

Folder: Mathematics

Group/District: PENNSYLVANIA

Course Map Timeline Trigonometry

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Unit 1: Prerequisites (U)	25 days																		
Unit 2 Trigonometry (U)	25 days																		
Unit 3: Analytic Trigonometry (U)	25 days																		
Unit 4: Applications of the Laws of Trigonometry (U)	25 days																		
Unit 5: Complex Numbers (U)	25 days																		

☐ Essential (E)
 ☐ Important (I)
 ☐ Compact (C)
 ☐ Unranked (U)

Topic: Unit 1: Prerequisites

Days: 25

Subject(s):

Grade(s):

Key Learning: Trigonometry is an extension of Algebra



Unit Essential Question(s):

**What are the fundamentals of solving equations,
identifying, evaluating, and graphing functions?**



Concept Ordering and using properties of Real Numbers <u>2.1.11.A, 2.2.11.A, 2.5.11.B, 2.5.11.C</u>	Concept Properties of Algebra and solving linear and non-linear equations. <u>2.1.11.A, 2.2.11.F, 2.5.11.B, 2.5.11.C, 2.8.11.N</u>	Concept Cartesian Plane <u>2.1.11.A, 2.2.11.A, 2.2.11.F, 2.5.11.B, 2.5.11.C, 2.8.11.J, 2.8.11.K, 2.8.11.E</u>
Lesson Essential Question(s): How do we determine real numbers as rational or irrational? (A) How do we use inequalities to order numbers? (A) How do we use interval notation to describe inequalities? (A) How do we find and use absolute value and distance? (A)	Lesson Essential Question(s): How are the properties of algebra used to solve linear and non-linear equations (A) How do we solve quadratic equations using factoring, extracting square roots, completing the square, and the quadratic formula? (A) How do we solve polynomial equations of degree three or greater? (A) How do we solve equations involving radicals? (A) How do we solve equations involving absolute value? (A)	Lesson Essential Question(s): How do we use the Cartesian Plane to plot points and graph equations? (A) How are the midpoint and distance formulas used? (A) How do we find x and y intercepts? (A) What is the relationship between x intercepts and zeroes of a function? (A) How do we use symmetry to sketch graphs of equations? (A) What are the graphical tests for symmetry? (A) How do you use the algebraic tests to determine symmetry? (A) How do you find equations and sketch graphs of circles? (A)
Vocabulary: real numbers, rational numbers , irrational numbers, bounded interval, positive infinity, negative infinity, absolute value, distance	Vocabulary: Conditional equation, Identity, Extraneous solution, Quadratic equation, Quadratic formula, Radicals	Vocabulary: Cartesian Plane, Distance formula, Midpoint formula, Intercepts, Symmetry, Standard form of equation of a circle

Topic: Unit 1: Prerequisites

Days: 25

Subject(s):

Grade(s):

Concept: Linear Equations in 2 Variables <u>2.1.11.A, 2.5.11.B, 2.5.11.C</u>	Concept: Evaluation of Characteristics of Functions <u>2.2.11.F, 2.5.11.B, 2.5.11.C</u>	Concept: Analysis and Graphs of Common Functions <u>2.2.11.F, 2.5.11.B, 2.5.11.C</u>
Lesson Essential Question(s): How do we find and use slope to write and graph equations in two variables? (A) How do we use slope to identify parallel and perpendicular lines? (A) How is slope used to reflect rate of change? (A) How do we use linear equations in two variables to model and solve real-life problems? (A)	Lesson Essential Question(s): How do we determine if relations are functions? (A) How do we use function notation to evaluate functions? (A) In what ways can functions be represented? (A) How do we find the domain of a function? (A) How do we evaluate piece-wise defined functions? (A)	Lesson Essential Question(s): How do we use the Vertical Line Test to determine functions? (A) How do we use the graph of a function to determine its domain and range; its zeroes; the intervals over which the function is increasing, decreasing, and constant; its relative minimum and maximum; and whether the function is even, odd, or neither? (A) How can we identify and graph the common functions: constant, Identity; Absolute Value; Square Root; Quadratic; Cubic; Reciprocal; and Greatest Integer? (A) How are vertical and horizontal shifts, stretches, shrinks, and reflections used in graphing functions? (A)
Vocabulary: Linear equation, Slope, Rate of change, General form, Vertical/horizontal line, Slope intercept form, Parallel, Perpendicular	Vocabulary: Relation, Function, Domain, Range, Independent Variable, Dependent Variable, Piece-wise Defined Function, Implied Domain	Vocabulary: Vertical Line test, Zeroes of a function, Increasing, Decreasing, Constant, Relative Minimum, Relative Maximum, Even Function, Odd Functions, Vertical and horizontal shifts, Vertical and horizontal stretch, Vertical and horizontal shrink, Rigid

