Unit A - *Trigonometry*

Overview

This unit covers all the basics of trigonometry, from radian measure to right triangle and unit circle definitions to graphing. These fundamentals will be built on in further units, so it is important students understand these concepts thoroughly, without relying on the calculator until the applications are taught.

21st Century Capacities: Analyzing

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS	Transfer:
MP 1 Make sense of problems and persevere in solving them **MP4** Model with Mathematics **MP7** Look for and make use of structure 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.	*Students will be able to independently use their learning in new situations to...* 1. Model relationships among quantities. (Analyzing) 2. Demonstrate fluency with computation and concepts. 3. Make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution.

Meaning:

UNDERSTANDINGS: *Students will understand that:*	ESSENTIAL QUESTIONS: *Students will explore & address these recurring questions:*
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.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	1. Mathematicians create or use models to examine, describe, solve and/or make predictions. 2. Mathematicians examine relationships to discern a pattern, generalizations, or structure. 3. Mathematicians flexibly use different tools, strategies, and operations to build conceptual knowledge or solve problems.	A. What math tools/models/strategies can I use to solve the problem? B. What is another way that this problem could be solved? C. How do you express and describe a pattern and use it to make predictions and solve a problem?

	Acquisition:	
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. CCSS.MATH.CONTENT.HSF.TF.B.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.[*] 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.[*] 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.[*]	*Students will know…* 1. How to measure angles in radians and degrees 2. That the unit circle and right triangle definition are compatible with each other 3. Trigonometry is used to model periodic behavior 4. The basic graphs of the six trig functions and how the parameters transform them 5. That trig functions must be restricted to make inverse functions 6. Vocabulary: Radian, Degree, Coterminal angles, Quadrantal Angles, Arc Length, Angular Speed, Sector Area, Unit Circle, Sine, Cosine, Tangent, Cosecant, Secant, Cotangent, Period, Reference Angle, Co-Functions, Amplitude, Sinusoidal Axis, Inverse Trig Functions, Bearings/Headings, Simple Harmonic Motion, Frequency	*Students will be skilled at…* 1. Calculating angular speed and linear speed for objects in circular motion 2. Determining exact values of trig functions for special angles using the unit circle and right triangle definitions 3. Using trig identities to find exact values of trig functions 4. Creating models using sinusoidal functions 5. Solving real world problems involving trig functions