Pre-Calculus Mathematics Curriculum

	First day introductions, materials, policies, procedures and Summer Exam (2 days)

Unit 1 Functions

Estimated time frame for unit	Big Ideas	Essential Question	Concepts	Competencies	Lesson Plans and Suggested Resources	Vocabulary	Standards/Eligible Content
13 Days	Mathematical functions are relationships that assign each member of one set (domain) to a unique member of another set (range), and the relationship is recognizable across representations.	How can students identify the domain and range for a relation, equation or a graph?	Functions	Students should be able to determine whether a relation is a function. Students should be able to identify the domain and range of a relation or function. Students should be able to evaluate functions.	**Relations and Functions** Suggested Resources: Advanced Mathematical Concepts Section 1-1 (Pgs. 5-12) Sullivan- Precalculus Section 2-1 and 2-2 Pgs. 48 - 71 Glencoe-Precalulus /2012- Section 1-1 (PC Pgs 4 – 12) Algebra and Trigonometry with Analytic Geometry (Swokowski) Section 3-4 (Pg 175-188) 4 days	relation, domain, range, function, vertical line test, function notation,	Domain: F-IF Interpreting Functions. Analyze Functions using different representations Standard: Analyze Functions using different representations 7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic equations and show intercepts, maxima and minima. c. Graph polynomial functions, identify zeros when suitable factorizations are available, and show end behavior.
	Mathematical functions are relationships that assign each member of one set (domain)	How can students identify the domain and range for a relation, equation or a graph?	Functions	Students should be able to Identify and graph piecewise functions including greatest	**Piecewise Functions** Suggested Resources:	Piecewise Function Step Function Greatest Integer	Domain: F-IF Interpreting Functions. Analyze Functions using different representations

	to a unique member of another set (range), and the relationship is recognizable across representations.			integer, step, and absolute value functions.	Advanced Mathematical Concepts Section 1-7 (Pgs.4 5-51) Sullivan- Precalculus Section 2-4 Pgs. 82-92 Glencoe-Precalulus (2012-) Section 1-5 (PC Pgs 45 – 55) Algebra and Trigonometry with Analytic Geometry (Swokowski) Section 3-5 (Pg 193-208) 3 days	Function	Standard: Analyze Functions using different representations 7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic equations and show intercepts, maxima and minima. c. Graph polynomial functions, identify zeros when suitable factorizations are available, and show end behavior.
	Families of functions exhibit properties and behaviors that can be recognized across representations. Functions can be transformed, combined, and composed to create new functions in mathematical and real world situations.	How can students manipulate functions through transformations, operations, and compositions?	Functions	Students should be able to identify graphs, and parent functions. Students should be able to identify and graph transformations of parent functions.	**Parent Function and Transformation-** Suggested Resources: Advanced Mathematical Concepts Section 3-2 (Pgs.137--145) Sullivan- Precalculus Section 2-5 Pgs. 92-104 Glencoe-Precalculus(2012) Section 1- 5 (Pgs 45 – 55) Algebra and Trigonometry with Analytic Geometry (Swokowski	Parent graph Constant Function Zero Function Identity Function Quadratic Function Cubic Function Square Root Function Reciprocal Function Absolute Value Function Transformation Translation	Domain: F-BF Building Functions Standard: Build a new function from and existing function 3. Identify the effect on the graph of replacing *f (x)* by *f (x) + k, k f(x), f (kx),* and *f (x + k)* for specific values of *k* given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*

					Pg 192 – 208) 4 Days	Reflection Dilation	
	Review For Unit 1 Exam Functions 1 Day						
13 Days	**Test Unit 1 Functions 1 Day**						
Unit 2 Trigonometry and Triangles							
Estimated time frame for unit	**Big Ideas**	**Essential Question**	**Concepts**	**Competencies**	**Lesson Plans and Suggested Resources**	**Vocabulary**	**Standards/Eligible Content**
22 days	Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.	In what ways might radians be more useful than degrees in various situations (or vice versa)?	Trigonometric Functions	Students should be able to convert decimal degree measures to degrees, minutes and seconds. Students should be able to convert degrees, minutes and seconds to decimal degrees. Students should be able to find the number of degrees in a given number of rotations. Students should be able to identify angles that are coterminal with a given angle. Students should be able to use angle measures to solve real-world problems.	**Degrees and Radians-** Suggested Resources: Advanced Mathematical Concepts Section 5-1 (Pgs.277--283) Glencoe-Pre-calculus(2012) Section 4-2 (Pgs 231 – 241) Algebra and Trigonometry with Analytic Geometry (Swokowski) Pg 392 - 403) 2 Days	Vertex Initial side Terminal side Standard Position Degree Minute Seconds Quadrantal Angle Coterminal Angle	Domain: F-TF Trigonometric Functions Standard: Extend the domain of trigonometric functions using the unit circle 1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. 2. Explain how the unit circle in the coordinate plane enables the extension of the trigonometric functions to all real numbers, interpreted as radian measure of angles traversed counterclockwise around the unit circle.

	Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms	Why should you know more than one way to solve a trigonometric problem?	Trigonometric Functions	Students should be able to find values of trigonometric functions for acute angles of right triangles.	**Trigonometric Ratios in Right Triangle** Suggested Resources: Advanced Mathematical Concepts Section 5-2 (Pgs.277--283) Glencoe-Precalculus(2012) Section 4-1 (Pgs 220 – 230) Algebra and Trigonometry with Analytic Geometry (Swokowski (Pg 392 - 420) 2 days	Hypotenuse Leg Side adjacent Side opposite Trigonometric ratios Sine Cosine Tangent Cosecant Secant Cotangent	Domain: G-SRT Similarity, Right Triangles, and Trigonometry Standard: Define trigonometric ratios and solve problems involving right triangles 6. Understand that by similarity, side ratios in right triangles are properties of the triangles, leading to the definitions of trigonometric ratios for acute angles. Domain: F-TF Trigonometric Functions Standard: Extend the domain of trigonometric functions using the unit circle. 3. Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi-x$, $\pi+x$, $2\pi-x$, $2\pi+x$ in terms of their values for x, where x is any real number.
	Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms	How is the unit circle a useful device in the solving of trigonometric problems?	Trigonometric Functions	Students should be able to find the values of the six trigonometric functions using the unit circle. Students should be able to find the values of the six trigonometric functions of an angle in standard position given a point on its terminal side.	**Trigonometric Functions on the Unit Circle-** Suggested Resources: Advanced Mathematical Concepts Section 5-3 (Pgs.291-298) Glencoe Pre-calculus(2012) Section 4-3 (Pgs 242 – 253) Algebra and Trigonometry with Analytic Geometry (Swokowski)	Unit circle Sine Cosine Circular functions Periodic function Period Trigonometric functions Quadrantal angle Reference angle	Domain: F-TF Trigonometric Functions Standard: Extend the domain of trigonometric functions using the unit circle 2. Explain how the unit circle in the coordinate plane enables the extension of the trigonometric functions to all real numbers, interpreted as radian measure of angles traversed counterclockwise around the unit circle. 4. Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions

					Pg 421 - 439) 2 days		
	Unit 2 Trigonometry and Triangles Quiz #1 (1 day)						
	Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms	Why should you know more than one way to solve a trigonometric problem?	Trigonometric Functions	Students should be able to solve right triangles. Students should be able to use trigonometry to find the measures of the sides of a right triangle. Students should be able to evaluate inverse trigonometric functions. Students should be able to fine the missing angles.	**Right Triangle Trigonometry** Suggested Resources: Advanced Mathematical Concepts Section 5-4 and 5-5 (Pgs.299--312) Sullivan- Precalculus Section 8-1 Pgs. 496 -508 Glencoe Pre-calculus(2012)- Section 4-1 (Pgs 220 – 230) Algebra and Trigonometry with Analytic Geometry (Swokowsk)i Pg 392 - 420) 2 Days	Angles of Elevation Angles of depression Inverse Arcsine relation Arccosine relation Arctangent relation	Domain: G-SRT Similarity, Right Triangles, and Trigonometry Standard: Define trigonometric ratios and solve problems involving right triangles 6. Understand that by similarity, side ratios in right triangles are properties of the triangles, leading to the definitions of trigonometric ratios for acute angles. Domain: F-TF Trigonometric Functions Standard: Extend the domain of trigonometric functions using the unit circle. 3. Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi - x$, $\pi + x$, $2\pi - x$, $2\pi + x$ in terms of their values for x, where x is any real number.
	Unit 2 Trigonometry and Triangles Quiz #2 (1 day)						
	There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are	How does one know when to use the Law of Sines versus the Law of Cosines?	Trigonometric Functions	Students should be able to solve triangles using the Law of Sines or the Law of Cosines if the measure of two angles and a side are given. Students should be able	**The Law of Sines** Suggested Resources: Advanced Mathematical Concepts	Law of Sines	Domain: G-SRT Similarity, Right Triangles, and Trigonometry Standard: Apply trigonometry to general triangles. 10. Prove the Laws of Sines and Cosines and use them to solve

	useful for writing equivalent forms of expressions and solving equations and inequalities.			to find the area of a triangle if the measure of two sides and an included angle are given.	Section 5-6 (Pgs.313--318) Sullivan- Precalculus Section 8-2 and 8-4 Pgs. 508-519, 525-531 Glencoe Pre-calculus(2012) Section 4-7 (Pgs 291 – 301) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 562 - 581) 3 Days		problems. 11. Understand and apply the Laws of Sines and the laws of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces)
	There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.	How does one know when to use the Law of Sines versus the Law of Cosines?	Trigonometric Functions	*Objectives:* SWBA to solve oblique triangles using the Law of Sines or the Law of Cosines. SWBA to find areas of oblique triangles.	**Ambiguaous Case for the Law of SInes** Suggested Resources: Advanced Mathematical Concepts Section 5-7 (Pgs.320--326) Sullivan- Precalculus Section 8-2 Pgs. 508-519 Glencoe Pre-calculus(2012) Section 4-7 (Pgs 291 – 301) Algebra and Trigonometry with Analytic Geometry (Swokowski)(Pg 562 - 581) 3 days	Ambiguous case	Domain: G-SRT Similarity, Right Triangles, and Trigonometry Standard: Apply trigonometry to general triangles. 10. Prove the Laws of Sines and Cosines and use them to solve problems. 11. Understand and apply the Laws of Sines and the laws of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces)

	There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.	How does one know when to use the Law of Sines versus the Law of Cosines?	Trigonometric Functions	Students should be able to solve triangles by using the Law of Cosines. Students should be able to find the area of triangles if the measure of the three sides is given.	**The Law of Cosines –** Suggested Resources: Advanced Mathematical Concepts Section 5-8 (Pgs.327--332) Sullivan- Precalculus Section 8-3 and 8-4 Pgs. 519-531 Glencoe Pre-calculus(2012) Section 4-7 (Pgs 291 – 301) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 562 - 581) 3 Days	Law of Cosines	Domain: G-SRT Similarity, Right Triangles, and Trigonometry Standard: Apply trigonometry to general triangles. 10. Prove the Laws of Sines and Cosines and use them to solve problems. 11. Understand and apply the Laws of Sines and the laws of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces)
	Review Unit 2 Trigonometry and Triangles 1 Day						
22 Days	Test Unit 2 Trigonometry and Triangles 1 Day						