Topic: Unit 1: Prerequisites

Days: 25

Subject(s):

Grade(s):

Concept:

**Composition and Inverses of
Function**

2.1.11.A, 2.2.11.F, 2.5.11.C, 2.5.11.B

**Lesson Essential Question(s):**

How do you evaluate the composition of functions? (A)

What are some applications of composition of functions? (A)

How do we algebraically and graphically find an inverse of a function? (A)

What are the relationships between a function and its inverse? (A)

How can the Horizontal line test be used to determine if a function is one-to-one? (A)

How do we verify that two functions are inverses? (A)

**Vocabulary:**

Composition, Inverse function, One-to-one functions, Horizontal Line test

Additional Information:**Attached Document(s):**

Vocab Report for Topic: Unit 1: Prerequisites

Days: 25

Subject(s):

Grade(s):

Concept: Ordering and using properties of Real Numbers

real numbers -

rational numbers

-

irrational numbers -

bounded interval -

positive infinity -

negative infinity -

absolute value -

distance -

Concept: Properties of Algebra and solving linear and non-linear equations.

Conditional equation -

Identity -

Extraneous solution -

Quadratic equation -

Quadratic formula -

Radicals -

Concept: Cartesian Plane

Cartesian Plane -

Distance formula -

Midpoint formula -

Intercepts -

Symmetry -

Standard form of equation of a circle -

Concept: Linear Equations in 2 Variables

Linear equation -

Slope -

Rate of change -

General form -

Vertical/horizontal line -

Slope intercept form -

Parallel -

Perpendicular -

Concept: Evaluation of Characteristics of Functions

Vocab Report for Topic: Unit 1: Prerequisites

Days: 25

Subject(s):

Grade(s):

- Relation -
- Function -
- Domain -
- Range -
- Independent Variable -
- Dependent Variable -
- Piece-wise Defined Function -
- Implied Domain -

Concept: Analysis and Graphs of Common Functions

- Vertical Line test -
- Zeros of a function -
- Increasing -
- Decreasing -
- Constant -
- Relative Minimum -
- Relative Maximum -
- Even Function -
- Odd Functions -
- Vertical and horizontal shifts -
- Vertical and horizontal stretch -
- Vertical and horizontal shrink -
- Rigid -

Concept: Composition and Inverses of Function

- Composition -
- Inverse function -
- One-to-one functions -
- Horizontal Line test -

Topic: Unit 2 Trigonometry

Days: 25

Subject(s):

Grade(s):

Key Learning: Trigonometric functions can be used to solve real-world applications

Unit Essential Question(s):

What are the trigonometric functions and their relationship to the unit circle and right triangle?

Concept:

Radian and degree measure of angle

2.1.11.A, 2.2.11.A, 2.3.11.B

Concept:

Definition of the Trig Functions

2.2.11.A, 2.1.11.A

Concept:

Graphs of Trig Functions

2.9.11.A, 2.10.11.A

Lesson Essential Question(s):

What is the relationship between radian and degree measure of angles and how do we convert from one from to another? (A)

How can we find co-terminal angles by sketching and calculation? (A)

How is radian measure related to linear and angular speed? (A)

Lesson Essential Question(s):

How are trig functions of any angle evaluated using ratios, reference angles, and calculator? (A)

How are the trig identities used to determine angle measures? (A)

How can the periods of the trig functions be used to find coterminal angles? (A)

How are the Trig functions derived from the unit circle and from a right triangle? (A)

How are real numbers related to positions on the unit circle? (A)

How are (x,y) coordinates assigned to points on the unit circle? (A)

Lesson Essential Question(s):

How do we sketch the graphs of the six trig parent functions? (A)

How does , amplitude, period, shifting and reflecting affect the graphs of trig functions? (A)

How are trig functions used to model real-life situations? (A)

How can we use symmetry to determine which trig functions are even or odd? (A)

