Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Analytic Geometry Days: 9

Subject(s): Grade(s):

Key Learning:
The graphs of conic sections are represented by secondary degree equations.

Unit Essential Question(s):

How can we identify the "critical" components of the graph of a conic section from its equation?
How can we find the equation of a conic section from the "critical" components of its graph?

Concept: Review of the basics of analytic geometry CC.2.3.HS.A.10	Concept: Circles CC.2.3.HS.A.8	Concept: Ellipses CC.2.3.HS.A.10
Lesson Essential Question(s): What is analytic geometry? What are conic sections? (A)	Lesson Essential Question(s): What is the center and radius of a circle whose equation is (A)	Lesson Essential Question(s): What is the equation of the ellipse with major vertices (8,-2) and (2, -2), and foci (5+ (A)
Vocabulary: analytic geometry, locus, complete the square	Vocabulary: center, radius	Vocabulary: ellipse, foci, major axis, vertices

Concept: Hyperbolas CC.2.3.HS.A.10	Concept: Parabolas CC.2.3.HS.A.10
Lesson Essential Question(s): What are the center, foci, vertices, and equations of the asymptotes of the hyperbole: (A)	Lesson Essential Question(s): What is the equation of a parabola with vertex (2,2) and directrix y=17/8? (A)
Vocabulary:	Vocabulary: parabola, areas of symmetry, focus, vertex, directrix

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Data Analysis and Probability Days: 8

Subject(s): Grade(s):

Key Learning:

Data can be described by a variety of statistical means, depending on its context.

Probability and probability distributions are used to make inferences about a set of data.

Unit Essential Question(s):

How are sets of one-variable and two-variable data organized, summarized, presented and analyzed?

What probability measures are calculated and how do those measures allow us to make inferences from a data set?

Concept:	Concept:	Concept:
Counting Principle and Permutations and Combinations CC.2.4.HS.B.6	**Basic Probability, Compound Probability, Conditional Probability, Odds** CC.2.4.HS.B.6, CC.2.4.HS.B.7	**Binomial Probability** CC.2.4.HS.B.7
Lesson Essential Question(s): How are permutations different then combinations? (ET)	Lesson Essential Question(s): What are the similarities/differences between independent/dependent events inclusive/ mutually exclusiveHow id conditional probability related to the probability of two independent events? (A)	Lesson Essential Question(s): What conditions must be in effect for a binomial probability experiment? (A)
Vocabulary: Permutation, Combination, Sample space	Vocabulary: Inclusive, Mutually exclusive, Dependent, Independent	Vocabulary: Success, Failure, Experimental Probability, Theoretical Probability

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Data Analysis and Probability Days: 8

Subject(s): Grade(s):

Concept: **Descriptive Statistics** CC.2.4.HS.B.1	Concept: **Inferential Statistics** CC.2.4.HS.B.2, CC.2.4.HS.B.3	Concept: **Probability Distribution** CC.2.4.HS.B.2, CC.2.4.HS.B.3
Lesson Essential Question(s): Under what conditions would the measures of central tendency be greatly inpacted by the measures of variance? (ET)	Lesson Essential Question(s): For a set of given data, how are confidence levels determined? (A)	Lesson Essential Question(s): For a set of normally distributed data, how do the mean, the median, and the mode compare? (ET)
Vocabulary: Box plot, Frequency distributions, Histogram, Stem and leaf plot, Range, IQR, Measures of central tendency, Standard deviation, Quartile, Outlier, Regression equation	Vocabulary: Levels of confidence, Standard error of the mean	Vocabulary: Normal curve, T-scores, Normal distribution, Standard deviation

Additional Information:

Attached Document(s):

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Exponential & Logisitcs Functions Days: 6

Subject(s): Math Grade(s): 11th, 12th

Key Learning: **Exponential and logistics functions are particularly useful in modeling growth and decay.**

Unit Essential Question(s): **What are the characteristics of exponential and logistics functions that make them useful as models of growth and decay?**

Concept: **Properties** CC.2.2.HS.C.1	Concept: **Graphs** CC.2.2.HS.C.2	Concept: **Applications** CC.2.2.HS.C.5
Lesson Essential Question(s): What are the characteristics and properties of exponential and logistics functions? (A)	Lesson Essential Question(s): What is the relationship between the equation of an exponential/logistics function and its graph? (ET)	Lesson Essential Question(s): How can exponential functions be used to model real-world situations? (A) How can logistics functions be used to model real-world situations? (A)
Vocabulary: power functions, limit to growth, bounded	Vocabulary: domain, range	Vocabulary: compound interest, growth and decay

