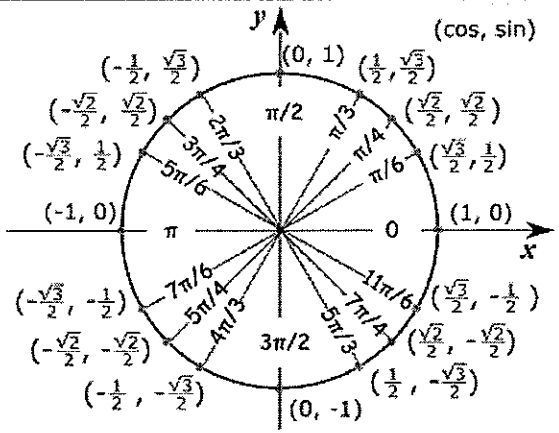
Secaucus Board of Education

Pre-Calculus

Course Codes: 3200, 3310, 3321

Mathematics Department



Born on January 2017

Aligned to the NJSLS for Mathematics (2016), Technology (2014), & 21st Century Life and Careers (2014)

Adopted by the Secaucus Board of Education on: January 19, 2017

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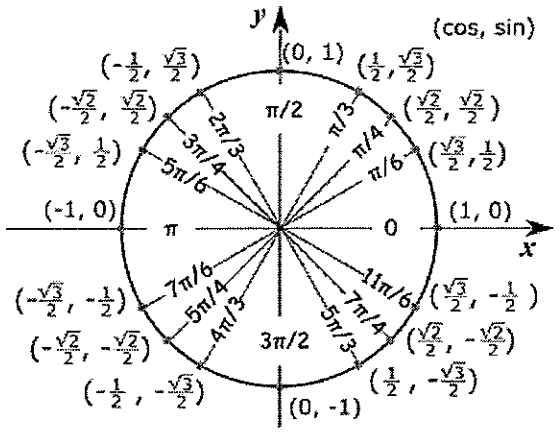

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District Equity Statement

The Board of Education directs that all students enrolled in the schools of this district shall be afforded equal educational opportunities in strict accordance with the law. No students shall be denied access to or benefit from any educational program or activity or from a co-curricular or athletic activity on the basis of the student's race, color, creed, religion, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, gender identity or expression, socioeconomic status, or disability. The Board directs the Superintendent to allocate faculty, administrators, support staff members, curriculum materials, and instructional equipment supplies among and between the schools and classes of this district in a manner that ensures equivalency of educational opportunity throughout this district. The school district's curricula in the following areas will eliminate discrimination, promote mutual acceptance and respect among students, and enable students to interact effectively with others, regardless of race, color, creed, religion, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, gender identity or expression, socioeconomic status, or disability:

1. School climate/learning environment
2. Courses of study, including Physical Education
3. Instructional materials and strategies
4. Library materials
5. Software and audio-visual materials
6. Guidance and counseling
7. Extra-curricular programs and activities
8. Testing and other assessments.

Excerpt from Secaucus Board of Education, Policy 5750, Edited September 2016.

Course Description

This course is designed to provide a comprehensive study of functions, which are the basis of calculus and other higher mathematics courses. Functions are studied through a graphical, algebraic and numerical analysis. In addition to reviewing linear and quadratic functions, students are introduced to polynomial, rational, trigonometric, logarithmic, and exponential functions. Students will also explore inequalities, polar coordinates, complex numbers, conic sections, matrices, vectors, sequences, series and limits. The course emphasizes applications, problem solving, reasoning, and communication. The graphing calculator is frequently used as part of instruction. Integrating calculus concepts such as limits and derivatives throughout the course will prepare the students for a course in calculus.