Vocabulary:

angle,
Initial side

, Terminal Side, Vertex, Positive Angle, Negative Angle, Radian, Degree, Central Angle, Complementary, Supplementary, Arc length, Linear speed, Angular speed

Vocabulary:

Unit Circle, Sine, Cosine, Tangent, Secant, cosecant, cotangent, Period, Periodic domain and range, Opposite side, Adjacent Side, Hypotenuse, Trigonometric Identities, Quadrant Angles, Reference Angles

Vocabulary:

Sine curve, Cycle, Amplitude, Period, Vertical Stretch and Shrink, Horizontal Stretch and Shrink, Scaling Factor, Phase Shift, Translation, Mathematical model, Vertical Asymptotes

Topic: Unit 2 Trigonometry

Days: 25

Subject(s):

Grade(s):

Concept Inverse Trig Functions <u>2.1.11.A, 2.2.11.A</u>	Concept Applications and Models <u>2.1.11.A, 2.2.11.A, 2.3.11.B, 2.9.11.A, 2.10.11.A</u>
Lesson Essential Question(s): How do we evaluate the inverse sine, cosine, and tangent functions? (A) How do we define the domain and range of inverse trig functions? (A) How are inverse trig functions graphed? (A) What are the properties of these inverse trig functions and how are they used to evaluate composition of these functions? (A)	Lesson Essential Question(s): How do we use the trig functions to solve real-life problems involving right triangles? (A) How do we solve real-life problems involving directional bearings? (A) How do we solve real-life problems involving harmonic motion? (A)
Vocabulary: Inverse sine, Inverse cosine, Inverse tangent, arcsine, arccosine, arctangent, composition of functions	Vocabulary: Angle of elevation, Angle of depression, Bearings, Simple Harmonic Motion

Additional Information:

Attached Document(s):

Vocab Report for Topic: Unit 2 Trigonometry

Days: 25

Subject(s):

Grade(s):

Concept: Radian and degree measure of angle

angle -

Initial side

-

Terminal Side -

Vertex -

Positive Angle -

Negative Angle -

Radian -

Degree -

Central Angle -

Complementary -

Supplementary -

Arc length -

Linear speed -

Angular speed -

Concept: Definition of the Trig Functions

Unit Circle -

Sine -

Cosine -

Tangent -

Secant -

co-secant -

cotangent -

Period -

Periodic domain and range -

Opposite side -

Adjacent Side -

Hypotenuse -

Trigonometric Identities -

Quadrant Angles -

Reference Angles -

Concept: Graphs of Trig Functions

Sine curve -

Cycle -

Amplitude -

Period -

Vertical Stretch and Shrink -

Horizontal Stretch and Shrink -

Scaling Factor -

Phase Shift -

Translation -

Vocab Report for Topic: Unit 2 Trigonometry

Days: 25

Subject(s):

Grade(s):

Mathematical model -
Vertical Asymptotes -

Concept: Inverse Trig Functions

Inverse sine -
Inverse cosine -
Inverse tangent -
arcsine -
arccosine -
arctangent -
composition of functions -

Concept: Applications and Models

Angle of elevation -
Angle of depression -
Bearings -
Simple Harmonic Motion -

Topic: Unit 3: Analytic Trigonometry

Days: 25

Subject(s): Math

Grade(s): 10th, 11th, 12th

Key Learning: Trigonometry can be used to solve special equations



Unit Essential Question(s):

**How are the fundamental trig identities verified
and used to evaluate trig functions and solve trigonometric
equations?**



Concept: Trigonometric Identities <u>2.1.11.A, 2.2.11.A, 2.5.11.B, 2.5.11.C, 2.8.11.S</u>	Concept: Solving Trig Equations <u>2.1.11.A, 2.2.11.A, 2.2.11.F, 2.5.11.B, 2.5.11.C, 2.10.11.B</u>	Concept: Sum and Difference Formulas <u>2.1.11.A, 2.2.11.A, 2.5.11.A, 2.5.11.B, 2.5.11.C, 2.10.11.B</u>
Lesson Essential Question(s): How are the fundamental trig identities used to evaluate trig functions, simplify trig expressions, and rewrite trig expressions? (A) How are trig functions verified? (A)	Lesson Essential Question(s): How do we use standard algebraic techniques to solve trig equations? (A) How do we solve trig equations using multiple angles? (A) How do we use inverse trig functions to solve trig equations? (A)	Lesson Essential Question(s): How do we use the sum and difference formulas to evaluate trig functions, verify identities and solve trig equations? (A)
Vocabulary: Verifying trig identities	Vocabulary: Multiple angles, Inverse Trig Functions	Vocabulary: Sum and difference formulas, Reduction Formulas

