Verona Public School District
Curriculum Overview

Trigonometry

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Verona Public Schools
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Verona Public Schools Mission Statement:

The mission of the Verona Public Schools, the center of an engaged and supportive community, is to empower students to achieve their potential as active learners and productive citizens through rigorous curricula and meaningful, enriching experiences.

Course Description:

This course is designed for students who have completed Algebra II, but are not planning on majoring in a STEM-related field. This course will cover topics in a standard college-level Trigonometry course, Elementary Trigonometry, Analytic Trigonometry, Vectors, Complex Numbers and Conic Sections. These topics will be put in the context of real world applications. Graphing calculators will be an important tool that will routinely be used in instruction.

Prerequisite(s):

Algebra 2 CP

Verona High School — Trigonometry

Standard 8: Technology Standards

8.1: Educational Technology: *All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.*	**8.2: Technology Education, Engineering, Design, and Computational Thinking - Programming:** *All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.*
X A. Technology Operations and Concepts **X** B. Creativity and Innovation C. Communication and Collaboration D. Digital Citizenship E. Research and Information Fluency **X** F. Critical thinking, problem solving, and decision making	**X** A. The Nature of Technology: Creativity and Innovation B. Technology and Society C. Design D. Abilities for a Technological World E. Computational Thinking: Programming

SEL Competencies and Career Ready Practices

Social and Emotional Learning Core Competencies: *These competencies are identified as five interrelated sets of cognitive, affective, and behavioral capabilities*	**Career Ready Practices:** *These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.*
Self-awareness: The ability to accurately recognize one's emotions and thoughts and their influence on behavior. This includes accurately assessing one's strengths and limitations and possessing a well-grounded sense of confidence and optimism.	**X** CRP2. Apply appropriate academic and technical skills. CRP9. Model integrity, ethical leadership, and effective management. **X** CRP10. Plan education and career paths aligned to personal goals.
Self-management: The ability to regulate one's emotions, thoughts, and behaviors effectively in different situations. This includes managing stress, controlling impulses, motivating oneself, and setting and working toward achieving personal and academic goals.	CRP3. Attend to personal health and financial well-being. **X** CRP6. Demonstrate creativity and innovation. **X** CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.
Social awareness: The ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources and supports.	**X** CRP1. Act as a responsible and contributing citizen and employee. CRP9. Model integrity, ethical leadership, and effective management.
Relationship skills: The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. This includes communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed.	**X** CRP4. Communicate clearly and effectively and with reason. CRP9. Model integrity, ethical leadership, and effective management. CRP12. Work productively in teams while using cultural global competence.
Responsible decision making: The ability to make constructive and respectful choices about personal behavior and social interactions based on consideration of ethical standards, safety concerns, social norms, the realistic evaluation of consequences of various actions, and the well-being of self and others.	**X** CRP5. Consider the environmental, social, and economic impact of decisions. CRP7. Employ valid and reliable research strategies. **X** CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership, and effective management.

Standard 9: 21st Century Life and Careers

9.1: Personal Financial Literacy: *This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.*	**9.2: Career Awareness, Exploration & Preparation:** *This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.*	**9.3: Career and Technical Education:** *This standard outlines what students should know and be able to do upon completion of a CTE Program of Study.*
X A. Income and Careers B. Money Management C. Credit and Debt Management **X** D. Planning, Saving, and Investing **X** E. Becoming a Critical Consumer F. Civic Financial Responsibility G. Insuring and Protecting	A. Career Awareness (K-4) B. Career Exploration (5-8) **X** C. Career Preparation (9-12)	A. Agriculture, Food & Natural Res. B. Architecture & Construction C. Arts, A/V Technology & Comm. D. Business Management & Admin. E. Education & Training F. Finance G. Government & Public Admin. H. Health Science I. Hospital & Tourism J. Human Services K. Information Technology L. Law, Public, Safety, Corrections & Security M. Manufacturing N. Marketing **X** O. Science, Technology, Engineering & Math P. Transportation, Distribution & Log.