Primary Interdisciplinary Connections

Science

Finance

Economics

Business

Entrepreneurial Literacy

Potential Course Modifications (ELLs, Special Education, Gifted and Talented)

The course instructor will determine, with the assistance of guidance counselors, teacher assistant/aides, and/or special education teachers, what modifications will be made for his/her students. Such examples of modifications can include, but not be limited to:

- Extended time as needed
- Modification of tests and quizzes
- Preferential seating
- Alternative/Formative assessment (projects)
- Effective teacher questioning (ranging from simple recall to higher order critical thinking questions)
- Supplemental materials
- Cooperative learning
- Teacher tutoring
- Peer tutoring
- Differentiated Instruction

Unit 1:	Functions and Their Graphs	
Timing:	4 weeks	
Standards:	*NJSLS for Mathematics:* F-IF.C.7 F-IF.C.7a-d, F-BF.A.1c, F-BF.B.4b, F-BF.B.4c, F-BF.B.4d, F-BF.B.5, Standards for MP 1-8 *NJSLS for Technology:* 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1 *NJSLS 21st Century Life and Careers:* CRP1, CRP2, CRP4, CRP8, CRP11, CRP12	
Essential Questions:	**Objectives:**	**Activities, Investigation, and Student Experiences:**

• How can we use symmetry to sketch graphs of equations?
• What does the vertical line test prove?
• How can functions be used to model practical situations?
• How can we identify even and odd functions?
• Explain vertical and horizontal shifts to sketch graphs of functions.
• What does domain and
	• Students will sketch graphs of equations.
	• Students will be able to find domain and range of the functions.
	• Students will be able to find the zeros of the function.
	• Students will be able to find the intervals on which functions are increasing or decreasing.
	• Students will be able to identify even and odd functions from graphs and also from the equations.
	• Students will be able to recognize
		• Interactive Whiteboard Presentations
		  ○ Visual Representations of Concepts
		  ○ Modeling of Examples
		• Cooperative Group Investigations and Hands-on Activities
		• Graphing Calculator Demonstrations and Using the Graphing Calculator to Solve Problems
		• Partner collaboration or

range represent? • How many different ways can we use to find the inverse of any function? • Does every function have an inverse? • What does the horizontal line test prove? • Explain the difference between the horizontal and vertical line tests and what they represent.	graphs of common functions. • Students will be able to identify and graph step and other piecewise-defined functions. • Students will be able to use horizontal and vertical shifts and reflections to sketch graphs of functions. • Students will be able to add, subtract, multiply, and divide	individual work (depending on the topic and assignment.) • Solving Real World Problems
Assessments:	**Materials:**	**Resources:**
• Do Nows • Student Participation • Oral Questioning • Exit Cards • ActivExpression Device Results • Homework Assignments • Classwork • Projects • Unit Quizzes • Unit Test	• Interactive Whiteboard • Document Camera • ActivExpression Devices • Whiteboards • Dry Erase Markers • Erasers • Colored Pencils • Rulers • Activity Sheets • Graph Paper • TI-84+ Graphing Calculator • TI-84 Smartview Software	• NJCTL.org • WolframAlpha Website • Textbook Activities • Teacher Created Interactive Whiteboard Presentations • Texas Instruments Activity Central Website • Illuminations Website • Mathematics Assessment Project Website • IXL Pre-Calculus Website • Department Created Assessments

Unit 2:	Polynomial Functions, Rational Functions and Complex Numbers	
Timing:	4 weeks	
Standards:	*NJSLS for Mathematics:* F-IF.C.7, F-IF.C.7a-c, F-BF.A.1c, F-BF.B.5, N- CN.A.3, N-CN.B.4-6, Standards for MP 1-8 *NJSLS for Technology:* 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1 *NJSLS 21st Century Life and Careers:* CRP1, CRP2, CRP4, CRP8, CRP11, CRP12	
Essential Questions:	**Objectives:**	**Activities, Investigation, and Student Experiences:**

