • Quiz 	<p>3 days</p>

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
A-APR Arithmetic with Polynomials and Rational Expressions <ul style="list-style-type: none"> • How do you evaluate $(2x - 1)^6$? • How is Pascal's Triangle used to expand the powers of binomials? 		A-APR.5 Use polynomial identities to solve problems. Know and apply the Binomial Theorem for the expansion of $(x+y)^n$ in powers of x and y for a positive integer n , where x and y are any numbers, with coefficients determined for example by Pascal's Triangle SMP.1 Make sense of problems and persevere in solving them SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics. SMP.7 Look for and make use of structure SMP.8 Look for and express regularity in repeated reasoning.		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
Obj. 9.2 Expand a power of a binomial using the binomial theorem or Pascal's triangle. Find the coefficient of a given term of a binomial expansion.	<ul style="list-style-type: none"> • Definitions, examples and notes • Extending Pascals triangles • Comparing Pascals triangle to nCr • Using nCr to expand a Binomial • Applying the Binomial Thm. <u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator Supplemental Worksheets	<ul style="list-style-type: none"> • Extended time • Assignment modification • Group investigations • Mnemonics • Color coding • Highlighting/and underlining • Simulations • Pair-share 	<u>Formative:</u> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions <u>Summative:</u> <ul style="list-style-type: none"> • Mini-quiz • Quiz 	2 days

NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
<p>S-CP Conditional Probability and the Rules of Probability</p> <p>S-MD Using Probability to Make Decisions</p> <ul style="list-style-type: none"> How can experimental and theoretical probabilities be used to make predictions or draw conclusions? 		<p>C-CP.1 Understand independence and conditional probability and use them to interpret data. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”)</p> <p>S-MD.2 Calculate expected values and use them to solve problems. Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.</p> <p>S-MD.3 Calculate expected values and use them to solve problems. Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.</p> <p>S-MD.4 Calculate expected values and use them to solve problems. Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.</p> <p>S-MD.2 Calculate expected values and use them to solve problems. Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.</p> <p>S-MD.3 Calculate expected values and use them to solve problems. Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.</p> <p>S-MD.4 Calculate expected values and use them to solve problems. Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.</p> <p>SMP.1 Make sense of problems and persevere in solving them SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics. SMP.6 Attend to precision SMP.7 Look for and make use of structure SMP.8 Look for and express regularity in repeated reasoning</p>		
Skills/Objectives	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
SWBAT...				
<p>Obj. 9.3 Identify a sample space and calculate probabilities and conditional probabilities in sample spaces with equally likely or unequally likely outcomes</p>	<ul style="list-style-type: none"> Definitions, examples and notes Determine probability of successive or either/or events Find complement of an event Drawing Venn Diagrams and Tree Diagrams Using the Conditional Probability Formula applications 	<ul style="list-style-type: none"> Extended time Assignment modification Group investigations Mnemonics Color coding Highlighting/and underlining Simulations 	<p>Formative:</p> <ul style="list-style-type: none"> In class practice problems Board work Do Now prompts Class work Homework 	5 days

	<p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard Graphing Calculator Supplemental Worksheets</p>	<ul style="list-style-type: none"> • Pair-share 	<ul style="list-style-type: none"> • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts • Study Island assignments <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Mini-quiz • Quiz 	
NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
<p>F-LQE Linear, Quadratic, and Exponential Models</p> <p>F-BF Building Functions</p> <ul style="list-style-type: none"> • How can patterns, relations and functions be used as tools to best describe and help explain real life situations? • How do you determine whether a sequence is arithmetic or geometric 	<p>F-LQE.4 Construct and compare linear and exponential models and solve problems. For exponential models, express as a logarithm the solution to $a b^x = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.</p> <p>F-BF.2 Build a function that models a relationship between two quantities. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.</p> <p>SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics. SMP.6 Attend to precision SMP.7 Look for and make use of structure SMP.8 Look for and express regularity in repeated reasoning</p>			
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
<p>Obj. 9.4 Express arithmetic and geometric sequences explicitly and recursively; find the limit of convergent sequences.</p> <p>Obj. 9.5 Use sigma notation and find finite sums of terms in arithmetic and geometric sequences, find sums of convergent geometric series</p>	<ul style="list-style-type: none"> • Definitions, examples and notes • Discuss/apply the principle of Mathematical Induction. • Generating sequences with/without a calculator • Calculating the sum of a finite arithmetic sequence and a finite and infinite geometric sequence, discuss the limit of convergence. • Finding limits of a sequence <p><u>Materials/Technology/Resources:</u> Precalculus AW 2007 Smartboard</p>	<ul style="list-style-type: none"> • Extended time • Assignment modification • Group investigations • Mnemonics • Color coding • Highlighting/and underlining • Simulations • Pair-share 	<p><u>Formative:</u></p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended 	4 days

