# **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

			T				
	to a unique member			integer, step, and	Advanced	Function	Standard: Analyze Functions
	of another set			absolute value functions.	Mathematical		using different representations
	(range), and the				Concepts		
	relationship is				Section 1-7		
	recognizable across				(Pgs.4 5-51)		7. Graph functions expressed
	•				(Pgs.4 5-51)		· · · · · · · · · · · · · · · · · · ·
	representations.						symbolically and show key
					Sullivan- Precalculus		features of the graph, by hand in
					Section 2-4		simple cases and using technology
					Pgs. 82-92		for more complicated cases.
					. 83. 62 32		Tot more complicated cases.
					Classes		- Cook Passas and a sadas ba
					Glencoe-		a. Graph linear and quadratic
					Precalulus (2012-)		equations and show intercepts,
					Section 1-5		maxima and minima.
					(PC Pgs 45 – 55)		
					(1.0.83.3.35)		c. Graph polynomial functions,
					Almahaman		
					Algebra and		identify zeros when suitable
					Trigonometry with		factorizations are available, and
					Analytic Geometry		show end behavior.
					(Swokowski )		
					Section 3-5		
					(Pg 193-208)		
					3 days		
	Families of	How can students	Functions	Students should be able	Parent Function and	Parent graph	Domain: F-BF Building
	functions exhibit	manipulate functions	Tanccions	to identify graphs, and	Transformation-	Turcite Brupii	Functions
		•		, , , ,	Transformation-		Fullctions
	properties and	through transformations,		parent functions.		Constant Function	
	behaviors that can	operations, and			Suggested		Standard: Build a new function
	be recognized	compositions?			Resources:	Zero Function	from and existing function
	across	·		Students should be able			ı
					Advanced	Identity Function	2 Identify the effect on the graph
	representations.			to identify and graph		Identity Function	3. Identify the effect on the graph
	Functions can be			transformations of	Mathematical		of replacing $f(x)$ by $f(x) + k$ , $k f(x)$ ,
	transformed,			parent	Concepts	Quadratic	f(kx), and $f(x + k)$ for specific
	combined, and			functions.	Section 3-2	Function	values of k given the graphs.
	composed to create				(Pgs.137145)		Experiment with cases and
	•				(. 83.13, 173)	Cubic Eurotion	
	new functions in					Cubic Function	illustrate an explanation of the
	mathematical and				Sullivan- Precalculus		effects on the graph using
	real world				Section 2-5	Square Root	technology. Include recognizing
ı			1		D 03 104	Function	even and odd functions from
	situations.				Pgs. 92-104	FULLULI	
	situations.				Pgs. 92-104	Function	
	situations.						their graphs and algebraic
	situations.				Glencoe-	Reciprocal	
	situations.				Glencoe- Precalculus(2012)		their graphs and algebraic
	situations.				Glencoe-	Reciprocal	their graphs and algebraic
	situations.				Glencoe- Precalculus(2012) Section 1- 5	Reciprocal	their graphs and algebraic
	situations.				Glencoe- Precalculus(2012)	Reciprocal Function Absolute Value	their graphs and algebraic
	situations.				Glencoe- Precalculus(2012) Section 1- 5 ( Pgs 45 – 55)	Reciprocal Function	their graphs and algebraic
	situations.				Glencoe- Precalculus(2012) Section 1- 5 ( Pgs 45 – 55)	Reciprocal Function Absolute Value Function	their graphs and algebraic
	situations.				Glencoe- Precalculus(2012) Section 1- 5 ( Pgs 45 – 55) Algebra and Trigonometry with	Reciprocal Function Absolute Value	their graphs and algebraic
	situations.				Glencoe- Precalculus(2012) Section 1- 5 ( Pgs 45 – 55)	Reciprocal Function Absolute Value Function	their graphs and algebraic
	situations.				Glencoe- Precalculus(2012) Section 1- 5 ( Pgs 45 – 55) Algebra and Trigonometry with	Reciprocal Function Absolute Value Function	their graphs and algebraic

Unit 2 Trigonometry and Triangles										
13 Days	Test Unit 1 Functions 1 Day									
	Review For Unit 1 Exam Functions 1 Day									
	Pg 192 – 208) 4 Days  Reflection Dilation									