• List the important values that we need to find in order to analyze quadratic functions.
• Write the pros of vertex form of quadratic functions and compare with standard form.
• Assume two functions are algebraically equal and one of them has a horizontal asymptote and the other one does not have it. What cases can happen?
• Can you apply transformations
	• Students will be able to analyze graphs of quadratic functions.
	• Students will be able to write quadratic functions in standard form and use the result to sketch the graphs of functions.
	• Students will be able to use quadratic functions to model and solve real life problems.
	• Students will be able to use transformations to sketch graphs of polynomial functions.
		• Interactive Whiteboard Presentations
		  ○ Visual Representations of Concepts
		  ○ Modeling of Examples
		• Cooperative Group Investigations and Hands-on Activities
		• Graphing Calculator Demonstrations and Using the Graphing Calculator to Solve Problems

to any functions? • How do you write a real number as a complex number? • Why are complex numbers necessary? • Why do imaginary numbers exist? • After performing operations with complex numbers, what determines when the expression is in its simplest form? • Why is it important to use a conjugate when dividing by a complex number? • How can rectangular coordinates be used to manipulate complex numbers? • How do I use the complex plane? • How do you use the complex plane and find the absolute value of a complex number? • What do vertical and horizontal asymptotes represent?	• Students will be able to use the leading coefficient test to determine the end behavior of graphs of polynomial functions. • Students will be able to use zeros of the functions as sketching aids. • Students will be able to use the Intermediate Value Theorem to help locate zeros of polynomial functions. • Students will be able to use long and synthetic division. • Students will be able to use the Remainder Theorem and Factor Theorem. • Students will be able to use the imaginary unit 'i' to write complex numbers. • Students will be able to use complex conjugates to write the quotient of two complex numbers in standard form. • Students will be able to find complex solutions of quadratic equations. • Students will be able to 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	• Partner collaboration or individual work (depending on the topic and assignment.) • Solving Real World Problems

	number. • Students will be able to use the Fundamental Theorem of Algebra to determine the number of zeros of polynomial functions. • Students will be able to find rational zeros of polynomial functions. • Students will be able to find conjugate pairs of complex zeros. • Students will be able to find the zeros of polynomials by factoring. • Students will be able to use Descartes' Rule of Signs and the Upper and Lowe Bound Rules to find zeros of polynomials. • Students will be able to find the domains of rational functions. • Students will be able to find horizontal and vertical asymptotes of graphs of rational functions. • Students will be able to analyze and sketch graphs of rational functions. • Students will be able to sketch graphs of rational functions that have slant asymptotes.	
Assessments:	**Materials:**	**Resources:**
• Do Nows • Student Participation	• Interactive Whiteboard • Document Camera	• NJCTL.org • WolframAlpha Website

• Oral Questioning • Exit Cards • ActivExpression Device Results • Homework Assignments • Classwork • Projects • Unit Quizzes • Unit Test	• ActivExpression Devices • Whiteboards • Dry Erase Markers • Erasers • Colored Pencils • Rulers • Activity Sheets • Graph Paper • TI-84+ Graphing Calculator • TI-84 Smartview Software	• Textbook Activities • Teacher Created Interactive Whiteboard Presentations • Texas Instruments Activity Central Website • Illuminations Website • Mathematics Assessment Project Website • IXL Pre-Calculus Website • Department Created Assessments

Unit 3:	Exponential and Logarithmic Functions	
Timing:	3 Weeks	
Standards:	*NJSLS for Mathematics:* F-BF.B.5, SF-BF.A.1b, F-BF.B.4b, F- BF.B.4c, F-IF.C.7,e, Standards for MP 1-8 *NJSLS for Technology:* 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1 *NJSLS 21st Century Life and Careers:* CRP1, CRP2, CRP4, CRP8, CRP11, CRP12	
Essential Questions:	**Objectives:**	**Activities, Investigation, and Student Experiences:**