Course Materials

Core Instructional Materials: *These are the board adopted and approved materials to support the curriculum, instruction, and assessment of this course.*	**Differentiated Resources**: *These are teacher and department found materials, and also approved support materials that facilitate differentiation of curriculum, instruction, and assessment of this course.*
• TI-Nspire CX Calculator • Trigonometry with Calc Chat and Calc View (10 E)	• Khan Academy • Delta Math • Kuta Software • TI-Nspire CX CAS Student Software • SmartBoard and SMART Notebook 10 Software • Google Classroom, Sheets, Slides, and Documents

Verona High School

Trigonometry

Unit Title / Topic: Elementary Trigonometry	Unit Duration: 17 Class periods

Stage 1: Desired Results

Established Goals:

F.TF.1 - Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

F.TF.2 - Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

F.TF.3 - Use special triangles to determine geometrically the values of sine, cosine, tangent for π/3, π /4 and π /6, and use the unit circle to express the values of sine, cosine, and tangent for π –*x*, π +*x*, and 2π –*x* in terms of their values for *x*, where *x* is any real number.

F.TF.4 - Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.

F.TF.5 - Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

F.TF.6 - Understand that restricting a trigonometric function to a domain on which it is always increasing or decreasing allows its inverse to be constructed.

G.SRT.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.

G.SRT.7 - Explain and use the relationship between the sine and cosine of complementary angles.

G.SRT.8 - Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Transfer Goal:

Students will be able to <u>independently</u> use their learning to…

apply their knowledge of the graphs of periodic functions and their equivalents to recognize and analyze real-life periodic phenomena that have these properties.

analyze real life phenomena while keeping in mind the unit circle, its implications and its relationships.

Students will understand that:

- Trig functions are ratios of sides of right triangles
- Trig functions evaluated at a certain angle are constant, regardless of the size of the triangle
- Trig identities allow us to express trig expressions in different, but equivalent ways
- Radians are often a more appropriate way of describing angles
- Changes to the algebraic equation of a function cause predictable changes to the function's graph
- Basic properties of trig graphs can be linked to a deep understanding of the unit circle and fundamental trig identities

Essential Questions:

- What are examples of things that happen periodically?
- How can radian measures be used in the real world?
- What is the value of knowing trigonometric identities?
- What is the benefit of having different units of measure?
- What is the benefit of having different representations?
- How can the unit circle begin to explain the graphs of sin, cos, tan, cot, sec and csc?

Students will know:

- Basic trig identities
- Pythagorean identities
- Cofunction relationships
- Basic trig functions of 30, 45 60 degree angles
- The relationship between (cos, sin) and (x, y) on the unit circle
- Sin, cos and tan of 30, 45, 60
- Sin, cos and tan of quadrantal angles
- Period formulas
- Relationship between frequency, amplitude, volume and pitch
- 5 Graphical Critical Points
- Inverse trig functions

Students will be able to:

- Solve multiple angle trig problems
- Derive trig formula
- Compose ordinates of sinusoidal graphs
- Analyze and write the equations for sinusoidal graphs
- Solve basic right triangle trig word problems
- Convert between radians and degrees
- Evaluate a trigonometric function for any multiple of 30, 45, 60 or 90
- Find all six trig functions of an angle, given one
- Fill out a unit circle (angles in radians, coordinates of points)

Stage 2: Acceptable Evidence

Transfer Tasks -

- **Graphing Trig Functions Project - Students will analyze average monthly temperatures (or another sinusoidal set of data) in a city of their choice. They will apply their knowledge of periodic functions to analyze this periodic phenomenon**
- **Students will analyze dissonant and consonant sound intervals. Students will analyze intervals that sound pleasing and intervals that sound displeasing, and students will uncover the relationship between frequency and pitch, as well as amplitude and volume.**
- **Chapter 13 Performance Tasks - Graphs and the Unit Circle - Students will answer real world/graphical questions relating to the topics in Chapter 13**
- **Chapter 14 Performance Tasks Trig Identities, Right/Non-Right Triangle Trig - Students will answer real world/graphical questions relating to the topics in Chap 14**

Reference Materials

- Trigonometry with Calc Chat and Calc View (10 E)
- TI-Nspire Lesson Activities: https://education.ti.com/en/timathnspired/us/precalculus
- Summary - Graphing Sine and Cosine
- Investigate Changes to Trig Graphs
- Graphing Trig Functions - Investigation Problem Set
- Graphing Trig Functions - Review
  - Graphing Trig Functions - Review Answers
- Graphs of Sound Waves for Last Section of Graphing Trig Functions
- Graphing Trig Functions - Teacher Notes
- Graphing Trig Functions - Student Notes
- Trig Graph Transformations Worksheet
  - Trig Graph Transformation Worksheet - Answers
- Graphing Trig Functions - Review - CP
- Steps for Graphing Trig Functions - CP
- Trig Identities - CP
- Khan Academy - Trig Graphs
- Regents Exam Questions by topic
- Math Videos By Topic

