KUTZTOWN AREA SCHOOL DISTRICT

Maximize potential, embrace change, create the future

Kutztown Area School District Curriculum (Unit Map)

Algebra III/Trigonometry

Written by Jesse Whitehouse & Sallie Sandler

Course Description: This advanced offering includes a study of functions and graphs, polynomial functions, exponential and logarithmic functions, and rational functions, as well as advanced algebraic processes. The course will also provide a solid foundation in the concepts, processes, and applications of basic and analytic trigonometry. Technology, especially scientific and/or graphing calculators, will be used throughout the course.

Table of Contents

Unit #	***Title***
1	*Functions and Linear Functions*
2	*Solving Equations and Functions*
3	*Polynomial Functions*
4	*Exponential, Logarithmic, and Rational Functions*
5	*Trigonometry*
6	*Additional Applications of Trigonometry*

Unit #/Title	1/Functions & Linear Functions	Time Frame	3-4 weeks

Standards

Standards of Mathematical Practices

- Make sense of problems and persevere in solving them.
- Model with mathematics.
- Use appropriate tools strategically.

CC.2.1.HS.F.3 Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.
CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi–step problems.
CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.
CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.
CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.
CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.
CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.
CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.
CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context.
CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.
CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities.
CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.

Big Ideas

- Linear functions and their multiple representations can model average rates of change.
- Function properties allow us to communicate and anticipate function behavior.

Essential Questions

- How are equations, functions, and their graphs related?
- How can functions be used to represent physical situations?

Content

- Functions
- Function notation
- Domain
- Range
- Vertical Line Test
- Slope
- Point-slope form
- Slope-intercept form
- General form
- Standard form
- Intercept form
- Vertical and horizontal lines
- Parallel and perpendicular lines
- Applications of linear functions
- Scatter plots
- Correlation
- Best fit line
- Linear regression
- Maximum

Skills

- Evaluate functions
- Function evaluation using technology
- Identify domain algebraically and graphically
- Identify range graphically
- Interpret graphs of functions using the vertical line test
- Calculate slope
- Write linear equations in point-slope form
- Write linear equations in general form
- Write linear equations in standard form
- Write linear equations in intercept form
- Write equations of vertical, horizontal, parallel, and perpendicular lines use linear equations to solve applications
- Use linear equations to solve applications
- Create scatter plots from data
- Identify correlation
- Identify and calculate line of best fit for linear data
- Use technology to find best-fit line via linear regression
- Identify maxima and minima

• Minimum • Increasing • Decreasing • Constant • Piecewise functions • Even and odd functions • Graph interpretation • Linear applications	• Determine where a graph is increasing, decreasing, and/or constant • Identify maxima and minima using technology • Interpret a piecewise-defined function • Graph piecewise-defined functions • Evaluate piecewise-defined functions • Determine whether a function is even, odd, or neither numerically, algebraically, and graphically • Recognize when a plot is reasonable (hidden behavior) • Solve application problems using linear functions

Unit #/Title	2/Solving Equations & Functions	Time Frame	3-4 weeks

Standards

Standards of Mathematical Practices

- Make sense of problems and persevere in solving them.
- Look for and make use of structure.
- Attend to precision.
- Look for and express regularity in repeated reasoning.

CC.2.1.HS.F.3 Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.
CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi–step problems.
CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.
CC.2.1.HS.F.7 Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems.
CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.
CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.
CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.
CC.2.2.HS.D.5 Use polynomial identities to solve problems.
CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.
CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.
CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.
CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.
CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context.
CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.
CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities.
CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverses of functions.
CC.2.2.HS.C.5 Construct and compare linear, quadratic, and exponential models to solve problems.
CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.
CC.2.4.HS.B.2 Summarize, represent, and interpret data on two categorical and quantitative variables.

Big Ideas	Essential Questions
• Mathematical manipulation of functions allows us to learn more about the function and its properties.	• How are the graphs of functions and their algebraic solutions related? • How can transformations be used to understand the graphs of functions? • How and why are mathematical operations performed on functions?

