Brookfield Local Schools
Curriculum Map for Pre-Calculus

Unit Title: Polynomial and function "review"

Duration of Unit: 3 – 4 weeks (September)

Topic Sequence:

1. Functions: Domain, range, compositions, inverses, transformations – 1 week
2. Quadratics: Factoring, solving, graphing, applications – 1 week
3. Polynomials: Operations, graphing, applications – 1 week

Common Core State Standards Addressed:

CCSS.Math.Content.HSF.IF.A.1
Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f*(*x*) denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y* = *f*(*x*).
CCSS.Math.Content.HSF.IF.A.2
Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
CCSS.Math.Content.HSF.BF.A.1.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 a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time*.
CCSS.Math.Content.HSF.BF.B.4.b
(+) Verify by composition that one function is the inverse of another.
CCSS.Math.Content.HSF.BF.B.4
Find inverse functions.
CCSS.Math.Content.HSF.BF.B.4.c
(+) Read values of an inverse function from a graph or a table, given that the function has an inverse.
CCSS.Math.Content.HSF.IF.C.7
Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*

CCSS.Math.Content.HSF.IF.C.7.a
Graph linear and quadratic functions and show intercepts, maxima, and minima.
CCSS.Math.Content.HSF.IF.C.7.c
Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior

Student Friendly Learning Targets:

- I can identify functions and use key characteristics to graph
- I can do compositions on functions and verify inverses using compositions

- I can solve linear and quadratic functions using multiple methods
- I can identify key characteristics of quadratic functions including maxima and minima

- I can factor polynomials to find zeros and identify key characteristics on a graph

Vocabulary:
Function: Function notation, domain, range, intercepts, inverse, composition
Quadratics: Factoring, maximum/minimum, axis of symmetry
Polynomials: Polynomial, zero, degree, even, odd, symmetry, end behavior

Materials and/or Technology Needed:
Textbook: Advanced Mathematics
Trigonometry
Practice worksheets
TI-84 Graphing Calculator

Instructional Notes:
- http://education.ohio.gov/Topics/Ohio-s-New-Learning-Standards/Mathematics

PARCC MODEL CONTENT FRAMEWORKS :
- http://www.parcconline.org/sites/parcc/files/PARCCMCFMathematicsNovember2012V3_FINAL.pdf

Assessment Notes:
Summative:
- Individual quizzes over graphing, dividing (all operations), factoring, and solving
- Unit test

Formative:
- Watch volunteers explain problems to peers on the board and observe students at their seats individually working or following along
- Observe students working on practice problems at their desk or at the board
- Exit Slip
- Muddy/Clear Post-its
- KWL (Know, Want to know, Learned) Chart
- Self-reflection

Resources:
Calculus Textbook
Internet – extra worksheets, examples, demonstrations, activities
Learning Tasks:
- NCTM Navigation Series

General resources:
- http://achievethecore.org/
- https://www.illustrativemathematics.org/
- http://www.nctm.org/
- http://www.parcconline.org/

Brookfield Local Schools
Curriculum Map for Pre-Calculus

Unit Title: Rational Functions

Duration of Unit: 2 - 3 weeks (October)

Topic Sequence:
1. Rational function introduction: simplifying and graphing
2. Adding and subtracting
3. Multiplying and dividing
4. Solivng

Common Core State Standards Addressed:
CCSS.Math.Content.HSA.APR.D.6
Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.
CCSS.Math.Content.HSA.APR.D.7
(+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.
CCSS.Math.Content.HSF.IF.C.7.d
(+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

Student Friendly Learning Targets:
- I can identify what rational functions look like.
- I can graph rational functions and identify their key characteristics
- I can add, subtract, multiply, and divide rational functions.
- I can solve rational functions.

Vocabulary:
Domain, zero, vertical/horizontal asymptote, hole
Least common denominator, extraneous solution

Materials and/or Technology Needed:
Textbook: Advanced Mathematics
Trigonometry
Practice worksheets
TI-84 Graphing Calculator

Instructional Notes:
Students should bring background knowledge in simplifying rational functions by factoring from algebra 2. Also, they should know how to solve multi-step linear equations with fractions (the beginning to rational functions) from algebra 1.
Students do not know how to solve rational equations from prior knowledge.