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Exponential & Logisitcs Functions Days: 6

Subject(s): Math Grade(s): 11th, 12th

Concept:

Zeros & Roots

CC.2.2.HS.C.5

Lesson Essential Question(s):

How can exponential functions be used to model real-world situations? (A)

How do we locate the roots of an exponetial/ logisticsistics function? (A)

How do we locate the roots of an exponetial/ logisticsistics function? (ET)

How can logistics functions be used to model real-world situations? (A)

What is the significance of the roots of an exponential/logistics function? (A)

What is the relationship between the equation of an exponential/logistics function and its graph? (ET)

What is the significance of the roots of an exponential/logistics function? (ET)

Vocabulary:

Additional Information:

Attached Document(s):

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Functions & Their Properties Days: 8

Subject(s): Math Grade(s): 11th, 12th

Key Learning: **All functions have several key properties.**

Unit Essential Question(s): **What methods can be used to analyze the chracteristics of a function?**

Concept: **Identify functions**	Concept: **Domain & Range (boundedness)**	Concept: **Discontinuity, Asymptotes, End-behavior**
CC.2.2.HS.C.1 CC.2.2.HS.D.4 CC.2.2.HS.C.1	**CC.2.2.HS.C.1** CC.2.2.HS.C.1	**CC.2.2.HS.C.4** **CC.2.2.HS.C.5** CC.2.2.HS.D.4 CC.2.2.HS.C.4 CC.2.2.HS.C.5
Lesson Essential Question(s): What makes a relationship a function? (ET)	Lesson Essential Question(s): How do we determine and describe the domain and range of a relation? (ET)	Lesson Essential Question(s): How do restrictions affect the graph of a function? (A) What happens to a function as the domain gets infinitely large or small? (A)
Vocabulary: relation, function, one-to-one, mapping, vertical-line test, domain, range	Vocabulary: domain, range, restrictions, disocntinuous, asymptotic	Vocabulary: discontinuituous, continuous, end-behavior, vertical and horizontal asymptotes, oblique asymptotes

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Functions & Their Properties Days: 8

Subject(s): Math Grade(s): 11th, 12th

Concept:	Concept:	Concept:
Increasing v Decreasing **CC.2.2.HS.C.2** **CC.2.2.HS.C.5** CC.2.2.HS.C.5 CC.2.2.HS.C.5	**Extrema** **CC.2.2.HS.C.4** CC.2.2.HS.C.4	**Radical functions** **CC.2.2.HS.C.6** CC.2.2.HS.C.6
Lesson Essential Question(s): How do restrictions affect the graph of a function? (A) How do we determine the interval(s) on which a function is increasing or decreasing? (A)	Lesson Essential Question(s): What happens to a function as the domain gets infinitely large or small? (A) How do we locate the minimum and maximum values of a function? (A)	Lesson Essential Question(s): How is the rational root theorem used to solve equations? (A)
Vocabulary: increasing, decreasing, positive & negative slope, extrema, tangent, secant, derivative, limit	Vocabulary: local extrema, global extrema	Vocabulary: extraneous roots

Additional Information:

Attached Document(s):

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Graphs of Trigonometric Functions Days: 6

Subject(s): Math Grade(s): 12th

Key Learning: **The graphs of all trigonometric functions share certain essential and useful characteristics.**

Unit Essential Question(s): **What are the characteristics of the graphs of trigonometirc functions and how do they apply to real-world situations?**

Concept: **Sinusoids** CC.2.2.HS.C.8	Concept: **Transformations** CC.2.2.HS.C.8	Concept: **Applications** CC.2.2.HS.C.8
Lesson Essential Question(s): What are the characteristics of sinusoidal graphs and how are they related to each function? (ET)	Lesson Essential Question(s): How do changes in the various fundamental characteristics (i.e. preiod, amplitude, phase displacement, etc.) affect the graph of a trigonometric function? (A)	Lesson Essential Question(s): What are the characteristics of sinusoidal graphs and how are they related to each function? (A) How can sinusoidal garphs be used to study sound and harmonic motion? (A)
Vocabulary: amplituide, frequency, period, phase displacement, periodic	Vocabulary:	Vocabulary:

Additional Information:

Worksheet on Sinusodial Applications
One lessonexample sheet for sinusodial applications
One Worksheet on trig graph transofrmations

Attached Document(s):

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Laws of Sines & Cosines Days: 5

Subject(s): Math Grade(s): 12th

Key Learning: **The laws of sines and cosines can be used to "solve" a variety of triangles.**

Unit Essential Question(s): **How do we find the lengths and measures of a triangle that does not contain a right angle?**

