## Trigonometry

## Unit 1 Functions

| Estimated Time Frame for Unit | Big Ideas | Essential Question | Concepts | Competencies | Lesson Plans and Suggested Resources | Vocabulary | Standards/Eligible Content |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 18 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 of a graph? | Functions | Students should be able to determine whether a relation is a function. <br> Students should be able to use function notation. <br> Students should be able to identify the domain and range of a relation or function. <br> Students should be able to evaluate functions. <br> Students should be able to evaluate difference quotients. <br> Students should be able to use functions to model and solve real life problems. | Relations and Functions <br> Suggested Resources: <br> Trigonometry (Hosteteler/Larson) <br> Section P-5 <br> Pgs.55-68 <br> Advanced <br> Mathematical <br> Concepts <br> Section 1-1 (Pgs. 5- <br> 12) <br> Glencoe- <br> Precalulus /2012- <br> Section 1-1 <br> (PC Pgs 4-12) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski) <br> Section 3-4 <br> (Pg 175-188) <br> 2 days | relation, <br> domain, <br> range, <br> function, <br> vertical line test, <br> function notation, | Domain: F-IF Interpreting Functions. <br> Standard: Analyze Functions using different representations <br> 7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. <br> a. Graph linear and quadratic equations and show intercepts, maxima and minima. <br> 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) to a unique member of another set (range), and the relationship is recognizable across representations. | What are the important features of a graph of a polynomial and why are they important? | Functions | Students should be able to use the vertical line test for functions. <br> Students should be able to use graphs to estimate function values and find domains, ranges, y intercepts, and zeros of functions. <br> Students should be able to explore symmetries of graphs, and identify even and odd functions. <br> Students should be able to determine intervals on which functions are increasing, decreasing, and determine maxima and minima of functions. <br> Students should be able to determine the average rate of change of a function. | Analyze Graphs of Functions and Relations- <br> Suggested <br> Resources: <br> Trigonometry (Hosteteler/Larson) <br> Section P-6 <br> Pgs.69-80 <br> Glencoe- Pre- <br> calculus / 2010 <br> Section 1-2 <br> (Pgs 13-23) <br> Section 1-4 <br> (Pgs 34-43) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski Pg 141- <br> 156, 175-193, 262- <br> 272) <br> 2 Days | relation, <br> domain, <br> range, <br> function, <br> vertical line test, <br> function notation, <br> composition, <br> composite, <br> linear equation, <br> x-intercept, <br> $y$-intercept, <br> standard form, <br> slope-intercept form, <br> zeros of the function, <br> constant function, <br> family of graphs, <br> mathematical model, <br> point-slope form | Domain: F-IF Interpreting Functions. <br> Standard: Analyze <br> Functions using <br> different <br> representations <br> 7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. <br> a. Graph linear and quadratic equations and show intercepts, maxima and minima. <br> c. Graph polynomial functions, identify zeros when suitable factorizations are available, and show end behavior. |
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|  | 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 | How can students  <br> manipulate functions <br> through transformations,  <br> operations, and <br> compositions?  | Functions | Students should be able to identify and graph linear and squaring functions. <br> Students should be able to identify and graph cubic, square | Parent Function and Transformation- <br> Suggested <br> Resources: <br> Trigonometry (Hosteteler/Larson) Section P-7 | Linear function <br> Point-slope form <br> Constant function <br> Squaring Function <br> Cubic function | Domain: F-BF Building Functions <br> Standard: Build a new function from and existing function <br> 3. Identify the effect on the graph of |


| mathematical and real world situations. |  |  | root, and reciprocal functions. <br> Students should be able to identify and graph step and piece-wise functions. <br> Students should be able to recognize graph of parent functions. | Pgs.81-88 <br> Glencoe- <br> Precalculus/2010- <br> Section 1-5 (PC Pgs <br> 45-55) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski Pg 192 - <br> 208) <br> 8 Days | Square root function Reciprocal function Step functions <br> Piece-wise function <br> Parent functions | replacing $f(x)$ by $f(x)+$ $k, k f(x), f(k x)$, and $f(x$ $+k$ ) for specific values of $k$ given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. |
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| 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 $r$ students <br> manipulate functions <br> through transformations,  <br> operations, and <br> compositions?  | Factors | Student should be able to use vertical and horizontal shifts to sketch graphs of functions. <br> Students should be able to use reflections to sketch graphs. <br> Students should be able to use nonrigid transformations to sketch graphs of functions. | Parent Function and Transformation- <br> Suggested <br> Resources: <br> Trigonometry <br> (Hosteteler/Larson) <br> Section P-8 <br> Pgs.89-98 <br> Glencoe- <br> Precalculus/2010- <br> Section 1-5 (PC Pgs <br> 45-55) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski Pg 192 - <br> 208) <br> 4 Days | Vertical shift <br> Horizontal shift <br> Reflection <br> Rigid transformations <br> Nonrigid transformations <br> Vertical stretch <br> Vertical shrink <br> Horizontal shrink | Domain: F-BF Building Functions <br> Standard: Build a new function from and existing function <br> 3. Identify the effect on the graph of replacing $f(x)$ by $f(x)+$ $k, k f(x), f(k x)$, and $f(x$ $+k$ ) for specific values of $k$ given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. |
| Review Unit 1 Functions 1 Day |  |  |  |  |  |  |