- http://education.ohio.gov/Topics/Ohio-s-New-Learning-Standards/Mathematics

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Assessment Notes:

Summative:

- Individual quizzes over graphing, dividing (all operations), factoring, and solving
- Unit test

Formative:

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- Observe students working on practice problems at their desk or at the board
- Exit Slip
- Muddy/Clear Post-its
- KWL (Know, Want to know, Learned) Chart
- Self-reflection

Resources:

Textbook: Pre-Calculus, Calculus

Internet – extra worksheets, examples, demonstrations, activities

Learning Tasks:

- https://www.georgiastandards.org/Frameworks/GSO%20Frameworks/Math%20IV%20unit%203%20SE.pdf
- http://www.utdanacenter.org/highered/alg2/downloads/IV-B-CourseContentAlgII/AlgII_5-3-3.pdf

General resources:

- http://achievethecore.org/
- https://www.illustrativemathematics.org/
- http://www.nctm.org/
- http://www.parcconline.org/

Brookfield Local Schools
Curriculum Map for Pre-Calculus

Unit Title: Analytic Geometry

Duration of Unit: 5 – 6 weeks (March/April)

Topic Sequence:

1. Equations of circles: Develop equations, find intersections
2. Ellipse: Develop equations, graph, intersections
3. Hyperbola: Develop equations, graph, intersections
4. Parabola: Find equations, graph, intersections
5. Solve systems of second degree equations: Graphically, algebraically, and with technology

Common Core State Standards Addressed:

CCSS.Math.Content.HSG.GPE.A.1
Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
CCSS.Math.Content.HSG.GPE.A.2
Derive the equation of a parabola given a focus and directrix.
CCSS.Math.Content.HSG.GPE.A.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.

Student Friendly Learning Targets:

- I can write and use equations of circles
- I can work with an ellipse
- I can work with hyperbolas
- I can work with a parabola
- I can solve a system of second degree equations

Vocabulary:

Distance formula, coordinates, radius, center, complete the square
Parabola, focus, prefect square trinomial, ellipse, hyperbola

Materials and/or Technology Needed:

Textbook: Advanced Mathematics
Trigonometry
Practice worksheets
TI-84 Graphing Calculator

Instructional Notes:

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Assessment Notes:
Summative:

- Individual quizzes over graphing, dividing (all operations), factoring, and solving
- Unit test

Formative:

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- Observe students working on practice problems at their desk or at the board
- Exit Slip
- Muddy/Clear Post-its
- KWL (Know, Want to know, Learned) Chart
- Self-reflection

Resources:
Textbook: Pre-Calculus, Calculus
Internet – extra worksheets, examples, demonstrations, activities

Learning Tasks:
General resources:

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Brookfield Local Schools
Curriculum Map for Pre-Calculus

Unit Title: Statistics

Duration of Unit: 3 – 4 weeks (April/May)

Topic Sequence:

1. Tables, graphs, averages
2. Box-and-Whisker plots
3. Variability
4. Normal distribution
5. Sampling
6. Surveys and Polls

Common Core State Standards Addressed:

CCSS.Math.Content.HSS.ID.A.1
Represent data with plots on the real number line (dot plots, histograms, and box plots).
CCSS.Math.Content.HSS.ID.A.2
Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
CCSS.Math.Content.HSS.ID.A.3
Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
CCSS.Math.Content.HSS.ID.A.4
Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

CCSS.Math.Content.HSS.IC.B.3
Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
CCSS.Math.Content.HSS.IC.B.4
Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

Student Friendly Learning Targets:

- I can represent data and compare/interpret data
- I can use a box-and-whisker plot to organize data and read data
- I can calculate standard deviation
- I can describe normal distribution
- I can describe the different types of sampling and relate this to probability
- I can define confidence intervals