• What is the role of exponential functions in science and business?
• What is the relationship between logarithmic and exponential functions? Explain with examples.
• Explain why log (x) is defined only for x>0.
• How do you prove properties of logarithms using a graphing calculator.
• Is the time required for an
	• Students will be able to recognize, evaluate, and graph exponential and logarithmic functions.
	• Students will be able to rewrite logarithmic functions with different bases.
	• Students will be able to use properties of logarithms to evaluate, rewrite, expand, or condense logarithmic equations.
	• Students will be able to solve exponential and logarithmic equations.
	• Students will be able to use
		• Interactive Whiteboard Presentations
		  ○ Visual Representations of Concepts
		  ○ Modeling of Examples
		• Cooperative Group Investigations and Hands-on Activities
		• Graphing Calculator Demonstrations and Using the Graphing Calculator to Solve Problems
		• Partner collaboration or

investment to quadruple twice as long as the time required for it to double? • What are all of the logarithmic models and how can they be applied?	exponential growth models, exponential decay models, Gaussian models, and logistic models to solve real-life problems.	individual work (depending on the topic and assignment.) • Solving Real World Problems
Assessments:	**Materials:**	**Resources:**
• Do Nows • Student Participation • Oral Questioning • Exit Cards • ActivExpression Device Results • Homework Assignments • Classwork • Projects • Unit Quizzes • Unit Test	• Interactive Whiteboard • Document Camera • ActivExpression Devices • Whiteboards • Dry Erase Markers • Erasers • Colored Pencils • Rulers • Activity Sheets • Graph Paper • TI-84+ Graphing Calculator • TI-84 Smartview Software	• NJCTL.org • WolframAlpha Website • Textbook Activities • Teacher Created Interactive Whiteboard Presentations • Texas Instruments Activity Central Website • Illuminations Website • Mathematics Assessment Project Website • IXL Pre-Calculus Website • Department Created Assessments

Unit 4:	Trigonometry	
Timing:	7 Weeks	
Standards:	*NJSLS for Mathematics:* F-TF.A.3, F-TF.A.4 F-TF.B.6, F-TF.B.7 F-TF.C.9, Standards for MP 1-8 *NJSLS for Technology:* 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1 *NJSLS 21st Century Life and Careers:* CRP1, CRP2, CRP4, CRP8, CRP11, CRP12	
Essential Questions:	**Objectives:**	**Activities, Investigation, and Student Experiences:**

• Why do we need linear and angular speed formulas? How can they be applied to real life problems.
• What are special triangles and what is the reasoning behind side and angle measurements.
• How do special triangles create the unit circle.
• What is the importance of reference angles.
• How can trigonometric graphs be transformed?
	• Students will be able to measure angles in radians or degrees.
	• Students will be able to find the complement and supplement of an angle.
	• Students will be able to convert between radian and degree measurements.
	• Students will be able to find arc length, linear and angular speed.
	• Students will be able to define unit circle and use the period to evaluate the sine and cosine functions.
	• Students will be able to find the value of the trigonometric functions by using special angles.
		• Interactive Whiteboard Presentations
		  ○ Visual Representations of Concepts
		  ○ Modeling of Examples
		• Cooperative Group Investigations and Hands-on Activities
		• Graphing Calculator Demonstrations and Using the Graphing Calculator to Solve Problems
		• Partner collaboration or

• How can the fundamental trigonometric identities be used to solve trigonometric equations? • When can we use Law of Sines and Law of Cosines? What are their differences? • How can you determine if a triangle has no solution, one solution, or two solutions when using Law of • Sines? • How can angle sum and difference, multiple-angle and product to sum formulas be used to simplify expressions and solve problems? • How can you compare the graphs of the sine, cosine, tangent functions and their inverses?	• Students will be able to solve real life problems by using right triangles. • Students will be able to use fundamental trigonometric identities • Students will be able to decide the sign of the trigonometric function by using the quadrants. • Students will be able to find reference angles • Students will be able to evaluate trigonometric functions by using reference angles. • Students will be able to graph all six trigonometric functions. • Students will be able to analyze amplitude, vertical and horizontal stretching and shrinking. • Students will be able to translate sine and cosine curves. • Students will be able to graph the reciprocal of trigonometric functions. • Students will be able to graph combinations of trigonometric functions Students will be able to graph and analyze inverse trigonometric functions. • Students will be able to apply their knowledge to real life problems. • Students will be able to write fundamental identities and use them to evaluate trigonometric functions. • Students will be able to simplify	individual work (depending on the topic and assignment.) • Solving Real World Problems

