



Pre-Calculus Honors - Unit B - Analytic Trigonometry

Unit Focus

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.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
Common Core Mathematics: 9-12 - 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.8) - Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems. (CCSS.MATH.CONTENT.HSF.TF.C.9) - Make sense of problems and persevere in solving them. (CCSS.MATH.MP.1) - Construct viable arguments and critique the reasoning of others. (CCSS.MATH.MP.3) - Model with mathematics. (CCSS.MATH.MP.4) Madison Public Schools Profile of a Graduate - Analyzing: Examining information/data/ evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2) - Collective Intelligence: Working respectfully and responsibly with others, exchanging and evaluating ideas to achieve a common objective. (POG.3.1)	<i>Students will be able to independently use their learning to...</i> T1 manipulate equations/expressions or objects to create order and establish relationships. T2 demonstrate fluency with math facts, computation and concepts. T3 make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution. T4 evaluate the accuracy and efficiency of a given solution.	
	Meaning	
	Understanding(s)	Essential Question(s)
	<i>Students will understand that...</i> U1 Effective problem solvers work to make sense of the problem before trying to solve it. U2 Mathematicians identify relevant tools, strategies, relationships, and/or information in order to draw conclusions. U3 Mathematicians flexibly use different tools, strategies, and operations to build conceptual knowledge or solve problems.	<i>Students will keep considering...</i> Q1 How can I break a problem down into manageable parts? Q2 Does this solution make sense? Q3 What is the best way to show my thinking?
	Acquisition of Knowledge and Skill	
	Knowledge	Skill(s)
	<i>Students will know...</i> K1 that you can only simplify one side of an identity at a time to prove it is true. K2 how to verify solutions on the graphing calculator K3 the sum and difference formulas for sine and cosine	<i>Students will be skilled at...</i> S1 applying basic trigonometric identities to simplify more complex identities S2 solving trigonometric equations, including multiple angles

Stage 1: Desired Results - Key Understandings

K4 the double angle and half angle formulas for sine and cosine

K5 the product to sum and sum to product formulas for sine and cosine

K6 Vocabulary: Identity, Multiple angle, Sum and Difference Formulas, Double Angle formulas, Half angle formulas, Sum to product and Product to sum formulas

S3 evaluating trigonometric expressions using the sum and difference, double angle, and half angle formulas

S4 applying the product to sum and sum to product formulas for sine and cosine