Vocabulary:
Stem-and-leaf plot, frequency table, averages (mean, median, mode)
Box-and-whisker plot, range, quartile
Statistic, variance, standard deviation, finite
Normal distribution, percentile
Population, sample, probability, random, interval

Materials and/or Technology Needed:
Textbook: Advanced Mathematics
Trigonometry
Practice worksheets
TI-84 Graphing Calculator

Instructional Notes:

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Assessment Notes:
Summative:

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- Unit test

Formative:

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- Observe students working on practice problems at their desk or at the board
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- Self-reflection

Resources:
Textbook: Pre-Calculus, Calculus
Internet – extra worksheets, examples, demonstrations, activities
Learning Tasks:
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Brookfield Local Schools
Curriculum Map for Pre-Calculus

Unit Title: Sequence and Series

Duration of Unit: 3 – 4 weeks (May)

Topic Sequence:

1. Arithmetic and geometric sequences
2. Recursive
3. Arithmetic and geometric series and their sums
4. Limits of infinite sequences
5. Sum of infinite series
6. Sigma Notation
7. Mathematical induction

Common Core State Standards Addressed:

CCSS.Math.Content.HSF.BF.A.1
Write a function that describes a relationship between two quantities.*
CCSS.Math.Content.HSF.BF.A.1.a
Determine an explicit expression, a recursive process, or steps for calculation from a context.
CCSS.Math.Content.HSF.IF.A.3
Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1*.

CCSS.Math.Content.HSF.BF.A.2
Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.*

CCSS.Math.Content.HSA.SSE.B.4
Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.**

Student Friendly Learning Targets:

- I can work with sequences
- I can define recursive equations
- I can work with series and their sums
- I can begin to identify limits of infinite sequences
- I can find the sum of infinite series
- I can work with sigma notation

Vocabulary:

Arithmetic sequence, geometric sequence, Fibonacci sequence, sequence
Recursive
Series, sum of a finite arithmetic series, sum of a finite geometric series
Infinite, limit
Partial sum, converge, diverge
Sigma notation, summand, limits, index, finite sum

Materials and/or Technology Needed:
Textbook: Advanced Mathematics
Trigonometry
Practice worksheets
TI-84 Graphing Calculator

Instructional Notes:

- http://education.ohio.gov/Topics/Ohio-s-New-Learning-Standards/Mathematics

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Assessment Notes:
Summative:

- Individual quizzes over graphing, dividing (all operations), factoring, and solving
- Unit test

Formative:

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- Observe students working on practice problems at their desk or at the board
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- Self-reflection

Resources:
Textbook: Pre-Calculus, Calculus
Internet – extra worksheets, examples, demonstrations, activities
Learning Tasks:
General resources:

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Brookfield Local Schools
Curriculum Map for Pre-Calculus

Unit Title: Exponential and Logarithmic Functions

Duration of Unit: 4 – 5 weeks (October)

Topic Sequence:
1. Growth and Decay
2. Exponential functions and their graphs
3. The number e, common and natural logarithms
4. Logarithm functions and their graphs
5. Logarithm properties
6. Solving exponential and logarithm equations

Common Core State Standards Addressed:
CCSS.Math.Content.HSF.LE.A.1.c
Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
CCSS.Math.Content.HSF.IF.C.8.b
Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)12^t$, $y = (1.2)^t/10$, and classify them as representing exponential growth or decay.
CCSS.Math.Content.HSF.LE.A.3
Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

CCSS.Math.Content.HSF.IF.C.7.e
Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

CCSS.Math.Content.HSF.LE.A.4
For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.
CCSS.Math.Content.HSF.BF.B.5
(+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.