Test Unit 1 Functions 1 Day

## Unit 2 Conic Sections

| Estimated Time Frame for Unit | Big Ideas | Essential Question | Concepts | Competencies | Lesson Plans and Suggested Resources | Vocabulary | Standards/Eligible Content |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 15 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? <br> Why is it important to write equations of various shapes? | Conic Sections | Students should be able to analyze and graph equations of parabolas. <br> Students should be able to write equations of parabolas. | Parabolas - <br> Suggested <br> Resources: <br> Advanced <br> Mathematical <br> Concepts <br> Section 10-5 <br> (Pgs.653-661) <br> Sullivan- <br> Precalculus <br> Section 10.2 <br> Pgs. 656-664 <br> Glencoe Precalculus <br> -2011 <br> Section 7-1 <br> (Pgs 422-431) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski) <br> ( $\operatorname{Pg}$ 806-816) <br> 3 Days | Conic sections <br> Degenerate conic <br> Locus <br> Parabola <br> Focus <br> Directrix <br> Axis of symmetry <br> Vertex <br> Latus rectum | Domain: G-GPE <br> Expressing Geometric <br> Properties with <br> Equations <br> Standard: Translate between a geometric description and the equation for a conic section <br> 2. Derive the equation of a parabola given a focus and directrix |
|  | 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. <br> SWBA to write equations of circles. | Circles <br> Suggested <br> Resources: <br> Advanced <br> Mathematical <br> Concepts <br> Section 10-2 <br> (Pgs.623-630) | Conic Section <br> Circle <br> Concentric Circle <br> Degenerate Conic Center <br> Radius | Domain: G-GPE <br> Expressing Geometric <br> Properties with <br> Equations <br> Standard: Translate between a geometric description and the equation for a conic section |


|  |  |  |  |  | Sullivan- <br> Precalculus <br> Section 1-4 <br> Pgs. 35-41 <br> Glencoe Precalculus -2011 <br> Section 7-2 <br> (Pgs 432-441) <br> Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 816-830) |  | 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. <br> 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. <br> SWBA to write equations of ellipses. | Ellipses <br> Suggested <br> Resources: <br> Advanced Mathematical Concepts <br> Section 10-3 <br> (Pgs.631-641) <br> Sullivan- Precalculus <br> Section 10-3 <br> Pgs. 634-644 <br> Glencoe Precalculus 2011 <br> Section 7-2 <br> (Pgs 432 - 441) <br> Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 816-830) <br> 3 Days | Ellipse <br> Foci <br> Major axis <br> Center <br> Minor axis <br> Vertices <br> Co-vertices <br> Eccentricity | Domain: G-GPE <br> Expressing Geometric <br> Properties with <br> Equations <br> Standard: Translate between a geometric description and the equation for a conic section <br> 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. <br> 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? <br> Why is it important to write equations of various shapes? | Conic Sections | Students should be able to analyze and graph equations of hyperbolas. <br> Students should be able to use equations to identify the types of conic sections. | Hyperbolas- <br> Suggested <br> Resources: <br> Advanced <br> Mathematical <br> Concepts <br> Section 10-4 <br> (Pgs.642-652) <br> Sullivan- Precalculus <br> Section 10.4 <br> Pgs. 644-656 <br> Glencoe Precalculus - <br> 2011 <br> Section 7-3 <br> (PC Pgs 442-442) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski) <br> (Pg 830-842) <br> 3 Days | Hyperbola <br> Transverse axis <br> Conjugate axis | Domain: G-GPE <br> Expressing Geometric <br> Properties with <br> Equations <br> Standard: Translate between a geometric description and the equation for a conic section <br> 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. |
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|  | 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? <br> Why is it important to write equations of various shapes? | Conic Sections and Parametric Equations | Objectives: SWBA to find rotation of axes to write equations of <br> rotates conics sections. <br> SWBA to use equations to identify the types of conic sections. | Rotations of Conic Sections- <br> Suggested <br> Resources: Glencoe- <br> Pre-calculus/2010- <br> Section 7-4 (PC Pgs <br> 454-461) <br> Day $118,119,120$ | identity, <br> trigonometric identity, <br> reciprocal identities, <br> quotient identity, <br> Pythagorean identities, <br> symmetry identities, <br> opposite-angle identities, <br> sum identities for sine, | Domain: G-GPE <br> Expressing Geometric <br> Properties with <br> Equations <br> Standard: Translate between a geometric description and the equation for a conic section <br> 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. |