	trigonometric functions and expressions. • Students will be able to verify trigonometric identities. • Students will be able to use standard algebraic techniques to solve trigonometric equations. • Students will be able to solve trigonometric equations of quadratic type. • Students will be able to solve trigonometric equations involving multiple angles. • Students will be able to use inverse functions to solve trigonometric equations. • Students will be able to use sum and difference formulas, multiple-angle formulas and power-reducing formulas to evaluate trigonometric functions, verify identities and solve trigonometric equations • Students will be able to use product-to-sum and sum-to- product formulas to rewrite and evaluate trigonometric functions. • Students will be able to use the Law of Sines and Cosines to solve oblique triangles and solve real-life problems • Students will be able to find the areas of oblique triangles.	

Assessments:	Materials:	Resources:
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Unit 5:	Vector Quantities and Matrices	
Timing:	3 weeks	
Standards:	*NJSLS for Mathematics:* N-VM.A.1-5, N-VM.B.4a, N-VM.B.4b, N-VM.B.5a, N-VM.B.5b, N-VM.C.6-11, A-REI.C.8-9, Standards for MP 1-8 *NJSLS for Technology:* 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1 *NJSLS 21st Century Life and Careers:* CRP1, CRP2, CRP4, CRP8, CRP11, CRP12	
Essential Questions:	**Objectives:**	**Activities, Investigation, and Student Experiences:**

• How do we find the magnitude of a vector?
• How do we find the components of a vector? What do they represent?
• How do you show adding, subtracting, and scalar multiplication of two vectors graphically.
• Which discipline use vectors more often and what does it
	• Students will be able to represent vectors as directed line segments.
	• Students will be able to write component forms of vectors.
	• Students will be able to perform basic vector operations and represent them graphically.
	• Students will be able write vectors as linear combinations of unit vectors.
	• Students will be able find the direction angles of vectors.
	• Students will be able to use vectors to model and solve real-life problems.
		• Interactive Whiteboard Presentations
		  ○ Visual Representations of Concepts
		  ○ Modeling of Examples
		• Cooperative Group Investigations and Hands-on Activities
		• Graphing Calculator Demonstrations and Using the Graphing Calculator to Solve Problems

represent? • What are real life examples of the usefulness of matrices? • What is the importance of dimensions when we add, subtract and multiply two matrices. • Matrix multiplication of square matrices satisfies which two properties? Give an example. • How do we know if a matrix has a multiplicative inverse? • How do we find the multiplicative inverse of a matrix? • What is the identity matrix and why do we need it?	• Students will be able to recognize vector quantities as having both magnitude and direction. • Students will be able to represent vector quantities as directed line segments and use appropriate symbols for vectors and their magnitudes. • Students will be able to find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. • Students will be able to solve problems involving velocity and other quantities that can be represented by vectors. • Students will be able to add and subtract vectors. • Students will be able to add vectors end-to-end, component –wise, and by the parallelogram rule. • Students will be able to understand vector subtraction • Students will be able to multiply a vector by a scalar. • Students will be able to represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication Component-wise • Students will be able to compute the magnitude of a scalar multiple • Students will be able to use matrices to represent and manipulate data, e.g., to	• Partner collaboration or individual work (depending on the topic and assignment.) • Solving Real World Problems

	represent payoffs or incidence relationships in a network. • Students will be able to multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled. • Students will be able to add, subtract, and multiply matrices of appropriate dimensions. • Students will be able to understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes. • Students will be able to understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties. • Students will be able to 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. • Students will be able to multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector, and work with matrices as transformations of vectors. • Students will be able to work with 2×2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.	