Student Friendly Learning Targets:
- I can create and use growth and decay models and express how they are different from linear models
- I can identify key characteristics of exponential equations and their graphs
- I can tell the difference between common and natural logarithm equations
- I can identify key characteristics of logarithm equations and their graphs
- I can use logarithm properties to simplify expressions and solve equations

Vocabulary:
Growth and decay, y-intercept, end behavior
Exponents, asymptotes
Euler's number, common/natural logarithm
Extraneous Solution

Materials and/or Technology Needed:
Textbook: Advanced Mathematics
Trigonometry
Practice worksheets
TI-84 Graphing Calculator

Instructional Notes:
Students should bring an understanding of exponential properties from algebra 1 and 2.
They should have an understanding of logarithmic functions and their properties to help solve equations.

- http://education.ohio.gov/Topics/Ohio-s-New-Learning-Standards/Mathematics

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Assessment Notes:
Summative:
- Individual quizzes over graphing, dividing (all operations), factoring, and solving
- Unit test

Formative:
- Watch volunteers explain problems to peers on the board and observe students at their seats individually working or following along
- Observe students working on practice problems at their desk or at the board
- Exit Slip
- Muddy/Clear Post-its
- KWL (Know, Want to know, Learned) Chart
- Self-reflection

Resources:
Textbook: Pre-Calculus, Calculus
Internet – extra worksheets, examples, demonstrations, activities
Learning Tasks:
General resources:
- http://achievethecore.org/
- https://www.illustrativemathematics.org/
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- http://www.parcconline.org/

Brookfield Local Schools
Curriculum Map for Pre-Calculus

Unit Title: Trigonometric Functions

Duration of Unit: 3 weeks (November)

Topic Sequence:

1. Basic concepts: Coordinate plane, interval notation, domain and range
2. Angles: Rotation, degree measure, standard position and coterminal angles
3. Angle relationships and similar triangles: Geometric properties of angles and triangles
4. Defining trigonometric functions: acute angles and quadrantal angles
5. Using trigonometric functions: Determining sign value and ranges, using basic identities

Common Core State Standards Addressed:

CCSS.Math.Content.HSG.SRT.C.6
Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
CCSS.Math.Content.HSG.SRT.C.7
Explain and use the relationship between the sine and cosine of complementary angles.
CCSS.Math.Content.HSG.SRT.C.8
Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*
CCSS.Math.Content.HSF.TF.A.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 x, π + x, and 2π - x in terms of their values for x, where x is any real number.

Student Friendly Learning Targets:

- I can work on the coordinate plane, use different types of notations, and determine domain/range
- I can work with angles in degrees, standard position and use coterminal angles
- I can use special right triangles to determine certain trig values
- I can identify a trig function and find angle values of special angles and quadrantal angles
- I can determine if the sign value is positive or negative and use basic trig identities

Vocabulary:

Interval notation
Degree, coterminal angle, standard position, rotation, counter-clockwise
Sine, cosine, tangent, secant, cosecant, cotangent
Quadrantal

Materials and/or Technology Needed:

Textbook: Advanced Mathematics
Trigonometry
Practice worksheets
TI-84 Graphing Calculator

Instructional Notes:
Students should know how to work on a coordinate plane from geometry and use special right triangles. They should have a basic understanding of what a trigonometric function look likes.

- http://education.ohio.gov/Topics/Ohio-s-New-Learning-Standards/Mathematics

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Assessment Notes:
Summative:

- Individual quizzes over graphing, dividing (all operations), factoring, and solving
- Unit test

Formative:

- Watch volunteers explain problems to peers on the board and observe students at their seats individually working or following along
- Observe students working on practice problems at their desk or at the board
- Exit Slip
- Muddy/Clear Post-its
- KWL (Know, Want to know, Learned) Chart
- Self-reflection

Resources:
Textbook: Pre-Calculus, Calculus
Internet – extra worksheets, examples, demonstrations, activities
Learning Tasks:
General resources:

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Brookfield Local Schools
Curriculum Map for Pre-Calculus

Unit Title: Acute Angles and Right Triangles

Duration of Unit: 4 weeks (November/December)

Topic Sequence:

1. Trigonometric functions of acute angles: Trig definitions, cofunctions, special angles
2. Trigonometric functions of non-acute angles: Reference angles
3. Trigonometric functions and calculators: Approximate trig functions and find angle values
4. Solving right triangles: Missing sides or angles using trig functions, angle of elevation/depression
5. Right triangle applications: Bearing and distance values