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	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.	Degrees and Radians- Suggested Resources:	Vertex Initial side Terminal side	Domain: F-TF Trigonometric Functions  Standard: Extend the domain of trigonometric functions using the unit circle
	mathematical situations and structures in many equivalent forms.			Students should be able to convert degrees, minutes and seconds to decimal degrees.  Students should be able	Advanced Mathematical Concepts Section 5-1 (Pgs.277283)	Standard Position  Degree  Minute	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
				to find the number of degrees in a given number of rotations.	Glencoe- Pre-calculus(2012) Section 4-2 ( Pgs 231 – 241)	Seconds  Quadrantal Angle	Explain how the unit circle in the coordinate plane enables the extension of the trigonometric functions to all real numbers,
				Students should be able to identify angles that are coterminal with a given angle.	Algebra and Trigonometry with Analytic Geometry (Swokowski)	Coterminal Angle	interpreted as radian measure of angles traversed counterclockwise around the unit circle.
				Students should be able to use angle measures to solve real-world problems.	Pg 392 - 403)  2 Days		

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.277283)  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 π-x, π + x, 2 π-x, 2 π + x in terms of their values for x, where x is
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	any real number.  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		
				2 days		
	Unit	2 Trigonometr	y and Triangles Quiz	2 #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.299312)  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 π-x, π + x, 2 π-x, 2 π + x in terms of their values for x, where x is any real number.
	Unit 2	Trigonometry a	and Triangles Quiz #	2 (1 day)		
There are some mathematical relationships that are always true and these relationships are used as the	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.	The Law of Sines  Suggested Resources:  Advanced	Law of Sines	Domain: G-SRT Similarity, Right Triangles, and Trigonometry Standard: Apply trigonometry to general triangles.
rules of arithmetic and algebra and are			Students should be able	Mathematical Concepts		10. Prove the Laws of Sines and Cosines and use them to solve

useful for writing			to find the area of a	Section 5-6		problems.
equivalent forms of			triangle if the measure of	(Pgs.313318)		
expressions and			two sides and an	,		11. Understand and apply the
solving equations			included angle are given.	Sullivan- Precalculus		Laws of Sines and the laws of
and inequalities.			meladed dright dre givern	Section 8-2 and 8-4		Cosines to find unknown
and mequanties.						
				Pgs. 508-519, 525-		measurements in right and non-
				531		right triangles (e.g., surveying
						problems, resultant forces)
				Glencoe		
				Pre-calculus(2012)		
				Section 4-7		
				( Pgs 291 – 301)		
				Algebra and		
				Trigonometry with		
				Analytic Geometry		
				(Swokowski)		
				'		
				( Pg 562 - 581)		
				3 Days		
There are some	How does one know when	Trigonometric	Objectives: SWBA to	Ambiguaous Case	Ambiguous case	Domain: G-SRT Similarity, Right
mathematical	to use the Law of Sines	Functions	solve oblique triangles	for the Law of Sines	0	Triangles, and Trigonometry
relationships that	versus the Law of		using the Law of Sines			Thanges, and Theorem ,
are always true and	Cosines?		daning the Edw of Silves	Suggested		Standard: Apply trigonometry to
these relationships	Cosines:		or the Law of Cosines.	Resources:		general triangles.
•			of the law of cosines.	Resources.		general triangles.
are used as the						40 5 11 1 661 1
rules of arithmetic				Advanced		10. Prove the Laws of Sines and
and algebra and are			SWBA to find areas of	Mathematical		Cosines and use them to solve
useful for writing			oblique triangles.	Concepts		problems.
equivalent forms of				Section 5-7		
expressions and				(Pgs.320326)		11. Understand and apply the
solving equations						Laws of Sines and the laws of
and inequalities.				Sullivan- Precalculus		Cosines to find unknown
				Section 8-2		measurements in right and non-
				Pgs. 508-519		right triangles (e.g., surveying
				. 63. 300 313		problems, resultant forces)
				Glencoe		problems, resultant forces
				Pre-calculus(2012)		
				Section 4-7		
				( Pgs 291 – 301)		
				Algebra and		
				_		
				Trigonometry with		
				Analytic Geometry		
				(Swokowski )(Pg		
				562 - 581)		
				2 days		
				3 days		

