Honors Algebra II

Diocese of Greensburg Curriculum

Unit	Standards	Content	Skills

Functions, Equations, Sequences & Their Graphs	**CCSS: Mathematics**
	CCSS: HS: Algebra
	Creating Equations
	HSA-CED.A. Create equations that describe numbers or relationships.
	HSA-CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
	Reasoning with Equations & Inequalities
	HSA-REI.B. Solve equations and inequalities in one variable.
	HSA-REI.B.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
	CCSS: HS: Functions
	Interpreting Functions
	HSF-IF.A. Understand the concept of a function and use function notation.
	HSF-IF.A.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
	HSF-IF.A.2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
		• Linear Functions
		  ○ Point-Slope Formula
		  ○ Slope-Intercept Formula
		  ○ Standard Form
		• Parallel and Perpendicular Lines
		• Domain and Range
		• Solving and Graphing Inequalities
		• Absolute Value Functions and Inequalities
		• Arithmetic and Geometric Sequences
		• Define a function
			The students will be able to:
			Knowledge
			• Define a function
			Application
			• Solve absolute value equations
			• Graph absolute value functions
			• Review point-slope, slope-intercept, and standard form of a line
			• Review absolute value functions and inequalities
			Synthesis
			• Create graphs and equations that meet given requirements
			Evaluation
			• Compare and contrast graphs

Unit	Standards	Content	Skills
	HSF-IF.A.3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. **HSF-IF.C. Analyze functions using different representations.** HSF-IF.C.7b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. **Building Functions** **HSF-BF.A. Build a function that models a relationship between two quantities.** HSF-BF.A.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. **HSF-BF.B. Build new functions from existing functions.** HSF-BF.B.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 (both positive and negative); find the value 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. **CCSS: HS: Geometry** **Expressing Geometric Properties with Equations** **HSG-GPE.B. Use coordinates to prove simple geometric theorems algebraically** HSG-GPE.B.5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). **NCTM: Mathematics**		

Unit	Standards	Content	Skills
	NCTM: Grades 9 - 12 **Number & Operations** **Compute fluently and make reasonable estimates** judge the reasonableness of numerical computations and their results. **Algebra** **Understand patterns, relations, and functions** generalize patterns using explicitly defined and recursively defined functions; understand relations and functions and select, convert flexibly among, and use various representations for them; analyze functions of one variable by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior; **Represent and analyze mathematical situations and structures using algebraic symbols** understand the meaning of equivalent forms of expressions, equations, inequalities, and relations; write equivalent forms of equations, inequalities, and systems of equations and solve them with fluency-mentally or with paper and pencil in simple cases and using technology in all cases; use symbolic algebra to represent and explain mathematical relationships; **Analyze change in various contexts** approximate and interpret rates of change from graphical and numerical data. **Data Analysis & Probability** **Select and use appropriate statistical methods to analyze data** recognize how linear transformations of univariate data affect shape, center, and spread;		

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Linear Systems	**CCSS: Mathematics**
	CCSS: HS: Algebra
	Reasoning with Equations & Inequalities
	HSA-REI.C. Solve systems of equations.
	HSA-REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
	HSA-REI.D. Represent and solve equations and inequalities graphically.
	HSA-REI.D.12. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
	NCTM: Mathematics
	NCTM: Grades 9 - 12
	Algebra
	Represent and analyze mathematical situations and structures using algebraic symbols
	write equivalent forms of equations, inequalities, and systems of equations and solve them with fluency-mentally or with paper and pencil in simple cases and using technology in all cases;
	
		• Methods to Solve Systems of Equations
		  ○ Elimination
		  ○ Substitution
		• Graph Systems of Linear Inequalities
		• Solve Systems of Linear Inequalities
		• Solve 3-Variable Systems of Equations using Elimination and Substitution
			The students will be able to:
			Comprehension
			• Understand systems of equations
			• Convert word problems into a system of equations
			Application
			• Graph systems of linear inequalities
			• Solve systems of linear inequalities
			Analysis
			• Identify which strategy to use on problems involving systems of equations