Common Core State Standards Addressed:

CCSS.Math.Content.HSG.SRT.C.6
Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
CCSS.Math.Content.HSG.SRT.C.7
Explain and use the relationship between the sine and cosine of complementary angles.
CCSS.Math.Content.HSG.SRT.C.8
Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*
CCSS.Math.Content.HSN.Q.A.1
Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

Student Friendly Learning Targets:

- I can define a trig function and use their properties with special angles
- I can use reference angles of special right triangles to evaluate trig functions
- I can approximate trig values and find angle values of non-special angles
- I can solve a right triangle using trig
- I can apply my knowledge of right triangles to bearings and distance

Vocabulary:

Similarity, corresponding, proportional, leg, hypotenuse, sine, cosine, tangent, ratio
Inverse, reciprocal
Pythagorean theorem, bearing

Materials and/or Technology Needed:

Textbook: Advanced Mathematics
Trigonometry
Practice worksheets
TI-84 Graphing Calculator

Instructional Notes:
Students should bring a basic knowledge of trigonometric ratios and the Pythagorean theorem from geometry.

- http://education.ohio.gov/Topics/Ohio-s-New-Learning-Standards/Mathematics

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Assessment Notes:
Summative:

- Individual quizzes over graphing, dividing (all operations), factoring, and solving
- Unit test

Formative:

- Watch volunteers explain problems to peers on the board and observe students at their seats individually working or following along
- Observe students working on practice problems at their desk or at the board
- Exit Slip
- Muddy/Clear Post-its
- KWL (Know, Want to know, Learned) Chart
- Self-reflection

Resources:
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Learning Tasks:
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Brookfield Local Schools
Curriculum Map for Pre-Calculus

Unit Title: Radian Measure and Unit Circle

Duration of Unit: 2 – 3 weeks (December)

Topic Sequence:
1. Radian measure: Define, convert between radians and degrees, finding function values
2. Radian applications: Arch length and area of a circle/sector
3. Circular functions: Unit circle

Common Core State Standards Addressed:
CCSS.Math.Content.HSF.TF.A.1
Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

CCSS.Math.Content.HSG.C.B.5
Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.

CCSS.Math.Content.HSF.TF.A.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.
CCSS.Math.Content.HSF.TF.A.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 x, π + x, and 2π - x in terms of their values for x, where x is any real number.
CCSS.Math.Content.HSF.TF.A.4
(+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.

Student Friendly Learning Targets:
- I can convert between angles measured in degrees and radians
- I can find the arc length of a circle and find the area of a given sector in applications
- I can identify the unit circle and make connections between angle measures and trig values

Vocabulary:
Radian, degree
Arc, arc length, sector, rotation
Unit circle, even, odd, periodicity

Materials and/or Technology Needed:
Textbook: Advanced Mathematics
Trigonometry
Practice worksheets
TI-84 Graphing Calculator

Instructional Notes:
Students should have a brief understanding of trigonometric functions to make logical connections to the unit circle. Some students may have seen the unit circle in geometry.
Stress the importance of radian measures with applications of circles.
Have students memorize and know the unit circle values in a week.

- http://education.ohio.gov/Topics/Ohio-s-New-Learning-Standards/Mathematics

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Assessment Notes:
Summative:

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- Unit test

Formative:

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- Observe students working on practice problems at their desk or at the board
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- Self-reflection

Resources:
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Brookfield Local Schools
Curriculum Map for Pre-Calculus

Unit Title: Trigonometric Graphing

Duration of Unit: 3 – 4 weeks (January)

Topic Sequence:
1. Graphs of the sine and cosine: Define a periodic function, work with transformations – 1 week
2. Graphs of the secant and cosecant – 3 – 4 days
3. Graphs of the tangent and cotangent – 3 days