	Graphing Calculator Supplemental Worksheets		<ul style="list-style-type: none"> questions • Exit prompts • Study Island assignments <p>Summative:</p> <ul style="list-style-type: none"> • Mini-quiz • Quiz 	
NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
A_APR Arithmetic with Polynomials and Rational Expressions <ul style="list-style-type: none"> • How can algebraic properties be used to prove that a nth term of a given sequence is defined? 		A-APR.7 Rewrite rational expressions. Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. SMP.1 Make sense of problems and persevere in solving them SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics. SMP.7 Look for and make use of structure SMP.8 Look for and express regularity in repeated reasoning		
Skills/Objectives SWBAT...	Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction	Assessments Formative Summative Benchmarks	Pacing
Obj. 9.6 Use the principle of mathematical induction to prove mathematical generalizations	<ul style="list-style-type: none"> • Definitions, examples and notes • Discuss the principals of Mathematical Induction • Apply Mathematical Induction <p>Materials/Technology/Resources: Precalculus AW 2007 Smartboard Graphing Calculator Supplemental Worksheets</p>	<ul style="list-style-type: none"> • Extended time • Assignment modification • Group investigations • Mnemonics • Color coding • Highlighting/and underlining • Simulations • Pair-share 	<p>Formative:</p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts • Study Island assignments 	3 days

			Summative: • Mini-quiz	
NJ-CCSS Domain Essential Questions		NJ-CCSS Cluster.Standard Standards for Mathematical Practice		
S-ID Interpreting Categorical and Quantitative Data <ul style="list-style-type: none"> • How can you display data graphically? • How can the collection, organization, interpretation, and display of data be used to answer questions? • What information can be obtained from the graphical display of data? 		<p>S-ID.1 Summarize, represent, and interpret data on a single count or measurement variable. Represent data with plots on the real number line(dot plots, histograms, and box plots).</p> <p>S-ID.2 Summarize, represent, and interpret data on a single count or measurement variable. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.</p> <p>S-ID.3 Summarize, represent, and interpret data on a single count or measurement variable. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).</p> <p>S_ID.4 Summarize, represent and interpret data on a single count or measurement variable. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.</p> <p>S-ID.5 Summarize, represent, and interpret data on two categorical and quantitative variables. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.</p> <p>SMP.1 Make sense of problems and persevere in solving them SMP.2 Reason abstractly and quantitatively SMP.4 Model with mathematics. SMP.5 Use appropriate tools strategically. SMP.7 Look for and make use of structure</p>		
Skills/Objectives	Instructional Strategies	Modifications	Assessments	Pacing
SWBAT...	Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity	ESL / Special Education Academic Support/G&T Differentiated Instruction	Formative Summative Benchmarks	
Obj. 9.7 Distinguish between categorical and quantitative variables and use various kinds of graphs to display data	<ul style="list-style-type: none"> • Definitions, examples and notes • Discuss circle graphs, box and whiskers, stem plot, histogram • Understanding how to use the grapher to organize and analyze data • Determining mean, median, mode, frequency table, five-number summary, box and whisker plot/boxplot, variance and standard deviation. 	<ul style="list-style-type: none"> • Extended time • Assignment modification • Group investigations • Mnemonics • Color coding • Highlighting/and underlining 	Formative: <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work 	4 days

<p>Obj. 9.8 Use measures of center, the five-number summary, a boxplot, standard deviation, and normal distribution to describe quantitative data</p>	<ul style="list-style-type: none">Analyze data and apply to problem solving	<ul style="list-style-type: none">SimulationsPair-share	<ul style="list-style-type: none">HomeworkProblem solving activitiesThink and DiscussOpen-ended questionsExit promptsStudy Island assignments <p><u>Summative:</u></p> <ul style="list-style-type: none">Quiz	
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NORTH BRUNSWICK TOWNSHIP HIGH SCHOOL

(2405) CP Precalculus

Grade 11, 12

5 Credits, 1 Year

Course Description:

Precalculus is intended to provide a solid foundation for the study of calculus. The development of the real number system is stressed as well as the analysis of functions, both algebraically and graphically. A complete course in trigonometry is included. Among the other topics studied are: functions and their inverses; complex numbers; limits; continuity; circular functions and their application. A TI-83+ or better graphing calculator is necessary for success.

Proficiencies:

Upon completion of this course the student should be able to

1. Interpret functions that arise in applications in terms of the context.
2. Analyze functions using different representations.
3. Build a function that models a relationship between two quantities
4. Build new functions from existing functions.
5. Rewrite rational expressions.
6. Understand the relationship between zeros and factors of polynomials.
7. Create equations that describe numbers or relationships.
8. Perform arithmetic operations with complex numbers.
9. Use complex numbers in polynomial identities and equations.
10. Understand solving equations as a process of reasoning and explain the reasoning. Solve
11. Construct and compare linear and exponential models and solve problems.
12. Extend the domain of trigonometric functions using the unit circle.
13. Model periodic phenomena with trigonometric functions.
14. Prove and apply trigonometric identities.
15. Apply trigonometry to general triangles
16. Translate between the geometric description and the equation for a conic section.
17. Represent and model with vector quantities.
18. Perform operations on vectors.
19. Represent complex numbers and their operations on the complex plane.
20. Solve systems of equations.
21. Perform operations on matrices and use matrices in applications.
22. Represent and solve equations and inequalities graphically.
23. Calculate expected values and use them to solve problems.
24. Use polynomial identities to solve problems.
25. Understand independence and conditional probability and use them to interpret data.
26. Summarize, represent, and interpret data on a single count or measurement variable.

Course Requirements

Students will be expected to:

1. Do homework assignments daily
2. Have a graphic utility
3. Have periodic quizzes and tests

Evaluation:

Marking period grades will be determined as follows:

- 90% performance assessments
- 10% homework

revised 5/2012