Concept: **Law of Sines** CC.2.2.HS.C.9	Concept: **Law of Cosines** CC.2.2.HS.C.9	Concept: **Area** CC.2.2.HS.C.9
Lesson Essential Question(s): What is the Law of Sines and how may it be used to "solve" a triangle? (A) What is the ambiguous case of the Law of Sines? (A)	Lesson Essential Question(s): When is the Law of Cosines appropriate and how can it be used to find the lengths and/or measures of a triangle? (A)	Lesson Essential Question(s): How can the Laws of Sines and Cosines be used to find the area of a triangle? (A)
Vocabulary:	Vocabulary:	Vocabulary: Heron's Formula, Heron's, Formula

Additional Information:

Worksheet: Law of Cosines Algebra Review

Attached Document(s):

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Logarithmic Functions Days: 7

Subject(s): Math Grade(s): 12th

Key Learning: **Logarithmic functions have many useful applications and are closely related to exponential functions.**

Unit Essential Question(s): **What are the properties and applications of logarithmic functions?**

Concept: **Properties** CC2.2.HS.C.1	Concept: **Graphs** CC.2.2.HS.C.2	Concept: **Applications** CC.2.2.HS.C.5
Lesson Essential Question(s): What are the basic characteristics of logarithmic functions? (A)	Lesson Essential Question(s): What is the relationship between the equation of a logarithmic function and its graph? (A) What is the relationship between the equation of a logarithmic function and its graph? (ET)	Lesson Essential Question(s): How can logarithmic functions be used to model various situations? (A)
Vocabulary: common logarithms, natural logarithms	Vocabulary:	Vocabulary:

Concept: **Solutions** CC.2.2.HS.C.5
Lesson Essential Question(s): How can the properties of algebra be used to simplify and solve logarithmic expressions? (A) How can the properties of algebra be used to simplify and solve logarithmic expressions? (A) How can logarithmic equations be solved using the properties of exponents? (A) How can logarithmic equations be solved using the properties of exponents? (ET)
Vocabulary:

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Parametrics and Polar Equations Days: 6

Subject(s): Math Grade(s): 12th

Key Learning: The height and distance traveled by an object can be determined by the amount of time that has elapsed since it was launcehd.

Unit Essential Question(s): How can the height and distance of a projectile be calculated?

Concept: Applications CC.2.2.HS.C.6	Concept: Properties CC.2.2.HS.C.6	Concept: Polar representations
Lesson Essential Question(s): How are parametric equations used to model real-world situations? (A)	Lesson Essential Question(s): What are the characteristics and properties of parametric equations? (A)	Lesson Essential Question(s): How are rectangular representations, etc. transformed to polar form? (A)
Vocabulary:	Vocabulary:	Vocabulary: Argument, Modulus

Additional Information:

Worksheets:
Normal and polar forms of linear equations
Polar form representations of complex numbers

Attached Document(s):

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Polynomial Functions & Rational Functions Days: 8

Subject(s): Math Grade(s): 11th, 12th

Key Learning: **The properties of polynomial and rational functions are instrumental in understanding the characteristics of higher-order functions.**

Unit Essential Question(s): **What are the essential characteristics and applications of polynomial and rational functions?**

Concept: **Zeros & Roots** CC.2.2.HS.D.4	Concept: **Complex Numbers** CC.2.1.HS.F.6	Concept: **Graphs** CC.2.2.HS.D.4
Lesson Essential Question(s): What means can be used to locate the zeros and roots of polynomial and rational functions? (A) What is the significance of the roots to a polynomial or rational function? (A)	Lesson Essential Question(s): How do we perform basic operations with complex numbers? (A) What are the methods for finding complex roots to a polynomial? (A)	Lesson Essential Question(s): What is the relationship between the equation of a polynomial/rational function and its graph? (ET)
Vocabulary: zeros, roots, intercepts, solutions, multiplicity, complex roots, real roots, rational roots, rational root theorem	Vocabulary: conjugate, complex numbers, imaginary numbers	Vocabulary: asymptotes and holes, types of discontinuity

Concept: **Properties** CC.2.1.HS.F.6	Concept: **Applications** CC.2.1.HS.F.7
Lesson Essential Question(s): How do we perform basic operations with complex numbers? (ET) What are the basic characteristics of polynomial and rational functions? (ET)	Lesson Essential Question(s): What are the methods for finding complex roots to a polynomial? (A) What real-world situations can be modeled using polynomial or rational functions? (A)
Vocabulary:	Vocabulary:

Additional Information:

Attached Document(s):

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Sequences and Series Days: 6

Subject(s): Grade(s):

Key Learning:

Many patterns of real-life data can be modeled by sequences and series. The inferences made from the recursive patterns of series can be mathematically verified.