Common Core State Standards Addressed:
CCSS.Math.Content.HSF.TF.A.4
(+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.
CCSS.Math.Content.HSF.TF.B.5
Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.*
CCSS.Math.Content.HSF.IF.C.7
Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*

Student Friendly Learning Targets:
- I can graph the sine function and identify key characteristics
- I can graph the cosine function and identify key characteristics
- I can graph the secant and cosecant based on properties of the sine and cosine graph
- I can graph the tangent and cotangent with key characteristics

Vocabulary:
Periodicity, period, amplitude, phase shift, vertical translation
Asymptote, zero

Materials and/or Technology Needed:
Textbook: Advanced Mathematics
Trigonometry
Practice worksheets
TI-84 Graphing Calculator

Instructional Notes:
Students should bring knowledge of transformations from geometry and transformations on functions from algebra 2.

- http://education.ohio.gov/Topics/Ohio-s-New-Learning-Standards/Mathematics

PARCC MODEL CONTENT FRAMEWORKS :
- http://www.parcconline.org/sites/parcc/files/PARCCMCFMathematicsNovember2012V3_FINAL.pdf

Assessment Notes:
Summative:

- Individual quizzes over graphing, dividing (all operations), factoring, and solving
- Unit test

Formative:

- Watch volunteers explain problems to peers on the board and observe students at their seats individually working or following along
- Observe students working on practice problems at their desk or at the board
- Exit Slip
- Muddy/Clear Post-its
- KWL (Know, Want to know, Learned) Chart
- Self-reflection

Resources:
Textbook: Pre-Calculus, Calculus
Internet – extra worksheets, examples, demonstrations, activities

Learning Tasks:
General resources:

- http://achievethecore.org/
- https://www.illustrativemathematics.org/
- http://www.nctm.org/
- http://www.parcconline.org/

Brookfield Local Schools
Curriculum Map for Pre-Calculus

Unit Title: Trigonometric Identities

Duration of Unit: 4 weeks (January/February)

Topic Sequence:

1. Fundamental identities: Basic identities review, odd/even identities, prove basic identities
2. Verifying identities: working on one side and both sides
3. Sum and difference identities: cosine
4. Sum and difference identities: sine
5. Sum and difference identities: tangent
6. Double angle identities
7. Half-angle identities

Common Core State Standards Addressed:

CCSS.Math.Content.HSF.TF.C.8

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

CCSS.Math.Content.HSF.TF.C.9

(+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.

Student Friendly Learning Targets:

- I can prove the basic identities and why they "work"
- I can verify multiple identities and work on one side or both sides if needed
- I can use the sum and difference identities for the cosine and sine
- I can use the sum and difference identity for the tangent
- I can work with the double-angle and half-angle identities

Vocabulary:

Pythagorean theorem, unit circle, quotient/reciprocal identity
Sine, cosine, tangent, sum and difference

Materials and/or Technology Needed:

Textbook: Advanced Mathematics
Trigonometry
Practice worksheets
TI-84 Graphing Calculator

Instructional Notes:

- http://education.ohio.gov/Topics/Ohio-s-New-Learning-Standards/Mathematics

PARCC MODEL CONTENT FRAMEWORKS :

- http://www.parcconline.org/sites/parcc/files/PARCCMCFMathematicsNovember2012V3_FINAL.pdf

Assessment Notes:
Summative:

- Individual quizzes over graphing, dividing (all operations), factoring, and solving
- Unit test

Formative:

- Watch volunteers explain problems to peers on the board and observe students at their seats individually working or following along
- Observe students working on practice problems at their desk or at the board
- Exit Slip
- Muddy/Clear Post-its
- KWL (Know, Want to know, Learned) Chart
- Self-reflection

Resources:
Textbook: Pre-Calculus, Calculus
Internet – extra worksheets, examples, demonstrations, activities

Learning Tasks:
General resources:

- http://achievethecore.org/
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- http://www.nctm.org/
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Brookfield Local Schools
Curriculum Map for Pre-Calculus

Unit Title: Trigonometric Inverses

Duration of Unit: 3 - 4 weeks (February)

