Course Title: Trigonometry
Board Approval Date: February 18, 2020
Credit / Hours: 1

Course Description:

A pre-Calculus course for the college bound student. The term includes a strong emphasis on circular and triangular trigonometric functions, graphs of trigonometric functions and identities and trigonometric equations, polar coordinates, and vectors. This course is primarily taught through lectures, small group activities, and projects dealing with real-life situations.

Learning Activities / Modes of Assessment:

Pre- tests Teacher Observation Kahoot, Quizizz and Quizlet Notability Bell Ringers Exit Tickets Collaborative Projects Small Group Whole Group Partner Work Whiteboard Practice Review Games Desmos Activities GeoGebra Think-Pair-Share Stations	Scavenger Hunts Nearpod Edpuzzles Flipgrid Constructed Response Questions Math Labs Task Cards Schoology Assignments Error Analysis Self-checking with answer key Word Problems- real world application Quizzes Tests

Instructional Resources:

Desmos
Geogebra
Online Practice Tools
Khan Academy
Teachers Pay Teachers
Teacher created resources
Kuta Software
Instructional Multimedia Tools
Collegeboard Practice Sets and Classroom

Curriculum:
Course: Trigonometry

Unit: Angles and Trigonometric Functions

Know:	Understand:	Do:
Angles can be measured in both degrees and radians. The ratios of the side lengths of a triangle can be defined with trigonometric functions. Using radian measure, trigonometric functions can be defined on all real numbers. --- How do you use trig functions to solve right triangles? How is radian measure defined? How do you convert between radian and degree measure? How do you find arc length and the area of a sector?	1. Angles and Their Measure 2. Arc Length and Area of a Sector 3. Velocity and Angular Velocity 4. Trig Functions on right triangles 5. Complementary and Cofunction Identities	The student will define a radian. The student will convert from degrees to radian and from radian to degrees. The student will find arc length, radius, or angle, given two of the three measures. The student will find area of a sector, angle, or radius, given the other two measures. The student will apply angular velocity, and velocity formulas to solve problems. The student will use the Pythagorean Theorem and given information to find all trig functions for a given angle in a right triangle. The student will, given one trig function of an angle, the student will find all other trig functions of the angle. The student will use trigonometric ratios and the Pythagorean Theorem to solve right triangles in application problems. The student will use basic cofunction identities to solve triangles.

		The student will use basic cofunction identities to simplify trigonometric expressions.

Unit: Acute Angles, Reference Angles, Right Triangles, and the Unit Circle.

Know:	Understand:	Do:
Using radian measure, trigonometric functions can be defined on all real numbers. Trigonometric functions are periodic. The unit circle is a means of finding trig functions for any given angle. --- Why is unit circle useful in illustrating trig functions on all real numbers? How do you use reference angles to find the value of any given angle?	1. Trig Functions of Acute Angles 2. Reference angles and non-acute angles. 3. Unit circle	The student will know the trig function values for 0, 30 45, 60 and 90 degree angles. The student will use calculators to approximate trig functions. The student will find values of trig functions for angles larger than 90 degrees using reference angles. The student will set up a unit circle using special angles and knowledge of reference angles. The student will use the unit circle to evaluate trig functions. The student will use the unit circle to explain odd and even symmetry and the period of trig functions.

Unit: Graphs of Trigonometric Functions

Know:	Understand:	Do:
Any cyclic occurrence can be represented by a trig function. Trig functions can be translated and transformed. --- How do we use trig functions to describe cyclic behavior? How do we translate and transform trig functions?	1. Graph of Sine and Cosine 2. Translating and transforming graphs of sine and cosine. 3. Real world application of sine graphs. 4. Graphs of tangent, cotangent, secant and cosecant 5. Writing Equations of trig functions	The student will graph of sine or cosine for two cycles. The student will plot graphs of the sine and cosine curves with vertical translations and amplitudes other than The student will graph sine or cosine graph affected by horizontal and vertical translations. The student will graph a sine or cosine curve including changes in amplitude, period, vertical and horizontal shifts and flips about the vertical or horizontal axis. Students will gather periodic data from the internet or from scientific probes. They will plot this data and determine the sine graph that best fits this data. They will relate the meaning of amplitude, period, phase shift and vertical shift to this real world application. The student will use a graphing calculator to plot a graph of periodic data and determine equation of best fit. The student will plot the graphs of secant, cosecant, tangent, and cotangent with appropriate transformations. The student will write an appropriate equation of a trig

		function given its graph

Unit: Trigonometric Identities

Know:	Understand:	Do:
Fundamental identities can be used to verify more complicated trig identities. We can use formulas to find exact value of angles that are combinations of unit circle angles. --- How do we use algebra and basic trig identities to verify complicated trig identities. How do we find trig functions of angles that are combinations of unit circle angles.	1. Fundamental Identities 2. Verify trig identities. 3. Sum and difference identities for Cosine and sine 4. Sum and difference identities for tangent. 5. Double angle and half angle identities	The student will know and use negative angle identities. The student will know and use Quotient Identities. The student will know and use Reciprocal Identities. The student will use the three Pythagorean Identities. The student will use Fundamental Identities to verify trig identities. The student will find cos(s+t) , cos(s-t) ,sin(s+t), or sin(s-t) given appropriate information. The student will use sum/difference formula to find measure of trig functions for angles such as 15, 75, and 105 degrees. The student will find , tan(s+t), and tan(s-t) given appropriate information. The student will find tangent for angles with measures such as 15, 75 and 105. The student will use double angle identities to find appropriate angle. The student will use double angle identities to verify the equivalence of two expressions.