|  |  |  |  |  |  | cosine, <br> difference identities for sine and cosine, <br> reduction identities, <br> double-angle identities, <br> half-angles identities | 2. Derive the equation of a parabola given a focus and directrix <br> 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. |
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| Review Unit 2 Conic Sections 1 Day |  |  |  |  |  |  |  |
| Test Unit 2 Conic Sections 1 Day |  |  |  |  |  |  |  |
| Unit 3 Trigonometry and Angles |  |  |  |  |  |  |  |
| Estimated Time Frame for Unit | Big Ideas | Essential Question | Concepts | Competencies | Lesson Plans and Suggested Resources | Vocabulary | Standards/Eligible Content |
| 20 days | Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms. | In what ways might radians be more useful than degrees in various situations (or vice versa)? | Trigonometric Functions | Students should be able to convert decimal degree measures to degrees, minutes and seconds. <br> Students should be able to convert degrees, minutes and seconds to decimal degrees. <br> Students should be able to find the number of degrees | Radian and Degree Measure <br> Suggested <br> Resources: <br> Trigonometry (Hosteteler/Larson) <br> Section 1-1 <br> Pgs.130-141 <br> Advanced <br> Mathematical <br> Concepts <br> Section 5-1 <br> (Pgs.277--283) | Vertex <br> Initial side <br> Terminal side <br> Standard Position <br> Degree <br> Minute <br> Seconds <br> Radian | Domain: F-TF <br> Trigonometric <br> Functions <br> Standard: Extend the domain of trigonometric functions using the unit circle <br> 1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. |


|  |  |  |  | in a given number of rotations. <br> Students should be able to identify angles that are coterminal with a given angle. <br> Students should be able to use angle measures to solve real-world problems. | Glencoe- <br> Pre-calculus(2012) <br> Section 4-2 <br> ( Pgs 231-241) <br> Algebra and Trigonometry with Analytic Geometry (Swokowski) Pg 392-403) | Quadrantal Angle <br> Coterminal 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 | How is the unit circle a useful device in the solving of trigonometric problems? | Trigonometric Functions | Students should be able to identify a unit circle and describe its relationship to real numbers. <br> Students should be able to evaluate trigonometric functions using the unit circle. <br> Students should be able to use the domain and period to evaluate sine and cosine functions. <br> Students should be able to use a calculator tor to evaluate trigonometric functions. | Trigonometric Functions: The Unit Circle- <br> Suggested <br> Resources: <br> Trigonometry (Hosteteler/Larson) <br> Section 1-2 <br> Pgs.142-148 <br> Advanced <br> Mathematical <br> Concepts <br> Section 5-3 <br> (Pgs.291-298) <br> Glencoe <br> Pre-calculus(2012) <br> Section 4-3 <br> ( Pgs 242-253) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski) <br> Pg 421-439) <br> 5 days | Unit circle <br> Sine <br> Cosine <br> Tangent <br> Cosecant <br> Secant <br> Cotangent <br> Circular functions <br> Periodic function <br> Period <br> Trigonometric functions <br> Quadrantal angle <br> Reference angle | Domain: <br> Trigonometric <br> Functions <br> Standard: Extend the domain <br> of <br> trigonometric <br> functions using the unit circle <br> 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. <br> 4. Use the unit circle to explain symmetry (odd and even) and periodicity trigonometric functions |