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	to convert from radian measure to degree measure.	Angles and Radian Measure Suggested	Circular arc	Domain: F-TF Trigonometric Functions Standard: Extend the domain of		
Estimated time frame for unit	Big Ideas	Essential Question	Concepts	Competencies  Students should be able	Lesson Plans and Suggested Resources	<b>Vocabulary</b> Radians	Standards/Eligible Content		
Unit 3 Graphing Trigonometric Functions									
22 Days		Te	st Unit 2 Trigor	nometry and Triangle	s 1 Day				
		R	eview Unit 2 Tr	rigonometry and Tria	ngles 1 Day				
	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.			Students should be able to find the area of triangles if the measure of the three sides is given.	Advanced Mathematical Concepts Section 5-8 (Pgs.327332)  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		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 nonright triangles (e.g., surveying problems, resultant forces)		
	There are some mathematical relationships that are always true and	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.	The Law of Cosines – Suggested Resources:	Law of Cosines	Domain: G-SRT Similarity, Right Triangles, and Trigonometry Standard: Apply trigonometry to		

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.343351)  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)	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.	2 Days  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.

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?	aphing Trigonon  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	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.
				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		
	Unit 3 Gra	aphing Trigonor	metric Functions. Qu	iz #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	be solved?		to write equations of			functions.
	using, words, tables,	SC 30/VCu:		trigonometric functions.	Advanced	Damped	Turicusis.
	graphs, and			a. po. loillettie talletiolis.	Mathematical	oscillation	5. Choose trigonometric
	equations.				Concepts		functions to model periodic
	equations				Section 6-7	Damped wave	phenomena with specific
					(Pgs.395-403)	Damped wave	amplitude,
					(1 83.333 103)	Damped harmonic	frequency, and midline.
					Sullivan- Precalculus	motion	in equency, and infamile.
					Section 6-5 and 6-6	Inotion	6. Understand that restricting a
					Pgs. 401-418		trigonometric function to a
					1 65. 101 110		domain on which it is always
					Glencoe- Precalculus		increasing or always decreasing
					2011		allows it's inverse to be
					Section 4-5		constructed.
					(PC Pgs 269 – 279)		constructed.
					(1.0163203 2/3)		
					Algebra and		
					Trigonometry with		
					Analytic Geometry		
					(Swokowsk)		
					(Pg 463 - 471)		
					(1 g 403 - 471)		
					3 Days		
					J Days		
	Relations and	What are the various	Trigonometric	Students should be able	Graphing Other	Damped	Domain: F-TF Trigonometric
	functions are	methods in which a trig	Functions	to graph secant and	Trigonometric-	trigonometric	Functions
	mathematical	expression may be		cosecant functions.	• • • • • • • • • • • • • • • • • • • •	function	
	relationships that	verified or			Suggested		Standard: Model periodic
	can be represented	that a trig equation may		Students should be able	Resources:	Damping factor	phenomena with trigonometric
	and analyzed	be solved?		to write equations of			functions.
	using, words, tables,			trigonometric functions.	Advanced	Damped	
	graphs, and				Mathematical	oscillation	5. Choose trigonometric
	equations.				Concepts		functions to model periodic
	ed- varantar				Section 6-7	Damped wave	phenomena with specific
					(Pgs.395-403)		amplitude,
					, ,	Damped harmonic	frequency, and midline.
					Sullivan- Precalculus	motion	
					Section 6-5 and 6-6		6. Understand that restricting a
					Pgs. 401-418		trigonometric function to a
1							domain on which it is always
					Glencoe- Precalculus		increasing or always decreasing
					Glencoe- Precalculus 2011		increasing or always decreasing allows it's inverse to be
							, ,
					2011 Section 4-5		allows it's inverse to be
					2011		allows it's inverse to be
					2011 Section 4-5		allows it's inverse to be
					2011 Section 4-5 (PC Pgs 269 – 279) Algebra and		allows it's inverse to be
					2011 Section 4-5 (PC Pgs 269 – 279)		allows it's inverse to be

					i Pg 463 - 471)		
					2 Days		
	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		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
		Revie	w Unit 3 Graph	ing Trigonometric Fu	Section 6-6 Pgs. 408-418 3 Days		trigonometric function to a domain on which it is always increasing or always decreasing allows it's inverse to be constructed.
23 Days		Test	Unit 3 Graphin	g Trigonometric Func	tions 1 Day		
		U	Init 4 Trigor	nometric Identiti	es		
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(θ), cos(θ), or tan(θ), 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(θ), cos(θ), or tan(θ), and the quadrant of the angle.