Verona High School

Trigonometry

- Khan Academy - Modeling Periodic Functions
- Regents Prep - Arc Length and Radian Measure
- Regents Prep - Trig Graphing and Translation
- Another Ferris Wheel Scaffolded Example
- More complex Ferris Wheel Scaffolded Example
- Math Assessment Project - Tasks by Standard
- Unit Circle - Printable Unit circle with degrees, radians, sine and cosine values
- Trigonometric Identities - Basic Trig Identities reference sheet

Verona High School

Trigonometry

Unit Title / Topic: Analytic Trigonometry	Unit Duration: 11 Class periods

Stage 1: Desired Results

Established Goals:

F.TF.5 - *Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.*

F.TF.6 *- Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.*

F.TF.7 *- Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate that solutions using technology and interpret them in terms of the context.*

F.TF.8 - *Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle.*

F.TF.9 *- Prove the addition and subtraction formulas for sine, cosine and tangent and use them to solve problems.*

F.IF.4 - *For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities and sketch graphs showing key features given verbal descriptions of the relationship.*

F.IF.7 - *Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.*

F.IF.8 - *Write a functions defined by an expression in different but equivalent forms to reveal and explain different properties of the function.*

F.IF.9 - *Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables or by verbal descriptions).*

F.BF.1 - *Write a function that describes a relationship between two quantities.*

F.BF.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.*

A.REI.2 - *Understand solving equations as a process of reasoning and explain the reasoning.*

Transfer Goal:

Students will be able to <u>independently</u> use their learning to… logically realize and explain the benefits of proofs (Identities) in mathematics.

Students will understand that:

- Fundamental trig identities are commonly seen in many parts of calculus
- Trigonometric identities enable us to rewrite trig equations that model real life situations
- Trig identities allow us to express trig expressions in different, but equivalent ways
- Trig equations can be treated like much more basic equations by using the concept of substitution
- Trigonometric functions are the basis of many Physics properties including sounds waves and simple harmonic motion.
- Trigonometric Equations have infinitely many solutions
- Trig equations have many applications in circular motion
- SUm and DIfference formulas are used to model standing waves

Essential Questions:

- What is the value of knowing trigonometric identities?
- What is the relationship between a trig equation and the trig functions graph?
- How can we determine if an arc trig function will yield multiple angles in a given interval?
- What is the algebraic and graphical relationship between trig equations and quadratic/linear equations?
- What is the relationship between sounds waves, simple harmonic motion and trig functions?
- Why do trigonometric equations have infinitely many solutions?
- How can we express infinitely many solutions?
- What mathematical logic can be used to explain projectile motion?

Students will know:

- Fundamental Trig Identities
- Inverse trig functions
- Sum and Difference Formulas
- Double and Half Angle Formulas
- Algebraic Techniques to solve trig equations
- Quadratic techniques to solve trig equations
- Cofunction Identities
- Reduction Identities
- Power-Reducing Formulas
- Product to Sum and Sum to Product formulas

Students will be able to:

- Verify Trigonometric Identities
- Solve systems of trig equations
- Solve linear trig equations
- Solve quadratic trig equations
- Solve trig equations with more than one function
- Solve trig equations graphically
- Solve multiple angle trig problems
- Derive trig formula
- Compose ordinates of sinusoidal graphs
- Analyze and write the equations for sinusoidal graphs

Stage 2: Acceptable Evidence

Transfer Task

Analytic Trig Transfer Task - Students will use their knowledge of trigonometric identities and their uses to create a playable game made to reinforce concepts

Reference Materials

- Trigonometry with Calc Chat and Calc View (10 E)
- TI-Nspire Lesson Activities: https://education.ti.com/en/timathnspired/us/precalculus
- Solving Trig Equations Investigation
- Solving Trig Equations - Exam Review
    - Solving Trig Equations - Exam Review Answers
- Solving Trig Equations - Teacher Notes - Honors
- Solving Trig Equations - Student Notes - Honors
- Khan Academy - Trig Equations
- Summative Assessment Tasks