Unit Essential Question(s):

How can the pattern of a sequence or series be algebraically represented?

How can pattern analysis be used to expand a binomial?

Concept:	Concept:	Concept:
Arithmetic sequences and series CC.2.2.HS.C.3	Geometric sequences and series:finate and infinite CC.2.2.HS.C.3	Binomial theorem CC.2.2.HS.C.3
Lesson Essential Question(s): What is meant by the "nth term "of a sequence or series? (A)	Lesson Essential Question(s): What are the similarities of arithmetic sequences and geometric sequences? (ET)	Lesson Essential Question(s): What pattern is established for the coefficients of the expansiion of a binomial? (ET)
Vocabulary: sequence, term, common difference, series, sigma rotation, arithmetic mean	Vocabulary: common ratio, geometric mean, infinite series	Vocabulary: expansion

Additional Information:

Attached Document(s):

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Trigonometric Functions and Angles Days: 6

Subject(s): Math Grade(s): 12th

Key Learning: Trigonometirc functions can be used to study a variety of topics including angles, triangles, arclength, and velocity.

Unit Essential Question(s): What are the trigonometric functions and how can they be applied to solve problems?

Concept: Circular Functions CC.2.2.HS.C.6	Concept: Angle Measure CC.2.2.HS.C.7	Concept: Right Triangle Trigonometry CC.2.2.HS.C.7
Lesson Essential Question(s): How can the trigonometric values of an angle be found in the Cartesian Plane? (A) What are the properties of an angle in standard position on the Cartesian Plane? (A) How can the measure of an angle be used to find arclength and velocity? (A)	Lesson Essential Question(s): How can the measure of an angle be found and what units may be used to record its size? (A) How can the measure of an angle be found and what units may be used to record its size? (ET) (A)	Lesson Essential Question(s): What are the definitions of the various trigonometric functions? (ET) What are the definitions of the various trigonometric functions? (A) How can the trigonometric functions be used to "solve" a right triangle? (A) How might right triangle trigonometry be used to model and solve problems of angle measure and length? (A)
Vocabulary: standard position, coterminal angles, reference angles, arclength, angular velocity	Vocabulary: radians, degrees-minutes-seconds	Vocabulary: SOHCAHTOA, sine, cosine, tangent, secant, cosecant, cotangent, Inverse trig functions

Additional Information:

Lesson Example Sheets:
applying right triangle trig
linear and angular velocity

Worksheets:
special right triangle trig ratios
inverse trig functions (2)

Attached Document(s):

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Trigonometric Identites & Conditionals Days: 7

Subject(s): Math Grade(s): 12th

Key Learning: **Trigonometric identities can be used to solve conditional equations.**

Unit Essential Question(s): **How can we simplify trigonometric expressions and solve equations involving trigonometric functions?**

Concept:	Concept:
Trigonometric Identities **CC.2.2.HS.C.8**	**Conditional Equations** **CC.2.2.HS.C.8**
Lesson Essential Question(s): What are the trigonometric identities? (A)	Lesson Essential Question(s): How do we solve equations involving trigonometric functions using properties of algebra and trigonometric identities? (A)
Vocabulary: reciprocal, quotient, Pythagorean, negative, sum and difference	Vocabulary:

Additional Information:

Worksheets:
Simplifying trig expressions
Solving trig equations
Trig equations and identities
Verify trig identities (3)

Attached Document(s):

Curriculum: COLUMBIA BOROUGH SD Curriculum PENNSYLVANIA

Course: PreCalculus with Trigonometry Date: March 14, 2013 ET

Topic: Vectors Days: 5

Subject(s): Math Grade(s): 12th

Key Learning: Many situations involve objects that are either in motion or under the influence of a variety of forces.

Unit Essential Question(s): How can vectors be used to model objects in motion or at rest?

Concept: Properties	Concept: Operations with Vectors	Concept: Applications
Lesson Essential Question(s): What are the various representations and properties of vectors? (A)	Lesson Essential Question(s): How do we perform basic operations with vectors? (A)	Lesson Essential Question(s): How may vecotrs be applied to solve a variety of real-world problems? (A)
Vocabulary:	Vocabulary: vector sum, resultant vector, component vectors	Vocabulary: geometric solution, algebraic solution

Additional Information:

Lesson Example Sheets:
Three dimensional vectors
vectors applied
modeling motion

Worksheets:
vector applications (2)
vectors

Attached Document(s):