Unit: Inverse Trig Functions

Know:	Understand:	Do:
Some trig functions must have their domains restricted so that we can find an inverse of these functions. Trig equations can be solved by using algebra and inverse trig functions. --- Why do make a trigonometric function into an invertible function. How do we solve trigonometric equations.	1. Definition of Inverse Trig Functions 2. Trigonometric Equations 3. Trig Equations with multiple angles.	The student will use a right triangle to solve problems of the type: sin(arccos(3/4)). The student will use inverse trig functions to find angle measurements. The student will graph inverse trig functions. The student will use the inverse trig functions to solve linear and quadratic equations. The student will substitute identities to solve trig equations.

Unit: Triangle Trigonometry

Know:	Understand:	Do:
Right triangles can be solved using the definitions of sine, cosine, and tangent. If the triangle is not a right triangle, most triangles can be solved using the Law of Sines or the Law of Cosines. Triangles can be used to solve various real world situations. ---------- How do you find the missing information from a given triangle? How do you use triangles to solve real world problems?	1. Right Triangle Trigonometry and Applications 2. Law of Sines 3. Law of Cosines 4. Applications	The student will use trigonometry to solve application problems involving right triangles. The student will use the Law of Sines to solve triangles including ambiguous cases. The students will use the Law of Sines in various application problems. The student will use the Law of Cosines to solve triangles. The student will use The Law of Cosines when appropriate to solve application problems. The student will apply triangle trigonometry to solve problems including areas, surveying and navigations problems.

Unit: Vectors

Know:	Understand:	Do:
Vectors are useful for understanding motion in two and three dimensions. Vectors can be used to study various applications including forces, and resultant motion due to wind and water currents. --- How do we use vectors to describe motion? How do we use vectors to describe resultant forces? How do we use vectors to show resultant direction due to wind or water currents?	1. Introduction to Vectors 2. Applications of Vectors	The student will calculate the resultant vector found from combinations of addition, subtraction, and scalar multiplication. The student will find the magnitude of a vector. The student will find the angle between two given vectors. The student will find the dot product between two vectors. The student will use the dot product to show two vectors are perpendicular. The student will find the cross product of two given vectors. The student will show the resulting vector is perpendicular to the two given vectors. The student will use vectors to solve real world applications.

Unit: Polar Coordinates and graphing

Know:	Understand:	Do:
Points are found in polar graphing by how far they are away from the pole (origin) and the angle they make with the positive horizontal axis. Basic equations determine graphs of lines, circles, cardioids, limacons, lemniscates and roses. --- How do we graph points in polar form? How do we determine the shape of a polar graph?	1. Introduction to Polar, graphing points and converting to polar representation 2. Graphing lines and circles 3. Cardioids and limacons 4. Roses and lemniscates.	The student will convert between Cartesian Coordinates and Polar Coordinates. The student will graph points from polar and cartesian forms. The student will write equations and graph simple lines and circles in polar form. The student will graph cardiods and limacons. The student will graph roses and lemniscates.

Unit: Trig Form of Complex Numbers

Know:	Understand:	Do:
Complex numbers can be represented using trigonometry Polar representation of complex numbers simplify computations --- How do we represent complex numbers using trigonometry? How does representing complex numbers in polar form simplify computations?	1. Operations on Complex Numbers 2. Trig Form of Complex Numbers 3. Product and Quotient Theorems 4. Powers and Roots of Complex Numbers (DeMoivre's Theorem)	The student will perform mathematical operations on complex numbers. The student will convert standard form complex number to trig form and vice versa. The student will use trig form of complex numbers to multiply and divide. The student will find powers of complex numbers. The student will find the multiple nth roots of complex numbers.

Pacing Guide

Course:

Course Unit (Topic)	**Length of Instruction (Class Periods)**
Angles and Trigonometric Functions	10 days
Acute Angles, Reference Angles, Right Triangles, and the Unit Circle	10 days
Graphs of Trigonometric Functions	15 days
Trigonometric Identities	10 days
Inverse Trig Functions	10 days
Triangle Trigonometry	10 days
Vectors	15 days
Polar Coordinates and graphing	5 days
Trig Form of Complex Numbers	5 days