		T.		I	1	
				Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 494 - 500) 4 Days		
	ι	Init 4 Trigonom	etric Identities Quiz	#1		
There are some mathematical relationships that	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	Sum and Difference Identities –	Reduction identity	Domain: F-TF Trigonometric Functions
are always true and these relationships are used	·		evaluate trigonometric functions.	Suggested Resources:		Standard: Prove and apply trigonometric identities
as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions			Students should be able to use the sum and difference identities to solve trigonometric equations.	Advanced Mathematical Concepts Section 7-3 (Pgs.437-447)		9. Prove the addition and subtraction formulas for sine, cosine and tangent and use them to solve problems.  Domain: A-REI Reasoning with
and solving equations and inequalities.				Sullivan- Precalculus Section 7-4 Pgs. 453-463 Glencoe Precalculus - 2011		equations and Inequalities  Standard: Understand solving equations as a process of reasoning and explain the reasoning.
				Section 5-4 (Pgs 336 – 343)  Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 515 - 525)  3 Day		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	What are trigonometric identities and why are they useful?	Trigonometric Identities and Equations	Students should be able to use double-angle, power-reducing, and	Multiple Angle(Double Angle and Half Angle) and		Domain: F-TF Trigonometric Functions
are always true and these relationships are used			half- angle identities to evaluate trigonometric	Product-to-Sum Identities-		Standard: Prove and apply trigonometric identities
as the rules of			expressions and solve			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)	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.
				( Pg 526 - 540) 3 Days	
I		Unit 4 Trigono	metric Identities Qu	<u> </u>	
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 Composi	te and Inverse F	unctions						
Estimated time frame for unit	Big Ideas	Essential Question	Concepts	Competencies	Lesson Plans and Suggested	Vocabulary	Standards/Eligible Content				
15 Days					Resources Function Operations						

	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	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 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	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.  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	What are the various	Trigonometric	to evaluate and graph	Inverse	Arcsine function	Domain: F-TF Trigonometric			
	functions exhibit	methods in which a trig	Functions	inverse trigonometric	Trigonometric		Functions			
	properties and	expression may be		functions.	Functions –	Arccosine function				
	behaviors that can	verified or					Standard: Model periodic			
	be recognized	that a trig equation may			Suggested	Arctangent	phenomena with trigonometric			
	across	be solved?		SWBA to find	Resources:	function	functions.			
	representations.			compositions of						
	Functions can be			trigonometric functions.	Advanced		5. Choose trigonometric functions			
	transformed,				Mathematical		to model periodic phenomena			
	combined, and				Concepts		with specific amplitude,			
	composed to create				Section 6-8		frequency, and midline.			
	new functions				(Pgs.405-412)		irequeriey, and midme.			
	in mathematical and				(Fg3.403-412)		6. Understand that restricting a			
	real world				Sullivan- Precalculus		trigonometric function to a			
					Section 7-1 and 7-2		•			
	situations.						domain on which it is always			
					Pgs. 428-445		increasing or always decreasing			
					1		allows it's inverse to be			
					Glencoe- Precalculus		constructed.			
					2011-					
					Section 4-6 (PC Pgs		Domain: F-BF Building Functions			
					280 – 290)					
							Standard: Build a function that			
					Algebra and		models a relationship between			
					Trigonometry with		quantities.			
					Analytic Geometry					
					(Swokowski)		c. Compose functions. For			
					( Pg 541 - 557)-		example, if T (y) is the			
							temperature in the atmosphere			
					4 Days		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.			
							or time.			
		Ui	nit 5 Composite	and Inverse Functio	ns Quiz #2					
			11.01.5							
		Kevie	w Unit 5 Comp	osite and Inverse Fur	ictions 1 Day					
15 Days										
	Test Unit 5 Composite and Inverse Functions 1 Day									
					,					
			Unit 6 Co	onic 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 Co	onic Sections Quiz #3	L		
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	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 parabolas.	Parabolas – Suggested Resources:	Conic sections  Degenerate conic  Locus	Domain: G-GPE Expressing Geometric Properties with Equations Standard: Translate between a
and analyzed	Why is it important to		Students should be able	Advanced		geometric description and the