|  | 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 determine Linear Displacement. <br> Students should be able to determine Linear velocity. <br> Students should be able to find Angular Displacement. <br> Students should be able to find Angular velocity. | Angular Motion Applications <br> Suggested <br> Resources: <br> Trigonometry (Hosteteler/Larson) <br> Section 1-1 <br> Pgs.130-141 <br> Advanced <br> Mathematical <br> Concepts <br> Section 5-1 <br> (Pgs.277--283) <br> Glencoe- <br> Pre-calculus(2012) <br> Section 4-2 <br> ( Pgs 231-241) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski) <br> Pg 392-403) <br> 5 Days | Linear Displacement <br> Linear velocity <br> Angular <br> Displacement <br> Angular velocity | Domain: F-TF <br> Trigonometric Functions <br> Standard: Extend the domain of trigonometric functions using the unit circle <br> 1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. <br> 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. |
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| Review Unit 3 Trigonometry and Angles 1 Day |  |  |  |  |  |  |  |
| Test Unit 3 Trigonometry and Angles 1 Day |  |  |  |  |  |  |  |
| Unit 4 Inverse Trigonometric Functions |  |  |  |  |  |  |  |
| Estimated Time Frame for Unit | Big Ideas | Essential Question | Concepts | Competencies | Lesson Plans and Suggested Resources | Vocabulary | Standards/Eligible Content |


| 15 Days | Families of functions exhibit properties and behaviors that can be recognized across representations. Functions can be transformed, combined, and composed to create new functions in mathematical and real world situations. | How can students manipulate functions through transformations, operations, and compositions? | Functions | Students should be able to perform operations on functions. <br> Students should be able to find compositions of functions <br> Students should be able to use combinations and compositions of functions to model real-world problems. | Function Operations and Composition of Function- <br> Suggested <br> Resources: <br> Trigonometry <br> (Hosteteler/Larson) <br> Section P-9 <br> Pgs.99-107 <br> Glencoe- Precalulus <br> /2010-Section 1-6 <br> (PC Pgs 57-64) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski Pg 224 - <br> 234) <br> 6 Days | Arithmetic combinations <br> Composition of Functions <br> Decompose a Function | Domain: F-BF <br> Building Functions <br> Standard: Build a function that models a relationship between quantities <br> 1. Write a function that describes a relationship between two quantities. <br> b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model. <br> c. Compose functions. For example, if $T(y)$ is the temperature in the atmosphere as a function of height, and $h(t)$ is the height of the weather balloon as a function of time, the $T(h(t))$ is the temperature at the location of the weather balloon as a function of time. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Families of functions exhibit properties and behaviors that can be recognized across representations. Functions can be transformed, combined, | How can students manipulate functions through transformations, operations, and compositions? | Functions | Students should be able to use the graphs of functions to determine if they are inverse functions. | Inverse Relations and Functions- <br> Suggested Resources: <br> Trigonometry | Inverse Function <br> One-to-One Functions <br> Horizontal Line test | Domain: F-BF Building Functions <br> Standard: Build new functions from existing functions. |


|  | and composed to create new functions in mathematical and real world situations. |  |  | Students should be able to find inverse functions algebraically and graphically. <br> Students should be able to use the horizontal line test to determine if functions are one -to-one | (Hosteteler/Larson) <br> Section P-10 <br> Pgs.108-117 <br> Glencoe- Precalulus - <br> Section 1-7 (PC Pgs $65-73)$ <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski Pg 235 - <br> 245) <br> 4 Days |  | 4. Find inverse functions. <br> 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. <br> b. Verify by composition that one function is the inverse of another. <br> c. Read values of an inverse function from a graph or a table given that the function has an inverse. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Families of functions exhibit properties and behaviors that can be recognized across <br> representations.Functions can be transformed, combined, and composed to create new functions in mathematical and real world situations. | What are the various methods in which a trig expression may be verified or <br> that a <br> trig equation may be solved? | Trigonometric Functions | Student should be able to evaluate and graph inverse trigonometric functions. <br> Student should be able to evaluate and graph compositions of trigonometric functions. | Inverse <br> Trigonometric <br> Functions - <br> Suggested <br> Resources: <br> Trigonometry <br> (Hosteteler/Larson) <br> Section P-10 <br> Pgs.108-117 <br> Glencoe-Pre- <br> calculus/2010- <br> Section 4-6 (PC Pgs <br> 280-290) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski Pg 541 -557)- <br> 2 Days |   <br> Inverse Sine <br> Function  <br>   <br> Inverse  <br> function  <br> Inverse  <br> function  <br>   | Domain: F-TF <br> Trigonometric <br> Functions <br> Standard: Model <br> periodic phenomena <br> with trigonometric functions. <br> 5. Choose <br> trigonometric <br> functions to model periodic phenomena with specific amplitude, frequency, and midline. <br> 6. Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows it's inverse to be constructed. <br> Domain: F-BF Building Functions |