Assessments:	Materials:	Resources:
• Do Nows • Student Participation • Oral Questioning • Exit Cards • ActivExpression Device Results • Homework Assignments • Classwork • Projects • Unit Quizzes • Unit Test	• Interactive Whiteboard • Document Camera • ActivExpression Devices • Whiteboards • Dry Erase Markers • Erasers • Colored Pencils • Rulers • Activity Sheets • Graph Paper • TI-84+ Graphing Calculator • TI-84 Smartview Software	• NJCTL.org • WolframAlpha Website • Textbook Activities • Teacher Created Interactive Whiteboard Presentations • Texas Instruments Activity Central Website • Illuminations Website • Mathematics Assessment Project Website • IXL Pre-Calculus Website • Department Created Assessments

Unit 6:	Sequences, Series and Probability	
Timing:	3 weeks	
Standards:	*NJSLS for Mathematics:* S-MD.A.1-4, S-MD.B.5, S-MD.B.5a, S-MD.B.5b, Standards for MP 1-8 *NJSLS for Technology:* 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1 *NJSLS 21st Century Life and Careers:* CRP1, CRP2, CRP4, CRP8, CRP11, CRP12	
Essential Questions:	**Objectives:**	**Activities, Investigation, and Student Experiences:**

• Where do we see arithmetic sequences in real-life? If we generate a function what kind of function would it be?
• What is a Recursion Formula and how we use it?
• How do we find the sum of a finite arithmetic sequence?
• Is it possible to find the sum of an infinite geometric sequence? Explain different cases.
• Is it possible to use the binomial theorem to expand
	• Students will be able to use sequence, factorial, and summation notation to write the terms and sums of sequences.
	• Students will be able to recognize, write, and use arithmetic sequences and geometric sequences.
	• Students will be able to use the Binomial Theorem and Pascal's triangle to calculate binomial coefficients and write binomial expansions.
	• Students will be able to solve counting problems using the
		• Interactive Whiteboard Presentations
		  ○ Visual Representations of Concepts
		  ○ Modeling of Examples
		• Cooperative Group Investigations and Hands-on Activities
		• Graphing Calculator Demonstrations and Using the Graphing Calculator to Solve Problems
		• Partner collaboration or

complex numbers? • What is the difference between permutation and combination? • Explain the Fundamental Counting Principle. • Explain the relationship between combinations and the Binomial Theorem.	Fundamental Counting Principle, permutations, and combinations. • Students will be able to find the probabilities of events and their complements. • Students will be able to use probability to make decisions. • Students will be able to calculate the expected value of a random variable.	individual work (depending on the topic and assignment.) • Solving Real World Problems
Assessments:	**Materials:**	**Resources:**
• Do Nows • Student Participation • Oral Questioning • Exit Cards • ActivExpression Device Results • Homework Assignments • Classwork • Projects • Unit Quizzes • Unit Test	• Interactive Whiteboard • Document Camera • ActivExpression Devices • Whiteboards • Dry Erase Markers • Erasers • Colored Pencils • Rulers • Activity Sheets • Graph Paper • TI-84+ Graphing Calculator • TI-84 Smartview Software	• NJCTL.org • WolframAlpha Website • Textbook Activities • Teacher Created Interactive Whiteboard Presentations • Texas Instruments Activity Central Website • Illuminations Website • Mathematics Assessment Project Website • IXL Pre-Calculus Website • Department Created Assessments

Unit 7:	Conics	
Timing:	3 weeks	
Standards:	*NJSLS for Mathematics:* G-GPE.A.3, Standards for MP 1-8 *NJSLS for Technology:* 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1 *NJSLS 21st Century Life and Careers:* CRP1, CRP2, CRP4, CRP8, CRP11, CRP12	
Essential Questions:	**Objectives:**	**Activities, Investigation, and Student Experiences:**