Unit 3 Graphing Trigonometric Functions

Estimated time frame for unit	**Big Ideas**	**Essential Question**	**Concepts**	**Competencies**	**Lesson Plans and Suggested Resources**	**Vocabulary**	**Standards/Eligible Content**
23 Days	Numbers, measures, expressions, equations, and	In what ways might radians be more useful than degrees in various situations (or vice versa)?	Trigonometric Functions	Students should be able to convert from radian measure to degree measure.	**Angles and Radian Measure** Suggested	Radians Circular arc	Domain: F-TF Trigonometric Functions Standard: Extend the domain of

	inequalities can represent mathematical situations and structures in many equivalent forms.			Students should be able to convert from degree measure to radian measure. Students should be able to find the length of an arc given the measure of the central angle. Students should be able to find the area of a sector.	Resources: Advanced Mathematical Concepts Section 6-1 (Pgs.343--351) Sullivan- Precalculus Section 6-1 and 6-2 Pgs. 334 - 372 Glencoe Precalculus (2012) Section 4-2 (Pgs. 231 – 241) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 392 - 403) 2 Days	Central angle	trigonometric functions using the unit circle 1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. 2. Explain how the unit circle in the coordinate plane enables the extension of the trigonometric functions to all real numbers, interpreted as radian measure of angles traversed counterclockwise around the unit circle.
	Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.	In what ways might radians be more useful than degrees in various situations (or vice versa)?	Trigonometric Functions	Students should be able to find linear and Angular velocity.	**Linear and Angular Velocity** Suggested Resources: Advanced Mathematical Concepts Section 6-2 (Pgs.352-358) Sullivan- Precalculus Section 6-1 Pgs. 334-357 Glencoe Precalculus(2012) Section 4-2 (Pgs 231 – 241) Algebra and Trigonometry with	Angular Displacement Angular velocity Dimensional analysis Linear velocity	Domain: F-TF Trigonometric Functions Standard: Extend the domain of trigonometric functions using the unit circle 1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. 2. Explain how the unit circle in the coordinate plane enables the extension of the trigonometric functions to all real numbers, interpreted as radian measure of angles traversed counterclockwise around the unit circle.

					Analytic Geometry (Swokowski) (Pg 392 - 403) 3 Days		
	Unit 3 Graphing Trigonometric Functions. Quiz #1						
	Relations and functions are mathematical relationships that can be represented and analyzed using, words, tables, graphs, and equations.	What are the various methods in which a trig expression may be verified or that a trig equation may be solved?	Trigonometric Functions	Students should be able to graph transformations of the sine and cosine functions. Students should be able to use sinusoidal functions to solve problems.	**Graphing Sine and Cosine Functions** Suggested Resources: Advanced Mathematical Concepts Section 6-3,6-4, 6-5 (Pgs.359-386) Sullivan- Precalculus Section 6-4 and 6-6 Pgs. 386-400, 408-418 Glencoe- Precalculus 2011- Section 4-4 (Pgs 256 – 266) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 448 - 462) 5 days	Sinusoid Amplitude Frequency Phase shift Vertical shift Midline	Domain: F-TF Trigonometric Functions Standard: Model periodic phenomena with trigonometric functions. 5. Choose trigonometric functions to model periodic phenomena with specific amplitude, frequency, and midline.
	Unit 3 Graphing Trigonometric Functions. Quiz #2						
	Relations and functions are mathematical relationships that can be represented	What are the various methods in which a trig expression may be verified or that a trig equation may	Trigonometric Functions	Students should be able to graph tangent and cotangent functions. Students should be able	**Graphing Other Trigonometric-** Suggested Resources:	Damped trigonometric function Damping factor	Domain: F-TF Trigonometric Functions Standard: Model periodic phenomena with trigonometric

	and analyzed using, words, tables, graphs, and equations.	be solved?		to write equations of trigonometric functions.	Advanced Mathematical Concepts Section 6-7 (Pgs.395-403) Sullivan- Precalculus Section 6-5 and 6-6 Pgs. 401-418 Glencoe- Precalculus 2011 Section 4-5 (PC Pgs 269 – 279) Algebra and Trigonometry with Analytic Geometry (Swokowsk) (Pg 463 - 471) 3 Days	Damped oscillation Damped wave Damped harmonic motion	functions. 5. Choose trigonometric functions to model periodic phenomena with specific amplitude, frequency, and midline. 6. Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows it's inverse to be constructed.
	Relations and functions are mathematical relationships that can be represented and analyzed using, words, tables, graphs, and equations.	What are the various methods in which a trig expression may be verified or that a trig equation may be solved?	Trigonometric Functions	Students should be able to graph secant and cosecant functions. Students should be able to write equations of trigonometric functions.	**Graphing Other Trigonometric-** Suggested Resources: Advanced Mathematical Concepts Section 6-7 (Pgs.395-403) Sullivan- Precalculus Section 6-5 and 6-6 Pgs. 401-418 Glencoe- Precalculus 2011 Section 4-5 (PC Pgs 269 – 279) Algebra and Trigonometry with Analytic Geometry (Swokowsk)	Damped trigonometric function Damping factor Damped oscillation Damped wave Damped harmonic motion	Domain: F-TF Trigonometric Functions Standard: Model periodic phenomena with trigonometric functions. 5. Choose trigonometric functions to model periodic phenomena with specific amplitude, frequency, and midline. 6. Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows it's inverse to be constructed.

					i Pg 463 - 471) 2 Days		
	Unit 3 Graphing Trigonometric Functions. Quiz #3						
	Relations and functions are mathematical relationships that can be represented and analyzed using, words, tables, graphs, and equations.	What are the various methods in which a trig expression may be verified or that a trig equation may be solved?	Trigonometric Functions	Students should be able to model real-world data with sine and cosine functions. Students should be able to use sinusoidal functions to solve problems.	**Modeling Real World Data with Sinusoidal Functions** Suggested Resources: Advanced Mathematical Concepts Section 6-6 (Pgs.387-394) Sullivan- Precalculus Section 6-6 Pgs. 408-418 3 Days		Domain: F-TF Trigonometric Functions Standard: Model periodic phenomena with trigonometric functions. 5. Choose trigonometric functions to model periodic phenomena with specific amplitude, frequency, and midline. 6. Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows it's inverse to be constructed.
	Review Unit 3 Graphing Trigonometric Functions 1 Day						
23 Days	Test Unit 3 Graphing Trigonometric Functions 1 Day						