Content	Skills
• Solving by roots • Solving by intersections • Standard form of a quadratic • Solving by extracting square roots • Solving by completing the square • Solving by quadratic formula • Solving by factoring • Discriminant • Projectile motion applications • Solving absolute value equations and inequalities	• Find solutions (roots) to equations using technology • Find solutions (intersections) to equations using technology • Solve quadratic equations by extracting square roots • Solve quadratic equations by completing the square • Solve quadratic equations by quadratic formula • Solve quadratic equations by factoring • Identify the nature of the roots by using the discriminant • Solve quadratic applications involving projectile motion

• Solving radical equations and inequalities • Function operations • Function composition • Applications of function composition • Function decomposition • Domain and range of composed functions • Translations • Reflections • Vertical and horizontal stretch and shrink • Inverse relations • Inverse functions • Graphs of inverses • One-to-one • Horizontal line test • Domain and range relationships	• Solve absolute value equations and inequalities algebraically and graphically • Solve radical equations and inequalities algebraically and graphically • Identify extraneous roots (solutions) • Write solutions to inequalities in interval notation • Perform operations on functions • Compose functions • Determine the domain of a function resulting from operations and/or function composition • Decompose a function • Solve application problems involving function composition algebraically and graphically • Identify translations algebraically and graphically • Identify reflections algebraically and graphically • Identify vertical/horizontal stretch and shrink algebraically and graphically • Determine function-specific appropriate application of transformations • Graph functions based on transformation knowledge • Graph a relation and its inverse • Graph a function and its inverse • Confirm inverses both algebraically and graphically • Determine if a function is one-to-one both algebraically and graphically • Find a function's inverse • Identify the domain and range of a function and its inverse

Unit #/Title	3/Polynomial Functions	Time Frame	8-10 weeks

Standards

Standards of Mathematical Practices

- Look for and make use of structure.
- Attend to precision.
- Look for and express regularity in repeated reasoning.

CC.2.1.HS.F.3 Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.
CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi–step problems.
CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.
CC.2.1.HS.F.7 Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems.
CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.
CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.
CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.
CC.2.2.HS.D.5 Use polynomial identities to solve problems.
CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.
CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.
CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.
CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.
CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.
CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities.
CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.
CC.2.3.HS.A.10 Translate between the geometric description and the equation for a conic section.

Big Ideas	Essential Questions
• Algebraic methods can be used to determine polynomial function behavior. • The Conic Sections are represented by second-degree equations in two variables.	• How can polynomial functions be graphed without technology? • How can transformations be used to understand quadratic functions and their properties? • What role do complex numbers play in polynomials and their graphs? • What is a double-napped cone, and how are the Conic Sections derived from it?
Content	**Skills**
• Polynomial functions • Quadratics and parabolas • Applications of quadratics • Line of symmetry • Vertex • Quadratic regression • Double-napped cone • Conic section	• Identify the degree and leading coefficient of a polynomial function • Use transformations to graph quadratic functions • Use transformations to identify the vertex of a quadratic function • Model quadratic data using quadratic regression • Recognize conic sections as intersections of a plane with a double-napped cone