• In your own words explain some of the math terms such as foci, focus, major axis, minor axis, eccentricity etc.
• Explain the similarities and differences between the standard forms of the ellipse and circle.
• Where do we need to use the standard form of the ellipse in real life? (building bridges, fireplaces etc.)
• How do we find the asymptotes of a hyperbola?
	• Students will be able to recognize a conic as the intersection of a plane and double napped cone.
	• Students will be able to 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.
	• Students will be able to find the equations for the *asymptotes* of a hyperbola.
	• Students will be able to complete the square in order to generate an equivalent form of an equation
	• for a conic section; use that
		• Interactive Whiteboard Presentations
		  ○ Visual Representations of Concepts
		  ○ Modeling of Examples
		• Cooperative Group Investigations and Hands-on Activities
		• Graphing Calculator Demonstrations and Using the Graphing Calculator to Solve Problems
		• Partner collaboration or individual work (depending

• How do you classify conics from its general equation? • Explain the importance of completing the square in conic sections.	equivalent form to identify key characteristics of the conic section • Students will be able to identify, graph, write, and analyze equations of each type of conic section, using properties such as symmetry, intercepts, foci, *asymptotes*, and *eccentricity*, and use technology when appropriate	on the topic and assignment.) • Solving Real World Problems
Assessments:	**Materials:**	**Resources:**
• Do Nows • Student Participation • Oral Questioning • Exit Cards • ActivExpression Device Results • Homework Assignments • Classwork • Projects • Unit Quizzes • Unit Test	• Interactive Whiteboard • Document Camera • ActivExpression Devices • Whiteboards • Dry Erase Markers • Erasers • Colored Pencils • Rulers • Activity Sheets • Graph Paper • TI-84+ Graphing Calculator • TI-84 Smartview Software	• NJCTL.org • WolframAlpha Website • Textbook Activities • Teacher Created Interactive Whiteboard Presentations • Texas Instruments Activity Central Website • Illuminations Website • Mathematics Assessment Project Website • IXL Pre-Calculus Website • Department Created Assessments

Unit 8:	Geometric Measurements and Dimensions	
Timing:	3 weeks	
Standards:	*NJSLS for Mathematics:* G-GMD.A.2, Standards for MP 1-8 *NJSLS for Technology:* 8.1.12.A.3, 8.1.12.A.4, 8.1.12.C.1 *NJSLS 21st Century Life and Careers:* CRP1, CRP2, CRP4, CRP8, CRP11, CRP12	
Essential Questions:	**Objectives:**	**Activities, Investigation, and Student Experiences:**

• What is the purpose of Cavalieri's principle?
• How can we explore Cavalieri's principle through real-world applications?
• How can we build relationships between volumes of various figures?
	• Students will understand if two space figures have the same height and the same cross-sectional area, then they have the same volume.	• Interactive Whiteboard Presentations
		  ○ Visual Representations of Concepts
		  ○ Modeling of Examples
		• Cooperative Group Investigations and Hands-on Activities
		• Graphing Calculator Demonstrations and Using the Graphing Calculator to Solve Problems
		• Partner collaboration or

		individual work (depending on the topic and assignment.) • Solving Real World Problems
Assessments:	**Materials:**	**Resources:**
• Do Nows • Student Participation • Oral Questioning • Exit Cards • ActivExpression Device Results • Homework Assignments • Classwork • Projects • Unit Quizzes • Unit Test	• Interactive Whiteboard • Document Camera • ActivExpression Devices • Whiteboards • Dry Erase Markers • Erasers • Colored Pencils • Rulers • Activity Sheets • Graph Paper • TI-84+ Graphing Calculator • TI-84 Smartview Software	• NJCTL.org • WolframAlpha Website • Textbook Activities • Teacher Created Interactive Whiteboard Presentations • Texas Instruments Activity Central Website • Illuminations Website • Mathematics Assessment Project Website • IXL Pre-Calculus Website • Department Created Assessments