Additional Information:

Attached Document(s):

Vocab Report for Topic: Unit 3: Analytic Trigonometry
Subject(s): Math

Days: 25
Grade(s): 10th, 11th, 12th

Concept: Trigonometric Identities

Verifying trig identities -

Concept: Solving Trig Equations

Multiple angles -
Inverse Trig Functions -

Concept: Sum and Difference Formulas

Sum and difference formulas -
Reduction Formulas -

Topic: Unit 4: Applications of the Laws of Trigonometry

Days: 25

Subject(s): Math

Grade(s): 10th, 11th, 12th

Key Learning: The Law of Sines and Law of Cosines can be used to in solving problems and in real-world applications



Unit Essential Question(s):

How can the Law of Sines and Law of Cosines be used to solve problems involving oblique triangles and find the area of triangles?

Concept

Law of Sines

2.1.11.A, 2.2.11.A, 2.5.11.A, 2.5.11.B, 2.5.11.C, 2.9.11.I, 2.10.11.B

Concept

Law of Cosines

2.1.11.A, 2.2.11.A, 2.5.11.A, 2.5.11.B, 2.9.11.I, 2.10.11.B

Lesson Essential Question(s):

How can the we use the Law of Sines to solve oblique triangles? (A)

How can the find the area of oblique triangles using the sine of an included angle and the measure of two sides? (A)

How can we use the Law of Sines to model and solve real-life problems? (A)

Lesson Essential Question(s):

How can we use the Law of Cosines to solve oblique triangles? (A)

How can the Law of Cosines be used to model and solve real-world problems? (A)

How can we use Heron's Area Formula to find the area of a triangle? (A)

Vocabulary:

Oblique Triangle, Law of Sines

Vocabulary:

Law of Cosines, Heron's Area Formula

Additional Information:

Attached Document(s):

Vocab Report for Topic: Unit 4: Applications of the Laws of Trigonometry

Days: 25

Subject(s): Math

Grade(s): 10th, 11th, 12th

Concept: Law of Sines

Oblique Triangle -
Law of Sines -

Concept: Law of Cosines

Law of Cosines -
Heron's Area Formula -

Topic: Unit 5:Complex Numbers

Days: 25

Subject(s): Math

Grade(s): 10th, 11th, 12th

Key Learning: Complex numbers exist and are useful in solving problems in science.



Unit Essential Question(s): **What are complex numbers and how are they used in solving polynomial equations?**



Concept:

Complex Numbers

2.1.11.A, 2.2.11.A, 2.5.11.A, 2.5.11.B, 2.5.11.C

Concept:

Complex Solutions of Equations

2.5.11.A, 2.8.11.N, 2.5.11.C, 2.5.11.B, 2.1.11.A



Lesson Essential Question(s):

What defines the complex number system? (A)

How is the imaginary unit used in the imaginary number system? (A)

How do we add, subtract, multiply, and divide complex numbers? (A)

What are complex conjugates and their usefulness? (A)

When does the quadratic formula yield complex imaginary roots? (A)

Lesson Essential Question(s):

How does the Fundamental Theorem of Algebra relate to the number of solutions to a polynomial equation? (A)

How do we find the complex solutions(zeroes) of polynomial equations? (A)

How do we use the discriminant to determine the number and types of solutions to a quadratic equation? (A)

How do we write the factors derived from given zeroes? (A)



Vocabulary:

Imaginary unit, Standard complex, complex number, Imaginary Number, Complex solutions, Principal Square Root

Vocabulary:

Fundamental Theorem of Algebra, Discriminant, Conjugate pairs, Zeroes of a polynomial

Additional Information:

Attached Document(s):

Vocab Report for Topic: Unit 5:Complex Numbers

Days: 25

Subject(s): Math

Grade(s): 10th, 11th, 12th

Concept: Complex Numbers

- Imaginary unit -
- Standard complex -
- complex number -
- Imaginary Number -
- Complex solutions -
- Principal Square Root -

Concept: Complex Solutions of Equations

- Fundamental Theorem of Algebra -
- Discriminant -
- Conjugate pairs -
- Zeroes of a polynomial -