|  |  |  |  |  |  |  | Standard: Build a function that models a relationship between quantities. <br> 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. |
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| Review Unit 4 Inverse Trigonometric Functions 1 Day |  |  |  |  |  |  |  |
| Test Unit 4 Inverse Trigonometric Functions 1 Day |  |  |  |  |  |  |  |
| Unit 5 Graphing Trigonometric 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. | 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 sketch graphs of basic sine and cosine functions. <br> Students should be able to graph transformations of the sine and cosine functions. | Graphing Sine and Cosine Functions <br> Suggested <br> Resources: <br> Trigonometry (Hosteteler/Larson) <br> Section 1-5 <br> Pgs.169-179 | Sinusoid <br> Amplitude <br> Period <br> Frequency <br> Phase shift <br> Vertical shift | Domain: F-TF <br> Trigonometric Functions <br> Standard: Model periodic phenomena with trigonometric functions. <br> 5. Choose trigonometric |



Review Unit 5 (Part 1) Graphing Trigonometric Functions 1 Day

Test Unit 5 (Part 1) Graphing Trigonometric Functions 1 Day



Review Unit 5 (Part 2) Graphing Trigonometric Functions 1 Day

Test Unit 5 (Part 2) Graphing Trigonometric Functions 1 Day

Unit 6 Trigonometric Identities

| Estimated Time Frame for Unit | Big Ideas | Essential Question | Concepts | Competencies | Lesson Plans and Suggested Resources | Vocabulary | Standards/Eligible Content |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 21 Days | Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms. | What are trigonometric identities and why are they useful? | Trigonometric Identities and Equations | Students should be able to use reciprocal identifies, quotient identities, Pythagorean Identities, symmetry identities and opposite angle identities. <br> Students should be able to identify and use basic trigonometric identities to find trigonometric values. <br> Students should be able to use, simplify and rewrite trigonometric identities. | Trigonometric Identities - <br> Suggested <br> Resources: <br> Trigonometry <br> (Hosteteler/Larson) <br> Section 2-1 <br> Pgs.222-229 <br> Advanced <br> Mathematical <br> Concepts <br> Section 7-1 <br> (Pgs.421-430) <br> Glencoe Precalculus - <br> 2011 <br> Chapter 5-Section 5- <br> 1 ( Pgs 312 - <br> 319) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski) <br> (Pg 494-500) <br> 2 Days | Identity <br> Trigonometric identity <br> Reciprocal identity <br> Quotient identity <br> Pythagorean Identity <br> Symmetry Identity <br> Opposite Angle Identity <br> Cofunction <br> Odd-even identity | Domain: F-TF <br> Trigonometric <br> Functions <br> Standard: Prove and apply trigonometric identities. <br> 8. Prove the Pythagorean Identity and use it to find $\sin (\theta), \cos (\theta)$, or $\tan (\theta)$, 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 | 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. <br> Students should be | Verifying <br> Trigonometric <br> Identities <br> Suggested <br> Resources: <br> Trigonometry <br> (Hosteteler/Larson) | Verify an identity | Domain: F-TF <br> Trigonometric <br> Functions <br> Standard: Prove and apply trigonometric identities. |


|  | in mathematical and real world situations. |  |  | able to determine whether equations are identities. Students should be able to find numerical values of trigonometric functions. | Section 2-2 <br> Pgs.230-236 <br> Advanced <br> Mathematical <br> Concepts <br> Section 7-1 <br> (Pgs.431-436) <br> Glencoe Precalculus - <br> 2011 <br> Section 5-2 <br> ( Pgs 320-326) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski) <br> (Pg 494-500) <br> 4 Days |  | 8. Prove the Pythagorean Identity and use it to find $\sin (\theta), \cos (\theta)$, or $\tan (\theta)$, and the quadrant of the angle. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 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 | Students should be able to solving trigonometric equations using algebraic techniques. <br> SWBA to solve trigonometric equations using basic techniques. | Solving <br> Trigonometric <br> Equations <br> Suggested <br> Resources: <br> Trigonometry (Hosteteler/Larson) <br> Section 2-3 <br> Pgs.237-247 <br> Glencoe-Pre- <br> calculus/2010- <br> Section 5-3 (PC Pgs <br> 327-333) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski Pg 500 - <br> 514) <br> 5 Days |  | Domain: A-REI Reasoning with equations and Inequalities <br> Standard: Understand solving equations as a process of reasoning and explain the reasoning. <br> 1. Explain each step in solving 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. |