Matrices	**CCSS: Mathematics** **CCSS: HS: Num/Quantity** **Vector & Matrix Quantities**	• Matrix Operations • Apply Matrices to Vectors • Determinant	**The students will be able to:** **Knowledge**

Unit	Standards	Content	Skills
	HSN-VM.A. Represent and model with vector quantities. HSN-VM.A.1. (+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, |v|, ||v||, v). HSN-VM.A.2. (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. **HSN-VM.B. Perform operations on vectors.** HSN-VM.B.5. (+) Multiply a vector by a scalar. **HSN-VM.C. Perform operations on matrices and use matrices in applications.** HSN-VM.C.7. (+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled. HSN-VM.C.8. (+) Add, subtract, and multiply matrices of appropriate dimensions. HSN-VM.C.9. (+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties. HSN-VM.C.10. (+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse. **CCSS: HS: Algebra** **Reasoning with Equations & Inequalities** **HSA-REI.C. Solve systems of equations.** HSA-REI.C.8. (+) Represent a system of linear equations as a single matrix equation in a vector variable.	• Solving Systems of Equations • Inverse Matrix	• Construct matrices. **Comprehension** • Add Subtract and Multiply Matrices • Multiply a matrix by a scalar. • Calculate the determinant of a matrix. • Calculate the inverse of a matrix. **Application** • Use Inverses to solve systems of equations. • Use Echelon Form to solve systems of equations.

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	HSA-REI.C.9. (+) Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater). **NCTM: Mathematics** **NCTM: Grades 9 - 12** **Number & Operations** **Understand numbers, ways of representing numbers, relationships among numbers, and number systems** understand vectors and matrices as systems that have some of the properties of the real-number system; **Understand meanings of operations and how they relate to one another** develop an understanding of properties of, and representations for, the addition and multiplication of vectors and matrices; **Compute fluently and make reasonable estimates** develop fluency in operations with real numbers, vectors, and matrices, using mental computation or paper-and-pencil calculations for simple cases and technology for more-complicated cases. 		

Quadratic Functions and Equations	CCSS: Mathematics
	CCSS: HS: Num/Quantity
	The Complex Number System
	HSN-CN.C. Use complex numbers in polynomial identities and equations.
	HSN-CN.C.7. Solve quadratic equations with real coefficients that have complex solutions.
	CCSS: HS: Algebra
	Arithmetic with Polynomials & Rational Functions
	HSA-APR.C. Use polynomial identities to solve problems.
		• Factoring
		  ○ Laws of Exponents
		  ○ Add, subtract, multiply polynomials
		  ○ Factoring GCF
		  ○ Factoring when a is not 1
		  ○ Inverse FOIL
		  ○ Perfect Square Trinomial
		  ○ Difference of Two Squares
			The students will be able to:
			
			Knowledge
			
			• Know standard, vertex, and intercept form of a quadratic function
			
			Comprehension

Unit	Standards	Content	Skills
	HSA-APR.C.5. (+) Know and apply the Binomial Theorem for the expansion of (x + y)n in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle. Reasoning with Equations & Inequalities HSA-REI.B. Solve equations and inequalities in one variable. HSA-REI.B.4. Solve quadratic equations in one variable. HSA-REI.B.4a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. HSA-REI.B.4b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b. CCSS: HS: Functions Interpreting Functions HSF-IF.C. Analyze functions using different representations. HSF-IF.C.7a. Graph linear and quadratic functions and show intercepts, maxima, and minima. HSF-IF.C.8a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. Building Functions HSF-BF.B. Build new functions from existing functions. HSF-BF.B.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 (both positive and negative); find the value 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. NCTM: Mathematics NCTM: Grades 9 - 12 Number & Operations	○ Grouping ○ Sum and Difference of Cubes • • Quadratic Formula • Graphing in Standard, Vertex, and Intercept Form • Complete the Square • Inequalities • Systems of Inequalities	• Understand the difference when a=1 and a is not 1 in ax^2+bx+c **Application** • Factor using trial and error, completing the square, and the quadratic formula **Analysis** • Factor recognizing a perfect square trinomial, difference of two squares • Factor using sum/difference of cubes and grouping **Synthesis** • Create the quadratic formula by completing the square • Find patterns in the functions for transformations