Verona High School

Trigonometry

Unit Title / Topic: Additional Topics in Trigonometry	Unit Duration: 9 Class periods

Stage 1: Desired Results

Established Goals:

G.SRT.9 **-** *Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.*

G.SRT.10 **-** *Prove the Laws of Sines and Cosines and use them to solve problems.*

G.SRT.11 **-** *Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).*

N-VM.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).*

N-VM.2*. (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.*

N-VM.3*. (+) Solve problems involving velocity and other quantities that can be represented by vectors.*

N-VM.4. *(+) Add and subtract vectors.*

N-VM.4.a*. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.*

N-VM.4.b*. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.*

N-VM.4.c*. Understand vector subtraction v – w as v + (–w), where –w is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.*

N-VM.5*. (+) Multiply a vector by a scalar.*

N-VM.5.a*. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as c(vx, vy) = (cvx, cvy).*

N-VM.5.b*. Compute the magnitude of a scalar multiple cv using ||cv|| = |c|v. Compute the direction of cv knowing that when |c|v ≠0, the direction of cv is either along v (for c > 0) or against v (for c < 0).*

Transfer Goal:

Students will be able to <u>independently</u> use their learning to… solve a variety of problems that use content in the fields of Engineering, Aviation, Nautical piloting, surveying and Physics.

Students will understand that:

- The LoC, LoS and Area formula are generalized versions of Pythagorean Theorem, SohCahToa and A=1/2bh
- Trigonometry allows you to find distances or angles that you could not have measured
- The law of sines can be used in cases where AAS, ASA and SSA are satisfied
- The ambiguous case must be checked when SSA is satisfied
- The Law of Cosines can be used in cases where SSS and SAS are satisfied
- There is no ambiguous case in LoC
- Vectors are useful tools in solving real-life problems

Essential Questions:

- What is the relationship of the Law of Cosines, Law of Sines and area formula to theorems you previously learned?
- What is the utility of the Law of Sines and the Law of Cosines?
- How can trigonometry be used in the real world?
- How does changing one part of a triangle affect other parts of the triangle?
- Why does an ambiguous case exist?
- Why do both magnitude and direction matter?
- How are math and physics related?

Students will know:

- Law of Cosines
- Law of Sines
- Area Formula
- Heron's Area Formula
- Directed line segment
- Initial point
- Terminal point
- Magnitude
- Vector
- Unit vector
- Standard position
- Parallelogram Law
- Resultant
- Negative vector
- Direction Angles
- Orthogonal vectors

Students will be able to:

- Use the Law of Sines
- Use the Law of Cosines
- Use Heron's Area Formula
- Solve area problems
- Solve force problems
- Write the component form of a vector
- Calculate the magnitude of a vector
- Perform vector operations
- Use Properties of vector Addition
- Use Properties of Scalar Multiplication
- Solve Physics Problems involving vectors
- Calculate dot products of vectors
- Use properties of dot products
- Find the angle between 2 vectors
- Find vector components
- Decompose a vector

Stage 2: Acceptable Evidence

Transfer Task

TrigStar Competition - Students will be introduced to trigonometry in the real world through a local competition facilitated by the National Society of Professional Surveyors.

Cross Curricular Vector Task - Print out road map of Verona. Have students locate their home. Then have them map out their walk/drive to VHS making sure to approximate roads as straight lines, not curves. have them do vector decomposition on each of the vectors, add them up and determine the magnitude and direction of their total displacement from their home. Then the students can measure the straight-line distance of their house from VHS from the map and see how close they got to the actual answer. You can then talk about vectors (displacement) vs scalars (distance) and even bring velocity (vector) and speed (scalar) into the discussion and do a bit of r=dt.

Reference Materials

- Kuta Software
- Trigonometry with Calc Chat and Calc View (10 E)
- Law of Sines - Students Notes - CP
- Law of Cosines - Student Notes - CP
- Reference Angles - CP
- Khan Academy - Non-Right Triangle Trig
- Khan Academy - Unit Circle
- Khan Academy- Vectors
- Summative Assessment Tasks

Verona High School — Trigonometry

Unit Title / Topic: Complex Numbers	Unit Duration: 11 Class Periods

Stage 1: Desired Results

Established Goals:

N-CN.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.
N-CN.2. Use the relation i^2 = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
N-CN.3. (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.
N-CN.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.
N-CN.5. (+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. For example, (-1 + √3i)3 = 8 because (-1+ √3i) has modulus 2 and argument 120°.
N-CN.6. (+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.
N-CN.C. Use complex numbers in polynomial identities and equations.
N-CN.7. Solve quadratic equations with real coefficients that have complex solutions.
N-CN.8. (+) Extend polynomial identities to the complex numbers. For example, rewrite x2 + 4 as (x + 2i)(x – 2i).
N-CN.9. (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.