Unit 4 Trigonometric Identities

Estimated time frame for unit	**Big Ideas**	**Essential Question**	**Concepts**	**Competencies**	**Lesson Plans and Suggested Resources**	**Vocabulary**	**Standards/Eligible Content**
21 Days	Numbers, measures, expressions,	What are trigonometric identities and why are they useful?	Trigonometric Identities and Equations	Students should be able to use reciprocal identifies, quotient	**Trigonometric Identities -**	Identity Trigonometric	Domain: F-TF Trigonometric Functions

	equations, and inequalities can represent mathematical situations and structures in many equivalent forms.			identities, Pythagorean Identities, symmetry identities and opposite angle identities. Students should be able to identify and use basic trigonometric identities to find trigonometric values. Students should be able to use, simplify and rewrite trigonometric identities.	Suggested Resources: Advanced Mathematical Concepts Section 7-1 (Pgs.421-430) Sullivan- Precalculus Section 6-3 and 7-3 Pgs. 373-386, 446-453 Glencoe Precalculus - 2011 Chapter 5-Section 5-1 (Pgs 312 – 319) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 494 - 500) 3 Days	identity Reciprocal identity Quotient identity Pythagorean Identity Symmetry Identity Opposite Angle Identity Cofunction Odd-even identity	Standard: Prove and apply trigonometric identities. 8. Prove the Pythagorean Identity and use it to find sin(ɵ), cos(ɵ), or tan(ɵ), and the quadrant of the angle
	Families of functions exhibit properties and behaviors that can be recognized across representations Functions can be transformed, combined, and composed to create new functions in mathematical and real world situations.	What are trigonometric identities and why are they useful?	Trigonometric Identities and Equations	Students should be able to use the basic identities to verify other trigonometric Identities. Students should be able to determine whether equations are identities. Students should be able to find numerical values of trigonometric functions.	**Verifying Trigonometric Identities** Suggested Resources: Advanced Mathematical Concepts Section 7-1 (Pgs.431-436) Sullivan- Precalculus Section 7-3 Pgs. 446-453 Glencoe Precalculus - 2011 Section 5-2 (Pgs 320 – 326)	Verify an identity	Domain: F-TF Trigonometric Functions Standard: Prove and apply trigonometric identities. 8. Prove the Pythagorean Identity and use it to find sin(ɵ), cos(ɵ), or tan(ɵ), and the quadrant of the angle.

					Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 494 - 500) 4 Days		
	Unit 4 Trigonometric Identities Quiz #1						
	There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.	What are trigonometric identities and why are they useful?	Trigonometric Identities and Equations	Students should be able to use the sum and difference identities to evaluate trigonometric functions. Students should be able to use the sum and difference identities to solve trigonometric equations.	**Sum and Difference Identities –** Suggested Resources: Advanced Mathematical Concepts Section 7-3 (Pgs.437-447) Sullivan- Precalculus Section 7-4 Pgs. 453-463 Glencoe Precalculus - 2011 Section 5-4 (Pgs 336 – 343) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 515 - 525) 3 Day	Reduction identity	Domain: F-TF Trigonometric Functions Standard: Prove and apply trigonometric identities 9. Prove the addition and subtraction formulas for sine, cosine and tangent and use them to solve problems. Domain: A-REI Reasoning with equations and Inequalities Standard: Understand solving equations as a process of reasoning and explain the reasoning. 1. Explain each step in solving a simple equations as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
	There are some mathematical relationships that are always true and these relationships are used as the rules of	What are trigonometric identities and why are they useful?	Trigonometric Identities and Equations	Students should be able to use double-angle, power-reducing, and half-angle identities to evaluate trigonometric expressions and solve	**Multiple Angle(Double Angle and Half Angle) and Product-to-Sum Identities-**		Domain: F-TF Trigonometric Functions Standard: Prove and apply trigonometric identities 9. Prove the addition and

	arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.			trigonometric equations. Students should be able to use power-to-sum identities to evaluate trigonometric expressions and solve trigonometric equations.	Suggested Resources: Advanced Mathematical Concepts Section 7-4 (Pgs.437-447) Sullivan- Precalculus Section 7-5 Pgs. 463-472 Glencoe Precalculus 2011 Section 5-5 (Pgs 336 – 343) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 526 - 540) 3 Days		subtraction formulas for sine, cosine and tangent and use them to solve problems. Domain: A-REI Reasoning with equations and Inequalities Standard: Understand solving equations as a process of reasoning and explain the reasoning. 1. Explain each step in solving a simple equations as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
	Unit 4 Trigonometric Identities Quiz #2						
	There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.	What are the various methods in which a trig expression may be verified or that a trig equation may be solved?	Trigonometric Identities and Equations	Student should be able to solving trigonometric equations and inequalities using algebraic techniques. Students should be able to solve trigonometric equations and inequalities using basic techniques	**Solving Trigonometric Equations** Suggested Resources: Advanced Mathematical Concepts Section 7-5 (Pgs.456-461) Sullivan- Precalculus Section 7-7 and 7-8 Pgs. 475-489 Glencoe Precalculus - 2011 Section 5-3 (PC Pgs		Domain: A-REI Reasoning with equations and Inequalities Standard: Understand solving equations as a process of reasoning and explain the reasoning. 1. Explain each step in solving a simple equations as following from the equality of number asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. Domain: F-TF Trigonometric Functions

					327 – 333) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 500 - 514) 3 days		Standard: Model periodic phenomena with trigonometric functions. 7. Use inverse functions to solve trigonometric equations that arise in modeling contexts: evaluate the solution using technology and interpret them in terms of the context.
	Unit 4 Trigonometric Identities Quiz #3						
	Review Unit 4 Trigonometric Identities 1 Day						
24 Days	Test Unit 4 Trigonometric Identities 1 Day						