Review Unit 6 (Part 1) Trigonometric Identities 1 Day

Test Unit 6 (Part 1) Trigonometric Identities 1 Day


|  |  |  |  |  | Section 5-4 <br> (Pgs 336-343) <br> Algebra and Trigonometry with Analytic Geometry (Swokowski) (Pg 515-525) <br> 3 Days |  | Standard: Understand solving equations as a process of reasoning and explain the reasoning. <br> 1. Explain each step in solving a simple equations as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities. | What are trigonometric identities and why are they useful? | Trigonometric Identities and Equations | Students should be able to use multiple angle formulas to rewrite and evaluate trigonometric functions. <br> Students should be able to use power reducing formulas to rewrite and evaluate trigonometric functions. <br> Students should be able to use halfangle formulas to rewrite and evaluate trigonometric functions. <br> Students should be able to use sum-to- | Double Angle and Half Angle Identities <br> Suggested <br> Resources: <br> Trigonometry (Hosteteler/Larson) <br> Section 2-5 <br> Pgs.255-266 <br> Advanced <br> Mathematical <br> Concepts <br> Section 7-3 <br> (Pgs.437-447) <br> Glencoe Precalculus - <br> 2011 <br> Section 5-4 <br> (Pgs 336-343) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski) <br> ( Pg 515-525) | Double-Angle Formulas <br> Power-Reducing Formulas <br> Half-Angle <br> Formulas <br> Product to Sum Formulas | Domain: F-TF <br> Trigonometric <br> Functions <br> Standard: Prove and apply trigonometric identities <br> 9. Prove the addition and subtraction formulas for sine, cosine and tangent and use them to solve problems. <br> Domain: A-REI <br> Reasoning with equations and Inequalities <br> Standard: Understand solving equations as a process of reasoning and explain the reasoning. |



## Review Unit 6 (Part 2) Trigonometric Identities 1 Day

Test Unit 6 (Part 2) Trigonometric Identities 1 Day

Unit 7 Trigonometry and Right Triangles

| 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 | 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. <br> Students should be able to use the Fundamental trigonometric identities. | Right Triangle <br> Trigonometry <br> Suggested <br> Resources: <br> Trigonometry <br> (Hosteteler/Larson) <br> Section 1-3 <br> Pgs.149-159 <br> Advanced <br> Mathematical <br> Concepts | Hypotenuse <br> Leg <br> Side adjacent <br> Side opposite <br> Trigonometric ratios <br> Sine <br> Cosine | Domain: G-SRT <br> Similarity, Right <br> Triangles, and Trigonometry <br> Standard: Define trigonometric ratios and solve problems involving right triangles <br> 6. Understand that by similarity, side ratios in right triangles are |




|  |  |  |  | life problems involving harmonic motion. | (Pgs 220-230) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski <br> (Pg 392-420) <br> 8 days | Bearing Harmonic motion | Domain: F-TF <br> Trigonometric <br> Functions <br> Standard: Extend the domain of trigonometric functions using the unit circle. <br> 3. Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi-x, \pi+x$, $2 \pi-x, 2 \pi+x$ in terms of their values for $x$, where $x$ is any real number. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Review Unit 7 Trigonometry and Right Triangles 1 Day |  |  |  |  |  |  |  |
| Test Unit 7 Trigonometry and Right Triangles 1 Day |  |  |  |  |  |  |  |
| Unit 8 Trigonometry and Oblique Triangles |  |  |  |  |  |  |  |
| Estimated Time Frame for Unit | Big Ideas | Essential Question | Concepts | Competencies | Lesson Plans and Suggested Resources | Vocabulary | Standards/Eligible Content |
| 15 Days | Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms. | In what ways might radians be more useful than degrees in various situations (or vice versa)? | Trigonometric Functions | Students should be able to evaluate trigonometric functions of any angle. <br> Students should be able to use reference angles to evaluate trigonometric functions. | Trigonometric Functions of Any Angle <br> Suggested Resources: <br> Trigonometry (Hosteteler/Larson) Section 1-4 Pgs.160-168 | Reference angles | Domain: F-TF <br> Trigonometric Functions <br> Standard: Extend the domain of trigonometric functions using the unit circle <br> 1. Understand radian measure of an angle as |