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	Understand numbers, ways of representing numbers, relationships among numbers, and number systems compare and contrast the properties of numbers and number systems, including the rational and real numbers, and understand complex numbers as solutions to quadratic equations that do not have real solutions; Algebra Understand patterns, relations, and functions understand and perform transformations such as arithmetically combining, composing, and inverting commonly used functions, using technology to perform such operations on more-complicated symbolic expressions understand and compare the properties of classes of functions, including exponential, polynomial, rational, logarithmic, and periodic functions; interpret representations of functions of two variables 		
Polynomials and Polynomial Functions	CCSS: Mathematics CCSS: HS: Num/Quantity The Complex Number System HSN-CN.C. Use complex numbers in polynomial identities and equations. HSN-CN.C.8. (+) Extend polynomial identities to the complex numbers. For example, rewrite $x^2 + 4$ as $(x + 2i)(x – 2i)$. HSN-CN.C.9. (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials. CCSS: HS: Algebra Arithmetic with Polynomials & Rational Functions HSA-APR.B. Understand the relationship between zeros and factors of polynomials. HSA-APR.B.2. Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x). HSA-APR.B.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros	• Polynomial Inequalities • Graphing • End Behavior • Maximum and Minimum Points • Zeros • Fundamental Theorem of Algebra	**The students will be able to:** **Knowledge** • State the Fundamental Theorem of Algebra **Comprehension** • Calculate the Zeros of a Polynomial. • Solve Polynomial Inequalities **Application** • Use The Fundamental Theorem of Algebra to

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	to construct a rough graph of the function defined by the polynomial. CCSS: HS: Functions Interpreting Functions HSF-IF.C. Analyze functions using different representations. HSF-IF.C.7c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Building Functions HSF-BF.B. Build new functions from existing functions. HSF-BF.B.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 (both positive and negative); find the value 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. NCTM: Mathematics NCTM: Grades 9 - 12 Algebra Understand patterns, relations, and functions understand and compare the properties of classes of functions, including exponential, polynomial, rational, logarithmic, and periodic functions; 		determine the roots of a polynomial. **Analysis** • Determine the end behavior of a polynomial function • Determine the maximum and minimum values of a polynomial. • Graph polynomial functions. • Graph polynomial inequalities.
Mid Term Exam			
Radical Functions and Rational Exponents	CCSS: Mathematics CCSS: HS: Num/Quantity The Real Number System HSN-RN.A. Extend the properties of exponents to rational exponents. HSN-RN.A.1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values,	• nth Roots • Properties of Exponents • Properties of Radicals • Simplify Radicals • Graph Square and Cube Roots • Rational Numbers • Higher Order Radicals	**The students will be able to:** **Knowledge** • Know properties of exponents and radicals

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	allowing for a notation for radicals in terms of rational exponents. Show details HSN-RN.A.2. Rewrite expressions involving radicals and rational exponents using the properties of exponents. The Complex Number System HSN-CN.A. Perform arithmetic operations with complex numbers. HSN-CN.A.1. Know there is a complex number i such that $i^2 = –1$, and every complex number has the form a + bi with a and b real. HSN-CN.A.2. Use the relation $i^2 = –1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. HSN-CN.A.3. (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers. HSN-CN.C. Use complex numbers in polynomial identities and equations. HSN-CN.C.7. Solve quadratic equations with real coefficients that have complex solutions. CCSS: HS: Algebra Reasoning with Equations & Inequalities HSA-REI.A. Understand solving equations as a process of reasoning and explain the reasoning. HSA-REI.A.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. CCSS: HS: Functions Interpreting Functions HSF-IF.C. Analyze functions using different representations. HSF-IF.C.7b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. Building Functions HSF-BF.A. Build a function that models a relationship between two quantities. HSF-BF.A.1c. (+) Compose functions. Show details HSF-BF.B. Build new functions from existing functions. HSF-BF.B.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	• Algebraic Equations with Radicals • Complex Numbers and Operations	**Comprehension** • Simplify radicals **Application** • Simplify radical expressions • Solve radical equations • Simplify expressions involving complex numbers **Analysis** • Transform graphs of square and cube roots