Unit 5 Composite and Inverse Functions

Estimated time frame for unit	**Big Ideas**	**Essential Question**	**Concepts**	**Competencies**	**Lesson Plans and Suggested Resources**	**Vocabulary**	**Standards/Eligible Content**
15 Days	Families of functions exhibit properties and behaviors that can be recognized across representations. Functions can be transformed, combined, and composed to create new functions in mathematical and real world situations.	How can students manipulate functions through transformations, operations, and compositions?	Composite and Inverse Functions	Students should be able to perform operations on functions. Students should be able to find compositions of functions. Students should iterate functions using real numbers.	**Function Operations and Composition of Function-** Suggested Resources: Advanced Mathematical Concepts Section 1-2 (Pgs.13-19) Sullivan- Precalculus Section 2-1 and 5-1	Composition	Domain: F-BF Building Functions Standard: Build a function that models a relationship between quantities 1. Write a function that describes a relationship between two quantities. b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a

					Pgs. 48-62,242-249 Glencoe- Precalculus 2011- Section 1- 6 (Pgs 57 – 64) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 224 - 234) 3 Days		cooling body by adding a constant function to a decaying exponential, and relate these functions to the model. c. Compose functions. For example, if T (y) is the temperature in the atmosphere as a function of height, and h (t) is the height of the weather balloon as a function of time, the T (h(t)) is the temperature at the location of the weather balloon as a function of time.
	Families of functions exhibit properties and behaviors that can be recognized across representations. Functions can be transformed, combined, and composed to create new functions in mathematical and real world situations.	How can students manipulate functions through transformations, operations, and compositions?	Composite and Inverse Functions	Students should be able to use the graphs of functions to determine if they are inverse functions. SWBA to find inverse functions algebraically andgraphically	Inverse Relations and Functions- Suggested Resources: Advanced Mathematical Concepts Section 3-4 (Pgs.152-158) Sullivan- Precalculus Section 5-2 Pgs. 249-263 Glencoe- Precalculus 2011- Section 1- 7 (PC Pgs 65 – 73) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 235 - 245) 4 Day	Inverse Relation Inverse function One-to-one Horizontal line test Inverse Process	Domain: F-BF Building Functions Standard: Build new functions from existing functions. 4. Find inverse functions. a. Solve an equation of the form f (x) = c for a simple function f that has an inverse and write an expression for the inverse. b. Verify by composition that one function is the inverse of another. c. Read values of an inverse function from a graph or a table given that the function has an inverse.
	Unit 5 Composite and Inverse Functions Quiz #1						

	Families of functions exhibit properties and behaviors that can be recognized across representations. Functions can be transformed, combined, and composed to create new functions in mathematical and real world situations.	What are the various methods in which a trig expression may be verified or that a trig equation may be solved?	Trigonometric Functions	to evaluate and graph inverse trigonometric functions. SWBA to find compositions of trigonometric functions.	**Inverse Trigonometric Functions –** Suggested Resources: Advanced Mathematical Concepts Section 6-8 (Pgs.405-412) Sullivan- Precalculus Section 7-1 and 7-2 Pgs. 428-445 Glencoe- Precalculus 2011- Section 4-6 (PC Pgs 280 – 290) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 541 – 557)- 4 Days	Arcsine function Arccosine function Arctangent function	Domain: F-TF Trigonometric Functions Standard: Model periodic phenomena with trigonometric functions. 5. Choose trigonometric functions to model periodic phenomena with specific amplitude, frequency, and midline. 6. Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows it's inverse to be constructed. Domain: F-BF Building Functions Standard: Build a function that models a relationship between quantities. c. Compose functions. For example, if T (y) is the temperature in the atmosphere as a function of height, and h (t) is the height of the weather balloon as a function of time, the (h(t)) is the temperature at the location of the weather balloon as a function of time.
	Unit 5 Composite and Inverse Functions Quiz #2						
	Review Unit 5 Composite and Inverse Functions 1 Day						
15 Days	Test Unit 5 Composite and Inverse Functions 1 Day						
Unit 6 Conic Sections							

Estimated time frame for unit	Big Ideas	Essential Question	Concepts	Competencies	Lesson Plans and Suggested Resources	Vocabulary	Standards/Eligible Content
19 Days	Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations.	What is a conic section and how does it relate to other areas of mathematics?	Conic Sections	Students should be able to analyze and graph equations of circles. SWBA to write equations of circles.	**Circles** Suggested Resources: Advanced Mathematical Concepts Section 10-2 (Pgs.623-630) Sullivan- Precalculus Section 1-4 Pgs. 35-41 Glencoe Precalculus - 2011 Section 7-2 (Pgs 432 – 441) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 816 - 830) 3 Days	Conic Section Circle Concentric Circle Degenerate Conic Center Radius	Domain: G-GPE Expressing Geometric Properties with Equations Standard: Translate between a geometric description and the equation for a conic section 1. Derive the equation of a circle of a given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. 3. 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.
	Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations.	What is a conic section and how does it relate to other areas of mathematics?	Conic Sections	Students should be able to analyze and graph equations of ellipses. SWBA to write equations of ellipses.	**Ellipses** Suggested Resources: Advanced Mathematical Concepts Section 10-3 (Pgs.631-641) Sullivan- Precalculus Section 10-3 Pgs. 634-644	Ellipse Foci Major axis Center Minor axis Vertices Co-vertices Eccentricity	Domain: G-GPE Expressing Geometric Properties with Equations Standard: Translate between a geometric description and the equation for a conic section 1. Derive the equation of a circle of a given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.