|  |  |  |  | Students should be able to evaluate trigomonetric functions of real numbers. | Advanced <br> Mathematical <br> Concepts <br> Section 5-1 <br> (Pgs.277--283) <br> Glencoe- <br> Pre-calculus(2012) <br> Section 4-2 <br> ( Pgs 231-241) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski) <br> Pg 392-403) <br> 1 Day |  | the length of the arc on the unit circle subtended by the angle. <br> 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. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities. | How does one know when to use the Law of Sines versus the Law of Cosines? | Trigonometric Functions | Students should be able to use the Law of Sines to solve oblique triangles (AAS or ASA) <br> Students should be able to use the Law of Sines to solve oblique triangles (SSA). | The Law of Sines <br> Suggested <br> Resources: <br> Trigonometry (Hosteteler/Larson) <br> Section 3-1 <br> Pgs.278-286 <br> Advanced <br> Mathematical <br> Concepts <br> Section 5-6 <br> (Pgs.313--318) <br> Glencoe <br> Pre-calculus(2012) <br> Section 4-7 <br> ( Pgs 291-301) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski) <br> (Pg 562-581) <br> 3 Days | Law of Sines | Domain: G-SRT <br> Similarity, Right <br> Triangles, and <br> Trigonometry <br> Standard: Apply <br> trigonometry to <br> general triangles. <br> 10. Prove the Laws of Sines and Cosines and use them to solve problems. <br> 11. Understand and apply the Laws of Sines and the laws of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces) |


|  | There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities. | How does one know when to use the Law of Sines versus the Law of Cosines? | Trigonometric Functions | Students should be able to use the Law of Cosines to solve oblique triangles (SSS or SAS) | The Law of Cosines <br> Suggested <br> Resources: <br> Trigonometry (Hosteteler/Larson) <br> Section 3-2 <br> Pgs.287-2294 <br> Advanced <br> Mathematical <br> Concepts <br> Section 5-6 <br> (Pgs.313--318) <br> Glencoe <br> Pre-calculus(2012) <br> Section 4-7 <br> ( Pgs 291-301) <br> Algebra and <br> Trigonometry with <br> Analytic Geometry <br> (Swokowski) <br> (Pg 562-581) <br> 5 Days | Law of Cosines | Domain: G-SRT <br> Similarity, Right <br> Triangles, and <br> Trigonometry <br> Standard: Apply <br> trigonometry to <br> general triangles. <br> 10. Prove the Laws of Sines and Cosines and use them to solve problems. <br> 11. Understand and apply the Laws of Sines and the laws of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities. | How does one know when to use the Law of Sines versus the Law of Cosines? | Trigonometric Functions | Students should be able to use the Law of SInes to model and solve realworld problems. <br> Students should be able to use the Law of CosInes to model and solve realworld problems. | Applications of the Use of the Laws of Sines and Cosines. <br> Suggested <br> Resources: <br> Trigonometry (Hosteteler/Larson) <br> Section 3-1 <br> Pgs.278-286 <br> Section 3-2 <br> Pgs.287-2294 <br> Advanced <br> Mathematical <br> Concepts <br> Section 5-6 <br> (Pgs.313--318) | Law of Cosines | Domain: G-SRT <br> Similarity, Right <br> Triangles, and <br> Trigonometry <br> Standard: Apply <br> trigonometry to <br> general triangles. <br> 10. Prove the Laws of Sines and Cosines and use them to solve problems. <br> 11. Understand and apply the Laws of Sines and the laws of Cosines to find unknown |



Test Unit 8 Trigonometry and Oblique Triangles 1 Day

Unit 9 Vectors
$\left.\begin{array}{|l|l|l|l|l|l|l|l|}\hline \begin{array}{l}\text { Estimated } \\ \text { Time Frame } \\ \text { for Unit }\end{array} & \text { Big Ideas } & \text { Essential Question } & \text { Concepts } & \text { Competencies } & \begin{array}{l}\text { Lesson Plans } \\ \text { and Suggested } \\ \text { Resources }\end{array} & \text { Vocabulary } & \text { Standards/Eligible } \\ \text { Content }\end{array}\right]$