	using words, tables,	write equations of various		to write equations of	Mathematical	Parabola	equation for a conic section
	graphs, and	shapes?		parabolas.	Concepts		
	equations.				Section 10-5	Focus	2. Derive the equation of a
	'				(Pgs.653-661)		parabola given a focus and
					, ,	Directrix	directrix
					Sullivan- Precalculus		
					Section 10.2	Axis of symmetry	
					Pgs. 656-664		
						Vertex	
					Glencoe Precalculus -		
					2011	Latus rectum	
					Section 7-1		
					(Pgs 422 – 431)		
					Algebra and		
					Trigonometry with		
					Analytic Geometry		
					(Swokowski)		
					( Pg 806 - 816)		
					3 Days		
					3 Days		
			Unit 6	Conic Sections Quiz	#2		
			Review Ur	nit 6 Conic Sections 1	L Day		
19 Days			Test Unit	6 Conic Sections 1	. Day		
		Unit	7 Exponent	ial and Logarithr	nic Functions		
Estimated	Rig Idoas	Essential Question	Concents	Compotoncies	Lesson Plans	Vocabulary	Standards/Elizible
	Big Ideas	Essential Question	Concepts	Competencies		Vocabulary	Standards/Eligible
time frame					and Suggested		Content
for unit					Resources		
13 Days	There are some	What are the	Exponential	Students should be able	Exponential	Exponential	2.1.A2.F-Understand the concepts
13 Days	mathematical	advantages/disadvantages	functions and	to Represent exponential	Functions	Functions	of exponential and logarithmic
	relationships that	of the various methods to	Logarithmic	functions in multiple			forms and use the inverse
	are always true and	represent exponential	functions and	ways, including tables,	Suggested Text-		relationships between
	these relationships	functions (table, graph,	equations.	graphs, equations, and		1	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 nonlinear 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	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 nonlinear 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 Expon	ential and Loga	arithmic Functions Qu	uiz # <b>1 (</b> 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 nonlinear equations using various methods.  A2.1.3.1.3-Write and/or solve a simple exponential or logarithmic equation (including common and natural logarithms).				
		Uı	nit 7 Exponentia	al and Logarithmic Fu	nctions Quiz #2					
	Review Unit 7 Exponential and Logarithmic Functions 1 Day									
13 Days		Test	Unit 7 Exponer	ntial and Logarithmic F	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		

 -				Г.	1	· · · · · · · · · · · · · · · · · · ·
expressions				(Pgs.222-228)		on division by x- a is p(a), so p(a)
and solving				Glencoe- Precalculus		=0 if and only if (x-a) is a factor of
equations and				2011-		p(x).
inequalities.				Section 2-3 (PC Pgs		
				109 – 117)		
				Algebra and		
				Trigonometry with		
				Analytic Geometry		
				(Swokowski)		
				(Pg 273 - 280)		
				4 Days		
Numbers,	How can students find	Power,	Students should be able	Zeros of Polynomial	Rational Zero	Domain: A-APR Arithmetic
measures,	roots of a polynomial	Polynomial, and	to find real zeros of	Functions-	Theorem	operations on polynomials
expressions,	equation using different	Rational	polynomial functions.			
equations, and	methods?	Functions		Suggested	Lower bound	Standard: Understand the
inequalities can			Students should be able	Resources:		relationship between zeros and
represent			to determine the		Upper bound	factors of polynomials.
mathematical			number of positive and	Advanced		
situations and			negative real roots a	Mathematical	Descartes' Rule of	3. Identify zeros of polynomials
structures in many			polynomial function has	Concepts	Signs	when suitable factorizations are
equivalent forms.				Section 4-4		available and use the zeros to
·			Students should be able	(Pgs.222-228)	Fundamental	construct a rough draft of the
			to find complex zeros of	,	Theorem of	function defined by the
			polynomial functions	Glencoe- Precalculus	Algebra	polynomial.
			, , , , , , , , , , , , , , , , , , , ,	2011-	9	
				Section 2-4 - PC Pgs	Linear	Domain: N-CN The Complex
				(119 – 129)	Factorization	Number System
				, , ,	Theorem	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
				Algebra and		
				Trigonometry with	Conjugate Root	Standard: Use complex numbers
				Analytic Geometry	Theorem	in Polynomial Identities and
				(Swokowski)		equations.
				( Pg281 – 303)	Complex	
				( . 6202 000)	conjugates	8. Extend polynomial identities to
				3 Days	- Jongagates	the complex numbers. (e.g.; x^2 +
				,-	Irreducible over	4 = (x + 2i)(x - 2)
					the reals	. (* //* -
						9. Know the Fundamental
						Theorem of Algebra: show that it
						is true for quadratic polynomials
Relations and	How do you sketch	Power,	Students should be able t	Rational Functions-	Rational function	Domain: A-APR Arithmetic
functions are	rational functions based	Polynomial, and	to analyze and graph			operations on polynomials
mathematical	upon knowledge that it is	Rational	rational functions.	Suggested	Asymptotes	operations on polynomials
relationships that	discovered?	Functions	rational functions.	Resources:	7.57mptotes	Standard: Rewrite rational
can be represented	alacovereu;	i diletions		nesources.	Vertical	expressions
and analyzed using			SWBA to solve rational	Advanced	asymptotes	CAPTESSIONS
words, tables,			equations and	Mathematical	asymptotes	6. Rewrite simple rational
worus, tables,			equations and	iviatifettiatical	l	o. Newrite simple fational