• Degenerate conic section • Parabola • Focus • Focal Length • Focal Width • Directrix • Ellipse • Major Axis • Minor Axis • Semimajor Axis • Semiminor Axis • Eccentricity • Hyperbola • Transverse Axis • Conjugate Axis • Semitransverse Axis • Semiconjugate Axis • Physical Properties of Conic Sections • Transformations of Conic Sections • Higher degree polynomial functions • Maxima and minima • End behavior • Limit notation • Roots of polynomial functions • Applications of polynomial functions • Polynomial long division • Factor theorem • Remainder theorem • Synthetic division • Linear factorization • Polynomial regression • Descartes' Rule of Signs • Upper bounds • Rational root theorem • Applications of polynomial functions • Complex numbers • Standard form of complex numbers • Complex number operations • Complex conjugates • Complex roots • Fundamental theorem of algebra • Linear factorization theorem • Multiplicity and graph behavior • Complex conjugate roots • Applications of polynomial functions • Polynomial inequalities	• Identify the focus and directrix of a parabola • Write the standard form equation of a parabola • Calculate the focal length and width of a parabola • Draw graphs of parabolas • Identify the vertices and foci of an ellipse • Write the standard form equation of an ellipse • Identify the length of the major axis, minor axis, semimajor axis, and semiminor axis of an ellipse • Apply translations to the equation of an ellipse • Calculate eccentricity of an ellipse • Draw graphs of ellipses • Identify the vertices and foci of a hyperbola. • Write the standard form equation of a hyperbola • Draw graphs of hyperbolas • Apply translations to the equation of a hyperbola • Calculate the eccentricity of a hyperbola • Identify end behavior of polynomial functions • Identify local extremum of polynomial functions • Find zeros of polynomial functions with a graphing calculator • Write and draw polynomial functions with given zeros • Solve application problems involving polynomial functions • Divide polynomials using long division • Use synthetic division to identify roots of polynomial functions • Use synthetic division to identify remainders of polynomial functions • Use the Factor Theorem and Remainder Theorem to identify linear factors of polynomial functions • Use the Rational Root Theorem to identify potential factors of polynomials • Use Descartes Rule of Signs to identify potential combinations of roots of polynomials • Use the Upper Bound test to identify potential factors of polynomials • Linear factorization of polynomials • Perform operations on complex numbers • Use the complex conjugate to rationalize complex numbers • Find complex roots of polynomial functions • Use the powers of i to simplify complex expressions • Use the Fundamental Theorem of Algebra to identify all linear factors of polynomial functions • Use the Linear Factorization Theorem to write polynomial functions • Write a polynomial function given the roots of the function • Use complex conjugates to write Linear Factorizations

Unit #/Title	4/Exponential, Logarithmic, & Rational Functions	Time Frame	5-6 weeks

Standards

Standards of Mathematical Practices

- Construct viable arguments and critique the reasoning of others.
- Use appropriate tools strategically.
- Model with mathematics.

CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents.
CC.2.1.HS.F.3 Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.
CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi–step problems.
CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.
CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.
CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.
CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.
CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.
CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.
CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.
CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.
CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities.
CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverses of functions.
CC.2.2.HS.C.5 Construct and compare linear, quadratic, and exponential models to solve problems.
CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.
CC.2.4.HS.B.2 Summarize, represent, and interpret data on two categorical and quantitative variables.

Big Ideas	Essential Questions
• Exponential functions can model percentage change. • Logarithms enable us to work with a wide range of numbers using a similar scale. • Rational functions can be used to model inverse variation and its application.	• What is an exponential function, how does it compare to a power function, how do I graph one and what properties does an exponential function have? • In which situations are exponential functions applicable? • What is a logarithmic function, how does it compare to an exponential function, how do I graph one and what properties does a logarithmic function have? • How can exponential and logarithmic equations be solved algebraically? • What is a rational function?
Content	**Skills**
• Exponential functions vs. power functions • Graphs of exponential functions • Comparing exponential functions • End behavior of exponential functions • Exponential growth/decay applications • Exponential regression • Logistic growth function • Logarithmic functions	• Compare graphs of exponential functions • Recognize exponential growth/decay numerically, algebraically, and graphically • Understand the graphs of exponential functions • Use transformations to graph exponential functions • Understand the end behavior of exponential functions • Solve application problems involving exponential growth and decay using graphing calculator technology