|  |  |  |  | Students should be able to use vectors to model and solve real world problems. | $\begin{aligned} & \text { (Pgs 492-499) } \\ & \text { Algebra and } \\ & \text { Trigonometry with } \\ & \text { Analytic Geometry } \\ & \text { (Swokowski Pg } 581 \\ & -596 \text { ) } \\ & 5 \text { Days } \end{aligned}$ |  | for vectors and their magnitudes. <br> Standard: Perform operations on vectors <br> 4. Add and subtract vectors. <br> a. Add vectors end-toend, 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. <br> b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. <br> c. Understand that vector subtraction is the additive inverse with the same magnitude and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise. <br> 5. Multiply a vector by a scalar. <br> a. Represent scalar multiplication graphically by scaling |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |



|  |  |  |  |  |  |  | parallelogram rule. <br> Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes. <br> b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. <br> c. Understand that vector subtraction is the additive inverse with the same magnitude and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise. <br> 5. Multiply a vector by a scalar. <br> a. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise. <br> b. Compute the magnitude of a scalar multiple. Compute the direction of a scalar multiple knowing that Icl $\mathrm{v} \neq 0$, the direction |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |



Test Unit 9 Vectors 1 Day

## Unit 10 Solving Systems of Equations with Matrices

| Estimated <br> Time Frame for Unit | Big Ideas | Essential Question | Concepts | Competencies | Lesson Plans and Suggested Resources | Vocabulary | Standards/Eligible Content |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 9 Days | Degree and direction of linear association between two variables is measurable | How do you differentiate between two independent events and two dependent events and how do you calculate the probabilities for each situation? | Algebraic properties, processes and representations | Students should be able to organize data into matrices. <br> Students should be able to matrix row and column operations to analyze data. | Introduction to Matrices <br> Suggested Text <br> Glencoe Algebra 2 (2010)- <br> Chapter 4- Section <br> 4-1 (pgs 185-191) <br> 1 Days | Matrix <br> Element <br> Dimensions <br> Row matrix <br> Column matrix <br> Square matrix <br> Zero matrix <br> Equal matrices | Domain: A-REI Reasoning with Equations and Inequalities <br> Standard: Solve systems of equation 8. Represent a system of linear equations as a single matrix equation in a vector variable. <br> 9. Find the inverse of a matrix if it exist and use it to solve systems of linear equations. (using technology for matrices of dimensions of $3 \times 3$ or higher) |
|  | Degree and direction of linear association between two variables is measurable | How do you differentiate between two independent events and two dependent events and how do you calculate the probabilities for each situation? | Algebraic properties, processes and representations. | Students should be able to add and subtract matrices. <br> Students should be able to multiply a matrix by a scalar | Operations with Matrices- <br> Suggested TextGlencoe Algebra 2 (2010)-Section 4-2 (pgs 191-199) Section 4-3 | Scaler <br> Scalar <br> multiplication | Domain: A-REI <br> Reasoning with <br> Equations and Inequalities <br> Standard: Solve systems of equation |


|  |  |  |  | Students should be able to multiply matrices. <br> Students should be able to use the properties of matrix multiplication. | (pgs 200-207) <br> 1 Day | 8. Represent a system of linear equations as a single matrix equation in a vector variable. <br> 9. Find the inverse of a matrix if it exist and use it to solve systems of linear equations. (using technology for matrices of dimensions of $3 \times 3$ or higher) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Degree and direction of linear association between two variables is measurable | How do you differentiate between two independent events and two dependent events and how do you calculate the probabilities for each situation? | Algebraic properties, processes and representations. | Students should be able to find the inverse of a $2 \times 2$ matrix. <br> Students should be able to write and solve matrix equations for a system of equations | Inverse Matrices and Systems of Equations <br> Suggested Text- <br> Glencoe Algebra 2 <br> (2010) <br> Section 4-6 <br> (pgs 229-235) <br> Glencoe <br> Precalculus -2011 <br> Section 6-3 <br> Pgs.388-394 <br> Algebra and <br> Trigonometry with Analytic Geometry (Swokowski Pg 687 709) <br> 5-days | Domain: A-REI Reasoning with Equations and Inequalities <br> Standard: Solve systems of equation 8. Represent a system of linear equations as a single matrix equation in a vector variable. <br> 9. Find the inverse of a matrix if it exist and use it to solve systems of linear equations. (using technology for matrices of dimensions of $3 \times 3$ or higher) |
|  | Review Unit 10 Solving Systems of Equations with Matrices 1 Day |  |  |  |  |  |
|  | Test Unit 10 Solving Systems of Equations with Matrices 1 Day |  |  |  |  |  |
|  |  |  |  |  |  |  |