					Glencoe Precalculus - 2011 Section 7-2 (Pgs 432 – 441) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 816 - 830) 3 Days		3. 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.
	Unit 6 Conic Sections Quiz #1						
	Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations.	What is a conic section and how does it relate to other areas of mathematics? Why is it important to write equations of various shapes?	Conic Sections	Students should be able to analyze and graph equations of hyperbolas. Students should be able to use equations to identify the types of conic sections.	**Hyperbolas-** Suggested Resources: Advanced Mathematical Concepts Section 10-4 (Pgs.642-652) Sullivan- Precalculus Section 10.4 Pgs. 644-656 Glencoe Precalculus - 2011 Section 7-3 (PC Pgs 442 – 442) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 830 - 842) 3 Days	Hyperbola Transverse axis Conjugate axis	Domain: G-GPE Expressing Geometric Properties with Equations Standard: Translate between a geometric description and the equation for a conic section 3. 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.
	Relations and functions are mathematical relationships that can be represented and analyzed	What is a conic section and how does it relate to other areas of mathematics? Why is it important to	Conic Sections	Students should be able to analyze and graph equations of parabolas. Students should be able	**Parabolas –** Suggested Resources: Advanced	Conic sections Degenerate conic Locus	Domain: G-GPE Expressing Geometric Properties with Equations Standard: Translate between a geometric description and the

	using words, tables, graphs, and equations.	write equations of various shapes?		to write equations of parabolas.	Mathematical Concepts Section 10-5 (Pgs.653-661) Sullivan- Precalculus Section 10.2 Pgs. 656-664 Glencoe Precalculus - 2011 Section 7-1 (Pgs 422 – 431) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 806 - 816) 3 Days	Parabola Focus Directrix Axis of symmetry Vertex Latus rectum	equation for a conic section 2. Derive the equation of a parabola given a focus and directrix
	Unit 6 Conic Sections Quiz #2						
	Review Unit 6 Conic Sections 1 Day						
19 Days	Test Unit 6 Conic Sections 1 Day						

Unit 7 Exponential and Logarithmic Functions

Estimated time frame for unit	**Big Ideas**	**Essential Question**	**Concepts**	**Competencies**	**Lesson Plans and Suggested Resources**	**Vocabulary**	**Standards/Eligible Content**
13 Days	There are some mathematical relationships that are always true and these relationships	What are the advantages/disadvantages of the various methods to represent exponential functions (table, graph,	Exponential functions and Logarithmic functions and equations.	Students should be able to Represent exponential functions in multiple ways, including tables, graphs, equations, and	**Exponential Functions** Suggested Text-	Exponential Functions	2.1.A2.F-Understand the concepts of exponential and logarithmic forms and use the inverse relationships between exponential and logarithmic

	are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.	equation) and how do we choose the most appropriate representation?		contextual situations, and make connections among representations; relate the growth/decay rate of the associated exponential equation to each representation. Students should be able to evaluate, analyze and graph exponential functions.	Advanced Mathematical Concepts Section 11-2 (Pgs.704-712) Sullivan- Precalculus Section 5-3 Pgs. 263-277 Glencoe Precalculus - 2011 Section 3-1 (Pgs 158– 169) 3 Days	Power Functions Transcendental Functions Exponential inequality Natural base Continuous compound interest	expression to determine unknown quantities in equations. 2.8.A2.E-Use combinations of symbols and numbers to create expressions, equations, and inequalities in two or more variables, systems of equations and inequalities, and functional relationships that model problem situations. 2.8.A2.F-Interpret the results of solving equations, inequalities, systems of equations, and systems of inequalities in the context of the situation that motivated the model. A2.1.3.1-Write and/or solve non-linear equations using various methods. A2.1.3.1.3-Write and/or solve a simple exponential or logarithmic equation (including common and natural logarithms).
	There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.	What are the advantages/disadvantages of the various methods to represent exponential functions (table, graph, equation) and how do we choose the most appropriate representation?	Exponential functions and logarithmic functions and equations.	Students should be able to Represent exponential functions in multiple ways, including tables, graphs, equations, and contextual situations, and make connections among representations; relate the growth/decay rate of the associated exponential equation to each representation. Students should be able to sketch and analyze graphs of logarithmic functions.	**Logarithmic Functions** Suggested Text- Advanced Mathematical Concepts Section 11-4 (Pgs.718-725) Sullivan- Precalculus Section 5-4 Pgs.277-290 Glencoe Precalculus - 2011 Section 3-2 (Pgs 172– 180) 3 Days	Logarithm Logarithmic Function with base b Common Logarithm Natural Logarithm	2.1.A2.F-Understand the concepts of exponential and logarithmic forms and use the inverse relationships between exponential and logarithmic expression to determine unknown quantities in equations. 2.8.A2.E-Use combinations of symbols and numbers to create expressions, equations, and inequalities in two or more variables, systems of equations and inequalities, and functional relationships that model problem situations. 2.8.A2.F-Interpret the results of solving equations, inequalities, systems of equations, and systems of inequalities in the context of the situation that motivated the model. A2.1.3.1-Write and/or solve non-linear equations using various methods. A2.1.3.1.3-Write and/or solve a

							simple exponential or logarithmic equation (including common and natural logarithms).
	Unit 7 Exponential and Logarithmic Functions Quiz #1 (1 day)						
	There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.	What are the advantages/disadvantages of the various methods to represent exponential functions (table, graph, equation) and how do we choose the most appropriate representation?	Exponential functions and Logarithmic functions and equations.	Students should be able to Represent exponential functions in multiple ways, including tables, graphs, equations, and contextual situations, and make connections among representations; relate the growth/decay rate of the associated exponential equation to each representation. Students should be able to find exponential and logarithmic functions to model real world data.	**Applications of Exponential and Logarithmic Functions** **Suggested Text-** Advanced Mathematical Concepts Section 11-7 (Pgs.740-748) Sullivan- Precalculus Section 5-7 and 5-8 Pgs.305-326 Glencoe Precalculus - 2011 Section 3-1 to 3-4 (Pgs 158– 199) 3 Days		2.1.A2.F-Understand the concepts of exponential and logarithmic forms and use the inverse relationships between exponential and logarithmic expression to determine unknown quantities in equations. 2.8.A2.E-Use combinations of symbols and numbers to create expressions, equations, and inequalities in two or more variables, systems of equations and inequalities, and functional relationships that model problem situations. 2.8.A2.F-Interpret the results of solving equations, inequalities, systems of equations, and systems of inequalities in the context of the situation that motivated the model. A2.1.3.1-Write and/or solve non-linear equations using various methods. A2.1.3.1.3-Write and/or solve a simple exponential or logarithmic equation (including common and natural logarithms).
	Unit 7 Exponential and Logarithmic Functions Quiz #2						
	Review Unit 7 Exponential and Logarithmic Functions 1 Day						
13 Days	Test Unit 7 Exponential and Logarithmic Functions 1 Day						