• Logarithms of various bases • Natural logarithm, common logarithm • The number e • Graphs of logarithmic functions • Transformations of exponential & logarithmic functions • Applications of logarithmic functions • End behavior of exponential functions vs. power functions • Logarithmic regression • Change of base formula • Properties of Logarithms • Solving exponential & logarithmic equations • Applications of exponential & logarithmic functions • Compounding interest • Continuous compounding • Annual Percentage Yield • Annuities: present value, future value • Applications supported by technology • Asymptotes: horizontal and vertical	• Identify the domain and range of exponential functions • Use logarithmic functions to represent inverse exponential functions • Solve equations involving logarithmic and exponential functions (natural logarithm and common logarithm) • Use transformations to graph logarithmic functions • Identify the domain and range of logarithmic functions • Use properties of logarithms to solve equations • Use properties of logarithms and exponential functions to solve application problems • Use the change of base formula for logarithms to evaluate using technology • Use the logistic growth model to solve application problems • Use exponential functions to derive formulas for compounding interest • Use exponential functions to derive formulas for compounding continuous interest • Calculate and compare Annual Percentage Yield • Calculate present value, future value, or time of an ordinary annuity • Solve financial application problems using technology and/or TVM solver • Graph rational functions with horizontal and slant asymptotes • Solve rational equations and inequalities

Unit #/Title	5/Trigonometry	Time Frame	6-7 weeks

Standards

Standards of Mathematical Practices

- Look for and make use of structure.
- Model with mathematics.
- Attend to precision.

CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
CC.2.1.HS.F.3 Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.
CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.
CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.
CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.
CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.
CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.
CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.
CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.
CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context.
CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.
CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities.
CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverses of functions.
CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.
CC.2.2.HS.C.7 Apply radian measure of an angle and the unit circle to analyze the trigonometric functions.
CC.2.2.HS.C.8 Choose trigonometric functions to model periodic phenomena and describe the properties of the graphs.
CC.2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.
CC.2.3.HS.A.7 Apply trigonometric ratios to solve problems involving right triangles.

Big Ideas

- Angles can be represented as rotations positively or negatively.
- The six trigonometric functions can be used in triangle measurement and can be represented graphically, in particular, harmonic motion can be represented using sinusoidal functions.

Essential Questions

- How do we represent and measure rotational angles?
- What's a radian?
- What are trigonometric functions, how are they graphed, and how are they used?
- What is the Unit Circle and how is it used?
- What are inverse operations for trigonometric functions?

Content

- Rotational angles
- Coterminal angles
- Fluency in radian measure
- Angles measured in degrees, minutes, seconds
- Angles measured in radians
- Degree-radian conversion
- Angular velocity
- Linear velocity
- Arc length
- Trigonometric functions and right triangles
- Solving right triangles
- Pythagorean and Quotient Identities
- Applications of right triangle trigonometry

Skills

- Draw and calculate rotational angles
- Draw and calculate positive and negative coterminal angles
- Calculate complements and supplements of angles
- Convert between degrees, minutes, seconds and decimal degrees
- Convert between degree and radian measure
- Calculate arc length, angular velocity, and linear velocity
- Solve applications involving angular velocity, linear velocity, and arc length
- Calculate the six trigonometric ratios for a given right triangle