Topic Sequence:
1. Inverse functions and their graphs
2. Equations I: Solving by linear methods, quadratic formula, and technology
3. Equations II: Solving with half-angle and multiple-angles
4. Equations III: Solving inverse trigonometric equations

Common Core State Standards Addressed:
CCSS.Math.Content.HSF.TF.B.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.
CCSS.Math.Content.HSF.TF.B.7
(+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.*

Student Friendly Learning Targets:
- I can work with inverse trig functions and identify their graphs
- I can solve trigonometric equations using multiple methods

Vocabulary:
Inverse, one-to-one, horizontal line test, domain, increasing/decreasing
Inverse function, evaluate, solve

Materials and/or Technology Needed:
Textbook: Advanced Mathematics
Trigonometry
Practice worksheets
TI-84 Graphing Calculator

Instructional Notes:

- http://education.ohio.gov/Topics/Ohio-s-New-Learning-Standards/Mathematics

PARCC MODEL CONTENT FRAMEWORKS :
- http://www.parcconline.org/sites/parcc/files/PARCCMCFMathematicsNovember2012V3_FINAL.pdf

Assessment Notes:
Summative:

- Individual quizzes over graphing, dividing (all operations), factoring, and solving
- Unit test

Formative:

- Watch volunteers explain problems to peers on the board and observe students at their seats individually working or following along
- Observe students working on practice problems at their desk or at the board
- Exit Slip
- Muddy/Clear Post-its
- KWL (Know, Want to know, Learned) Chart
- Self-reflection

Resources:
Textbook: Pre-Calculus, Calculus
Internet – extra worksheets, examples, demonstrations, activities

Learning Tasks:
General resources:

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Brookfield Local Schools
Curriculum Map for Pre-Calculus

Unit Title: Oblique Triangle Laws

Duration of Unit: 3 weeks (March)

Topic Sequence:
1. Law of sines: AAS or ASA
2. Law of cosines: SSS or SAS, Heron Formula for Area of a Triangle (no height)
3. Ambiguous case for Law of sines
4. Vectors and applications

Common Core State Standards Addressed:
CCSS.Math.Content.HSG.SRT.D.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.
CCSS.Math.Content.HSG.SRT.D.10
(+) Prove the Laws of Sines and Cosines and use them to solve problems.
CCSS.Math.Content.HSG.SRT.D.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).

CCSS.Math.Content.HSN.Q.A.1
Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
CCSS.Math.Content.HSN.VM.A.1
(+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., $\boldsymbol{v}$, $|\boldsymbol{v}|$, $||\boldsymbol{v}||$, v).
CCSS.Math.Content.HSN.VM.A.3
(+) Solve problems involving velocity and other quantities that can be represented by vectors.

Student Friendly Learning Targets:
- I can use the Law of sines when appropriate
- I can use the Law of cosines when appropriate
- I can identify ambiguous cases for the Law of sines
- I can identify a vector and use them

Vocabulary:
Pythagorean theorem, law of sines/cosines, ASA, AAS, SSA, SAS, SSS
Vector, magnitude, direction, initial point

Materials and/or Technology Needed:
Textbook: Advanced Mathematics
Trigonometry
Practice worksheets
TI-84 Graphing Calculator

Instructional Notes:

- http://education.ohio.gov/Topics/Ohio-s-New-Learning-Standards/Mathematics

PARCC MODEL CONTENT FRAMEWORKS :

- http://www.parcconline.org/sites/parcc/files/PARCCMCFMathematicsNovember2012V3_FINAL.pdf

Assessment Notes:

Summative:

- Individual quizzes over graphing, dividing (all operations), factoring, and solving
- Unit test

Formative:

- Watch volunteers explain problems to peers on the board and observe students at their seats individually working or following along
- Observe students working on practice problems at their desk or at the board
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- Self-reflection

Resources:

Textbook: Pre-Calculus, Calculus

Internet – extra worksheets, examples, demonstrations, activities

Learning Tasks:

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