Unit 8 Polynomial and Rational Functions

Estimated time frame for unit	Big Ideas	Essential Question	Concepts	Competencies	Lesson Plans and Suggested Resources	Vocabulary	Standards/Eligible Content
17 Days	Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations.	How can polynomial functions be used to model real life situations?	Power, Polynomial, and Rational Functions	Students should be able to determine roots of a polynomial equation. Students should be able to apply the Fundamental theorem of algebra. Students should be able to to graph polynomial functions. Students should be able to model real world data with polynomial functions.	**Polynomial Functions-** Suggested Resources: Advanced Mathematical Concepts Section 4-1 (Pgs.205-212) Sullivan- Precalculus Section 4-1 and 4-5 Pgs.164-184, 215-229 Glencoe- Precalculus 2011- Section 2-2 (PC Pgs 97 – 108) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 262 - 272) 4 Days	Polynomial function Polynomial function of degree n Leading coefficient Leading term test Quartic function Turning point Quadratic form Repeated zero Multiplicity	Domain: F-IF Interpreting Functions Standard: Analyze Functions using different representations 7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. c. Graph polynomial functions, identify zeros when suitable factorizations are available, and show end behavior. Modeling Standards: Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice and specific modeling standards appear throughout the high school standards.
	There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of	How can students find roots of a polynomial equation using different methods?	Power, Polynomial, and Rational Functions	Students should be able to divide polynomials using long divisions and synthetic division. Students should be able to use the Remainder and Factor Theorems to find polynomial factors.	**The Remainder and Factor Theorems-** Suggested Resources: Advanced Mathematical Concepts Section 4-3	Synthetic division Depressed polynomial Synthetic substitution	Domain: A-APR Arithmetic operations on polynomials Standard: Understand the relationship between zeros and factors of polynomials. 2. Know and apply the Remainder Theorem: For a polynomial p (x) and a number a, the remainder

	expressions and solving equations and inequalities.				(Pgs.222-228) Glencoe- Precalculus 2011- Section 2-3 (PC Pgs 109 – 117) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 273 - 280) 4 Days		on division by x- a is p(a), so p(a) =0 if and only if (x-a) is a factor of p(x).
	Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.	How can students find roots of a polynomial equation using different methods?	Power, Polynomial, and Rational Functions	Students should be able to find real zeros of polynomial functions. Students should be able to determine the number of positive and negative real roots a polynomial function has.. Students should be able to find complex zeros of polynomial functions	**Zeros of Polynomial Functions**- Suggested Resources: Advanced Mathematical Concepts Section 4-4 (Pgs.222-228) Glencoe- Precalculus 2011- Section 2-4 - PC Pgs (119 – 129) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg281 – 303) 3 Days	Rational Zero Theorem Lower bound Upper bound Descartes' Rule of Signs Fundamental Theorem of Algebra Linear Factorization Theorem Conjugate Root Theorem Complex conjugates Irreducible over the reals	Domain: A-APR Arithmetic operations on polynomials Standard: Understand the relationship between zeros and factors of polynomials. 3. Identify zeros of polynomials when suitable factorizations are available and use the zeros to construct a rough draft of the function defined by the polynomial. Domain: N-CN The Complex Number System Standard: Use complex numbers in Polynomial Identities and equations. 8. Extend polynomial identities to the complex numbers. (e.g.; x^2 + 4 = (x + 2i)(x – 2 9. Know the Fundamental Theorem of Algebra: show that it is true for quadratic polynomials
	Relations and functions are mathematical relationships that can be represented and analyzed using words, tables,	How do you sketch rational functions based upon knowledge that it is discovered?	Power, Polynomial, and Rational Functions	Students should be able t to analyze and graph rational functions. SWBA to solve rational equations and	**Rational Functions-** Suggested Resources: Advanced Mathematical	Rational function Asymptotes Vertical asymptotes	Domain: A-APR Arithmetic operations on polynomials Standard: Rewrite rational expressions 6. Rewrite simple rational

	graphs, and equations.			Inequalities.	Concepts Section 4-6 (Pgs.243-250) Glencoe- Precalculus 2011- Section 2-5 (Pgs 130 – 140) Sullivan- Precalculus Section 4-2 and 4-3 Pgs.184-209 Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg.303 - 321) 5 Days	Oblique asymptotes Holes	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 a 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. 7. Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication and division by a non-zero rational expression, and divide rational expressions. Domain: F-IF Interpreting Functions Standard: Analyze functions using different representations. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
	Review Unit 8 Polynomial and Rational Functions 1 Day						
17 Days	Test Unit 8 Polynomial and Rational Functions 1 Day						
Unit 9 Polar Coordinates							
Estimated time frame for unit	**Big Ideas**	**Essential Question**	**Concepts**	**Competencies**	**Lesson Plans and Suggested Resources**	**Vocabulary**	**Standards/Eligible Content**

14 Days	Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations.	What is a polar coordinate and how are they used in real life?	Polar Coordinate and Complex Numbers	Students should be able to graph points with polar coordinates. Students should be able to graph simple polar equations Students should be able to determine the distance between two points with polar coordinates.	**Polar Coordinates** - Suggested Resources: Advanced Mathematical Concepts Section 9-1 (Pgs.553-260) Sullivan- Precalculus Section 9-1 and 9-2 Pgs.550-574 Glencoe Precalculus - 2011 Section 9-1 (Pgs 534 – 540) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 857 - 872) 2 Days	Polar coordinate system Pole Polar axis Polar coordinates Polar equations Polar graph	Domain: N-CN Complex Number System Standard: Represent complex numbers and their operations on the complex plane. 4. 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.
	Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.	What is a polar coordinate and how are they used in real life? How can students convert between rectangle and polar coordinates?	Polar Coordinate and Complex Numbers	Students should be able tto convert between polar and rectangular coordinates. Students should be able convert between polar and rectangular equations.	**Polar and Rectangular Forms of Equations-** Suggested Resources: Advanced Mathematical Concepts Section 9-3 (Pgs.568-573) Glencoe Precalculus - 2011 Section 9-3 (Pgs 551 – 559) Algebra and Trigonometry with Analytic Geometry		Domain: N-CN Complex Number System Standard: Represent complex numbers and their operations on the complex plane. 4. 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.