• Extending trigonometric functions beyond QuadrantI • Reference angles • Quadrantal angles • Unit circle • Periodicity and amplitude of trigonometric functions • Graphs of sinusoidal functions • Domain and range of sinusoidal functions • Unwrapping the unit circle • Solving equations involving sinusoidal functions • Transformations of sinusoidal functions • Harmonic wave applications • Graph rational and reciprocal trigonometric functions • Vertical asymptotes • Properties of rational and reciprocal trigonometric functions • Inverse trigonometric functions • Domain and range of inverse trigonometric functions • Graphs of inverse trigonometric functions • Composition of trigonometric functions and their inverses • Applications of trigonometric functions • Angle of elevation/depression • Simple harmonic motion	• Use the rules of 45-45-90 and 30-60-90 triangles to calculate the six trigonometric ratios • Evaluate trigonometric functions on a calculator • Derive the quotient and Pythagorean Identities for Trigonometry • Solve right triangles using trigonometry • Solve application problems involving right triangles • Use angles of elevation and depression to solve right triangle trigonometry applications • Extend trigonometric function into quadrants 2, 3, & 4 • Evaluate trigonometric ratios of any rotational angle • Identify the sign of each trigonometric function in each quadrant • Use reference angles to evaluate trigonometric ratios • Graph sinusoidal functions • Use the periodicity of sinusoidal functions to evaluate trigonometric ratios • Identify the domain and range of sinusoidal functions • Identify the properties of sinusoidal functions • Describe the behavior of sinusoidal functions • Graph transformations of sinusoidal functions • Use sinusoidal functions to solve application problems • Graph rational and reciprocal trigonometric functions • Graph transformations of rational and reciprocal trigonometric functions • Identify the properties of rational and reciprocal trigonometric functions • Use graphing calculator technology to solve trigonometric equations • Identify the domain and range of inverse trigonometric functions • Evaluate inverse trigonometric functions • Graph inverse trigonometric functions • Evaluate composition of trigonometric functions and their inverses

Unit #/Title	6/Additional Applications of Trigonometry	Time Frame	1-2 weeks

Standards

Standards of Mathematical Practices

- Make sense of problems and persevere in solving them.
- Use appropriate tools strategically.
- Attend to precision.

CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
CC.2.1.HS.F.3 Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.
CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.
CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.
CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.
CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.
CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.
CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.
CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.
CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context.
CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.
CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities.
CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverses of functions.
CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.
CC.2.2.HS.C.7 Apply radian measure of an angle and the unit circle to analyze the trigonometric functions.
CC.2.2.HS.C.8 Choose trigonometric functions to model periodic phenomena and describe the properties of the graphs.
CC.2.3.HS.A.7 Apply trigonometric ratios to solve problems involving right triangles.

Big Ideas	Essential Questions
• Trigonometry can also be used to solve and calculate areas of oblique triangles.	• How can trigonometry be used to solve oblique triangles? • How do you know when a triangle cannot exist? • How can trigonometry be used to calculate area of triangles?
Content	**Skills**
• Law of Sines • Applications involving Law of Sines • Law of Cosines • Applications involving Law of Cosines	• Apply algebraic techniques to solve equations involving trigonometric functions • Solve triangles using Law of Sines • Recognize when a triangle cannot exist based on given information • Solve applications using Law of Sines • Solve triangles using Law of Cosines • Recognize when a triangle cannot exist based on given information • Solve applications using Law of Cosines • Calculate area of a triangle using sine function • Calculate semiperimeter of a triangle • Calculate area of a triangle using Heron's Formula

Unit #/Title	7/Analytic Trigonometry	Time Frame	2-3 weeks

Standards

Standards of Mathematical Practices

- Make viable arguments and critique the reasoning of others.
- Look for and make use of structure.
- Reason abstractly and quantitatively.

CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.
CC.2.2.HS.D.5 Use polynomial identities to solve problems.
CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.
CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.
CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.
CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.
CC.2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.

Big Ideas	Essential Questions
• Algebraic methods can be applied to solve equations of trigonometric functions. • Trigonometric identities can be used to write equations in terms of trigonometric function factors.	• Why prove a trigonometric identity? • What methods can be used prove trigonometric identities? • Do trigonometric equations have solutions? • How can trigonometric equations be solved? • How can algebraic methods be used to solve trigonometric equations?
Content	**Skills**
• Fundamental trigonometric identities • Confirm trigonometric identities • Factoring trigonometric expressions • Solving trigonometric equations • Applications involving trigonometric equations • Solve trigonometric equations for specific and general solutions	• Use fundamental identities to confirm identities • Solve trigonometric equations using algebraic methods • Solve trigonometric equations involving multiple angles • Solve trigonometric equations by graphing • Solve applications involving trigonometry by graphing • Solve applications involving trigonometry by algebraic methods