	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 expressions, 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.
		Revie	w Unit 8 Polync	omial and Rational Fu	nctions 1 Day		
17 Days		Test	Unit 8 Polynom	nial and Rational Fund	ctions 1 Day		
			Unit 9 I	Polar Coordinate	es		
Estimated time frame for unit	Big Ideas	Essential Question	Concepts	Competencies	Lesson Plans and Suggested Resources	Vocabulary	Standards/Eligible Content

14 Days	Relations and	What is a polar coordinate	Polar Coordinate	Students should be able	Polar Coordinates -	Polar coordinate	Domain: N-CN Complex Number
14 Days	functions are	and how are they used in	and Complex	to graph points with	Suggested	system	System
	mathematical	real life?	Numbers	polar coordinates.	Resources:		
	relationships that					Pole	Standard: Represent complex
	can be represented			Students should be able	Advanced		numbers and their operations on
	and analyzed			to graph simple polar	Mathematical	Polar axis	the complex plane.
	using words, tables,			equations	Concepts		
	graphs, and				Section 9-1	Polar coordinates	4. Represent complex numbers on
	equations.			Students should be able	(Pgs.553-260)		the complex plane in rectangular
				to determine the		Polar equations	and polar form (including real and
				distance between two	Sullivan- Precalculus	Dalamanah	imaginary numbers) and explain
				points with polar	Section 9-1 and 9-2	Polar graph	why the rectangular and polar
				coordinates.	Pgs.550-574		forms of a given complex number
					Glencoe Precalculus -		represent the same number.
					2011		
					Section 9-1		
					( Pgs 534 – 540)		
					(183331 310)		
					Algebra and		
					Trigonometry with		
					Analytic Geometry		
					(Swokowski)		
					( Pg 857 - 872)		
					2 Days		
	Numbers,	What is a polar coordinate	Polar Coordinate	Students should be able	Polar and		Domain: N-CN Complex Number
	measures,	and how are they used in	and Complex	tto convert between	Rectangular Forms		System
	expressions,	real life?	Numbers	polar and rectangular	of Equations-		
	equations, and			coordinates.			Standard: Represent complex
	inequalities can	How					numbers and their operations on
	represent	can students convert		Students should be able	Suggested		the complex plane.
	mathematical	between rectangle and		convert between polar	Resources:		
	situations and	polar coordinates?		and rectangular			4. Represent complex numbers on
	structures in many			equations.	Advanced		the complex plane in rectangular
	equivalent forms.				Mathematical		and polar form (including real and
					Concepts		imaginary numbers) and explain
					Section 9-3		why the rectangular and polar
					(Pgs.568-573)		forms of a given complex number
					Glencoe Precalculus -		represent the same number.
					2011		
					Section 9-3		
					( Pgs 551 – 559)		
					, ,		
					Algebra and		
					Trigonometry with		
					Analytic Geometry		

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.	(Swokowski) ( Pg 857 – 872) 2 Days  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	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)	Modulus	
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,	(Pgs. 569-579)  Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 614 – 620)  2 Days  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)	Modulus Argument Pth roots of unity  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.
				2 Days		
	U	Init 10 Complex	Numbers Quiz #1			
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)		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 mar equivalent forms	·	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