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	specific values of k (both positive and negative); find the value 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. NCTM: Mathematics NCTM: Grades 9 - 12 Number & Operations Understand numbers, ways of representing numbers, relationships among numbers, and number systems compare and contrast the properties of numbers and number systems, including the rational and real numbers, and understand complex numbers as solutions to quadratic equations that do not have real solutions; Algebra Understand patterns, relations, and functions understand and compare the properties of classes of functions, including exponential, polynomial, rational, logarithmic, and periodic functions; 		
Exponential and Logarithmic Functions	CCSS: Mathematics CCSS: HS: Algebra Seeing Structure in Expressions HSA-SSE.B. Write expressions in equivalent forms to solve problems. HSA-SSE.B.3c. Use the properties of exponents to transform expressions for exponential functions. Show details Reasoning with Equations & Inequalities HSA-REI.D. Represent and solve equations and inequalities graphically. HSA-REI.D.11. Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include	• Exponential Expressions • Logarithmic Expressions • Properties of Logarithmic Expressions • Solving Exponential and Logarithmic Equations • Graph Exponential and Logarithmic Equations	**Students will be able to:** **Knowledge** • Know how logarithms and exponentials are related • Know properties of logarithmic and exponential expressions **Comprehension** • Convert logarithmic expressions to exponential

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	cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. CCSS: HS: Functions Interpreting Functions HSF-IF.C. Analyze functions using different representations. HSF-IF.C.7e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. Linear, Quadratic, and Exponential Models HSF-LE.A. Construct and compare linear and exponential models and solve problems. HSF-LE.A.1a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. HSF-LE.A.3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. NCTM: Mathematics NCTM: Grades 9 - 12 Algebra Understand patterns, relations, and functions understand and compare the properties of classes of functions, including exponential, polynomial, rational, logarithmic, and periodic functions; 		expressions and vice versa • Combine logarithms via the laws of logarithms • Graph exponential and logarithmic equations **Application** • Solve exponential and logarithmic expressions
Probability and Statistics	CCSS: Mathematics CCSS: HS: Stats/Prob Making Inferences & Justifying Conclusions HSS-IC.B. Make inferences and justify conclusions from sample surveys, experiments and observational studies HSS-IC.B.3. Recognize the purposes of and differences among sample surveys, experiments and observational studies; explain how randomization relates to each.	• Fundamental counting principle • Permutations • Combinations • Experimental probability • Theoretical probability • Independent/dependent events • Probability of multiple events • Frequency table	**The students will be able to:** **Knowledge** • Explain the differences between permutations and combinations. • Know the Fundamental counting principle.

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	Conditional Probability & the Rules of Probability HSS-CP.B. Use the rules of probability to compute probabilities of compound events in a uniform probability model HSS-CP.B.9. (+) Use permutations and combinations to compute probabilities of compound events and solve problems. NCTM: Mathematics NCTM: Grades 9 - 12 Number & Operations Understand meanings of operations and how they relate to one another develop an understanding of permutations and combinations as counting techniques. Data Analysis & Probability Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them compute basic statistics and understand the distinction between a statistic and a parameter. Select and use appropriate statistical methods to analyze data for univariate measurement data, be able to display the distribution, describe its shape, and select and calculate summary statistics; Develop and evaluate inferences and predictions that are based on data use simulations to explore the variability of sample statistics from a known population and to construct sampling distributions; understand how sample statistics reflect the values of population parameters and use sampling distributions as the basis for informal inference; 	• Conditional probability • Analyzing data • Measures of central tendencies • Standard deviation • Variance • Binomial distribution • Normal Distributions	• Know the difference between experimental and theoretical probability, **Comprehension** • List data in charts or graphs • Construct a frequency table. • Calculate the measures of central tendency • Calculate the standard deviation **Application** • Calculate the Probability of events occurring. • Determine the binomial and normal distributions **Analysis** • Design charts to show the probability of events. • Analyze the meaning of the standard deviation and the variance. • Look at charts, graphs, and lists of data and make inferences on what will happen. **Synthesis**