Transfer Goal:

Students will be able to <u>independently</u> use their learning to…use complex numbers analytically and graphically.

Students will understand that:

- Complex numbers are made up of a real part and an imaginary part
- Complex solutions occur in conjugate pairs
- Graphing complex numbers is similar to plotting coordinates on the rectangular coordinate plane
- Complex numbers can be rewritten in trigonometric form and used in electrical engineering

Essential Questions:

- How can we use complex numbers?
- How can we use the Fundamental Theorem of Algebra with complex numbers?
- How are the complex plane and rectangular coordinate planes similar and different from one another?
- Why is it important to rewrite complex numbers in trigonometric form?

Students will know:

- Complex numbers: $a + bi$
- Complex conjugates
- Principal square root of a negative number
- Fundamental Theorem of Algebra
- Linear Factorization theorem
- Complex conjugate theorem
- Zeros
- Roots
- Complex plane
- Distance Formula
- Midpoint Formula
- Trig form of complex number $a + bi$ is $z = r(cos\theta + i\, sin\theta)$

Students will be able to:

- Use the imaginary unit, i, to write complex numbers
- Add, subtract, and multiply complex numbers
- Use complex conjugates to write the quotient of two complex numbers in standard form
- Find complex solutions of quadratic equations
- Determine the numbers of solutions of polynomial equations
- Find solutions of polynomial equations
- Find zeros of polynomial functions and find polynomial functions given the zeros of the functions
- Plot complex numbers in the complex plane and find absolute values of complex numbers
- Perform operations with complex numbers in the complex plane
- Use the distance and midpoint formulas in the complex plane
- Write trigonometric forms of complex numbers
- Multiply and divide complex numbers written in trigonometric form

Stage 2: Acceptable Evidence

Transfer Task

Modeling a Quadratic Regression- Students will be asked to complete a quadratic regression with a set of real-world data. They will be asked to compare their quadratic model with the actual data they found through research.

Reference Materials

- Trigonometry with Calc Chat and Calc View (10 E)
- Chapter 4 Larson Interactive Activities
- Fundamental Theorem of Algebra Notes
- Khan Academy- Complex Numbers
- Summative Assessment Tasks

Verona High School

Trigonometry

Unit Title / Topic: Topics in Analytic Geometry	Unit Duration: 19 Class periods

Stage 1: Desired Results

Established Goals:

A.CED.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.*

G.GPE.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.*

G.GPE.2 **-** *Derive the equation of a parabola given a focus and directrix.*

G.GPE.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*

Transfer Goal:

Students will be able to <u>independently</u> use their learning to…recognize and identify different conic sections occur in everyday life.

Students will understand that:

- Equations of conic sections can be reorganized and analyzed to produce adequate graphs
- Common shapes known in Geometry have complex Algebraic equations.
- Conic sections, parametric equations and the polar coordinate system are the basis of higher level Physics applications

Essential Questions:

- What is the importance of conic sections?
- Is a graph that overlaps itself possible, if it only has one equation?

Students will know:

- Standard form of a circle
- Standard form of a parabola
- Standard form of an ellipse
- Standard form of a hyperbola

Students will be able to:

- Identify Conics from graph OR equation in any form
- Write standard equations of conics
- Graph conics

Stage 2: Acceptable Evidence

Transfer Task

Conics Section Project- This is a two-part project. In the first part of the project, students will be asked to investigate where conic sections occur in real-life. In the second part of the project, students will be asked to re-create how each of the conic sections are formed.

Reference Materials

- Trigonometry with Calc Chat and Calc View (10 E)
- TI-Nspire Lesson Activities: https://education.ti.com/en/timathnspired/us/precalculus
- Folding Conic Sections Activity
- Conics Formula Sheet
- Conics Quiz Review
  - Conics Review - Answers
- Khan Academy - Conics
- Summative Assessment Tasks