					(Swokowski) (Pg 857 – 872) 2 Days		
	Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations.	What is a polar coordinate and how are they used in real life? How can students identify special polar graphs (circles, rose curve, limacon, lemniscates) from the graph and equation?	Polar Coordinate and Complex Numbers	Students should be able to graph polar equations. Students should be able to identify and graph classical curves.	**Graphs of Polar Coordinates -** Suggested Resources: Advanced Mathematical Concepts Section 9-2 (Pgs.568-573) Glencoe Precalculus - 2011 Section 9-2 (Pgs 542 – 550) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 857 – 872) 5 Days	Limacon Cardioid Rose Lemniscate Spiral of Archemedes	Domain: N-CN Complex Number System Standard: Represent complex numbers and their operations on the complex plane. 4. 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
	Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations.	What is a polar coordinate and how are they used in real life?	Polar Coordinate and Complex Numbers	Students should be able to write the polar form of a linear equation. Students should be able to graph the polar form of a linear equation.	**Polar Form of a Linear Equation.** Suggested Resources: Advanced Mathematical Concepts Section 9-4 (Pgs.574-579) 3 Days		Domain: N-CN Complex Number System Standard: Represent complex numbers and their operations on the complex plane. 4. 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

	Review Unit 9 Polar Coordinates 1 Day						
14 Days	Test Unit 9 Polar Coordinates 1 Day						
Unit 10 Complex Numbers							
Estimated time frame for unit	**Big Ideas**	**Essential Question**	**Concepts**	**Competencies**	**Lesson Plans and Suggested Resources**	**Vocabulary**	**Standards/Eligible Content**
14 Days	Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.	How can students convert between rectangle and polar coordinates?	Polar Coordinate and Complex Numbers	Student should be able to Add, subtract, multiply and divide complex numbers in rectangular form.	**Simplifying Complex Numbers** Suggested Resources: Advanced Mathematical Concepts Section 9-5 (Pgs.580-585) 1 Day	Rectangular Form Real Part Imaginary Part Imaginary Number Pure Imaginary Number	Domain: N-CN Complex Number System Standard: Represent complex numbers and their operations on the complex plane. 4. 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
	Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.	What is a polar coordinate and how are they used in real life? How can students convert between rectangle and polar coordinates?	Polar Coordinate and Complex Numbers	Students should be able to convert complex numbers from rectangular form to polar form and polar form to rectangular form.	**Complex plane and the Polar Form of Complex Numbers** Suggested Resources: Advanced Mathematical Concepts Section 9-6 (Pgs.580-585) Glencoe Precalculus - 2011	Complex plane Real axis Imaginary number Argand Plane Absolute value of a complex number Polar form Trigonometric form	Domain: N-CN Complex Number System Standard: Represent complex numbers and their operations on the complex plane. 4. 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.

					Section 9-5 (Pgs. 569-579) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 614 – 620) 2 Days	Modulus Argument Pth roots of unity	
	Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.	What is a polar coordinate and how are they used in real life? How can students convert between rectangle and polar coordinates?	Polar Coordinate and Complex Numbers	Students should be able to graph complex numbers in a complex plane,	Complex plane and the Polar Form of Complex Numbers Suggested Resources: Advanced Mathematical Concepts Section 9-6 (Pgs.580-585) Glencoe Precalculus - 2011 Section 9-5 (Pgs. 569-579) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 614 – 620) 2 Days	Complex plane Real axis Imaginary number Argand Plane Absolute value of a complex number Polar form Trigonometric form Modulus Argument Pth roots of unity	Domain: N-CN Complex Number System Standard: Represent complex numbers and their operations on the complex plane. 4. 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.
	Unit 10 Complex Numbers Quiz #1 1 day						
	Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many	What is a polar coordinate and how are they used in real life? How can students convert between rectangle and polar coordinates?	Polar Coordinate and Complex Numbers	Students should be able to find products and quotients of complex numbers in polar form.	**Products and Quotients of Complex Numbers in Polar Form** Suggested Resources: Advanced		Domain: N-CN Complex Number System Standard: Represent complex numbers and their operations on the complex plane. 4. Represent complex numbers on the complex plane in rectangular

	equivalent forms.				Mathematical Concepts Section 9-7 (Pgs.593-598) Glencoe Precalculus - 2011 Section 9-5 (Pgs. 569-579) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 614 – 620) 2 Days		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.
	Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.	What is a polar coordinate and how are they used in real life? How can students convert between rectangle and polar coordinates?	Polar Coordinate and Complex Numbers	SWBA to find powers, and roots of complex numbers in polar form.	**Powers and Roots of Complex Numbers** Suggested Resources: Advanced Mathematical Concepts Section 9-8 (Pgs.599-606) Glencoe Precalculus - 2011 Section 9-5 (Pgs. 569-579) Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 614 – 620) 3 Days	Escape Set Prisoner set Julia Set DeMoivre's Theorem	Domain: N-CN Complex Number System Standard: Represent complex numbers and their operations on the complex plane. 4. 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.

	Unit 10 Complex Numbers Quiz #2 1 Day
	Review Unit 10 Complex Numbers 1 Day
14 Days	Test Unit 10 Complex Numbers 1 Day