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			• Construct experiments to find probability
Rational Functions	**CCSS: Mathematics** **CCSS: HS: Algebra** **Arithmetic with Polynomials & Rational Functions** **HSA-APR.A. Perform arithmetic operations on polynomials.** HSA-APR.A.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **HSA-APR.B. Understand the relationship between zeros and factors of polynomials.** HSA-APR.B.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. **HSA-APR.D. Rewrite rational expressions.** HSA-APR.D.6. Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system. **Creating Equations** **HSA-CED.A. Create equations that describe numbers or relationships.** HSA-CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.	• Rational Algebraic Expressions • Sums and Differences of Rational Functions • Products and Quotients of Rational Functions • Graphing Rational Functions • Solve Rational Equations	**The students will be able to:** **Knowledge** • Simplify rational expressions. **Comprehension** • Add and Subtract Rational Functions • Multiply and Divide Rational Functions **Application** • Solve Rational Equations. • Find the Asymptotes of rational functions **Analysis** • Graph Rational Equations

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	CCSS: HS: Functions **Interpreting Functions** **HSF-IF.C. Analyze functions using different representations.** HSF-IF.C.7d. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. **Building Functions** **HSF-BF.B. Build new functions from existing functions.** HSF-BF.B.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 (both positive and negative); find the value 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. **NCTM: Mathematics** **NCTM: Grades 9 - 12** **Algebra** **Understand patterns, relations, and functions** understand and compare the properties of classes of functions, including exponential, polynomial, rational, logarithmic, and periodic functions; 		
Quadratic Relations and Conic Sections	**CCSS: Mathematics** **CCSS: HS: Algebra** **Seeing Structure in Expressions** **HSA-SSE.B. Write expressions in equivalent forms to solve problems.**	• Circles with Center and Radius • Parabolas with Directrix and Focus • Ellipses with Foci, Major and Minor Axes, and Translations	**Knowledge** • Identify a parabola, circle, ellipse and hyperbola **Comprehension**

Unit	Standards	Content	Skills
	HSA-SSE.B.3a. Factor a quadratic expression to reveal the zeros of the function it defines. HSA-SSE.B.3b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. **Reasoning with Equations & Inequalities** **HSA-REI.C. Solve systems of equations.** HSA-REI.C.7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = –3x$ and the circle $x^2 + y^2 = 3$. **CCSS: HS: Geometry** **Expressing Geometric Properties with Equations** **HSG-GPE.A. Translate between the geometric description and the equation for a conic section** HSG-GPE.A.1. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. HSG-GPE.A.2. Derive the equation of a parabola given a focus and directrix. HSG-GPE.A.3. (+) Derive the equations of ellipses and hyperbolas given two foci for the ellipse, and two directrices of a hyperbola. 	• Hyperbolas with Foci, Graphing Box, and Asymptotes	• Find the directrix and focus of a Parabola. • Find the center and radius of a Circle. • Find the foci, translation, major axis and minor axis of an Ellipse • Find the foci, graphing box and asymptotes of a Hyperbola **Application** • Create an equation of a Parabola • Create an equation of a Circle • Create the equation of an Ellipse • Create the equation of a Hyperbola
Introduction to Trigonometry	**CCSS: Mathematics** **CCSS: HS: Geometry** **Similarity, Right Triangles, & Trigonometry** **HSG-SRT.C. Define trigonometric ratios and solve problems involving right triangles**	• Ratios of Trig Functions • Right Triangle Problems • Properties of Special Right Triangles • Radian Measure	**The students will be able to:** **Comprehension**

Unit	Standards	Content	Skills
	HSG-SRT.C.6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. HSG-SRT.C.7. Explain and use the relationship between the sine and cosine of complementary angles. HSG-SRT.C.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. **NCTM: Mathematics** **NCTM: Grades 9 - 12** **Geometry** **Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships** use trigonometric relationships to determine lengths and angle measures. 		• Understand the relation between degrees and radians **Application** • Apply ratio of trig functions to discover a missing side of a right triangle • Find missing sides of special right triangles
Final Exam			