Unit B - *Analytic Trigonometry*

Overview

This unit extends the topics covered in unit A. It begins with simplifying expressions so that students understand how proving trigonometric identities depends on showing one side of an equation simplifies to the other without manipulating both sides simultaneously. Students also learn how to solve trigonometric equations, in particular when the angle has been multiplied by a factor within the trigonometric function. The graphing calculator is introduced here to show how the solutions may be verified. The second half of the unit covers many formulas that extend the number of angles for which exact values of the trigonometric functions may be found.

21st Century Capacities: Synthesizing

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS

MP 1 Make sense sense of problems and persevere in solving them
MP3 Construct viable arguments and critique the reasoning of others
MP4 Model with Mathematics

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.

Transfer:

Students will be able to independently use their learning in new situations to...

1. Manipulate equations/expressions or objects to create order and establish relationships.
2. Demonstrate fluency with math facts, computation and concepts.
3. Make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution. (Synthesizing)
4. Evaluate the accuracy and efficiency of a given solution.

Meaning:

UNDERSTANDINGS: *Students will understand that:*

1. Effective problem solvers work to make sense of the problem before trying to solve it.
2. Mathematicians identify relevant tools, strategies, relationships, and/or information in order to draw conclusions.

ESSENTIAL QUESTIONS: *Students will explore & address these recurring questions:*

A. How can I break a problem down into manageable parts?
B. Does this solution make sense?
C. What is the best way to show my thinking?

	3. Mathematicians flexibly use different tools, strategies, and operations to build conceptual knowledge or solve problems.	
	Acquisition:	
	Students will know… 1. That you can only simplify one side of an identity at a time to prove it is true. 2. How to verify solutions on the graphing calculator 3. The sum and difference formulas for sine and cosine 4. The double angle and half angle formulas for sine and cosine 5. The product to sum and sum to product formulas for sine and cosine 6. Vocabulary: Identity, Multiple angle, Sum and Difference Formulas, Double Angle formulas, Half angle formulas, Sum to product and Product to sum formulas	*Students will be skilled at…* 1. Applying basic trigonometric identities to simplify more complex identities 2. Solving trigonometric equations, including multiple angles 3. Evaluating trigonometric expressions using the sum and difference, double angle, and half angle formulas 4. Applying the product to sum and sum to product formulas for sine and cosine