Mathematics
Precalculus: Honors
Unit 3: Analytic Trigonometry

Essential Understandings	▪ Mathematics can be used to model real-life situations. ▪ Trigonometric identities help lay the foundation for upper level mathematics. ▪ Trigonometric identities must be used to solve certain types of equations.
Essential Questions	▪ What is an identity? ▪ Where are identities used? ▪ How can certain types of trig problems be solved without a calculator, but with trig identities?
Essential Knowledge	▪ Memorize, write and use the various trig identities. ▪ Write and use the various trig identities. ▪ Determine which applications area associated with the various types of trig identities. ▪ Trigonometric identities can be used to solve certain types of trig equations.
Vocabulary	▪ <u>Terms</u>: o trigonometric identities, identity proof, identity verification, double-angle identities, Pythagorean identities, reciprocal identities, quotient identities, half-angle identities
Essential Skills	▪ Apply appropriate identities to a certain situation and or equation. ▪ Use fundamental trig identities to verify other trig identities. ▪ Use trig formulas to rewrite trig functions in a more convenient form.

Related Maine Learning Results	Mathematics
	A. Number
	  Real Number
	  A1.Students will know how to represent and use real numbers.
	    a. Use the concept of nth root.
	    b. Estimate the value(s) of roots and use technology to approximate them.
	    c. Compute using laws of exponents.
	    d. Multiply and divide numbers expressed in scientific notation.
	    e. Understand that some quadratic equations do not have real solutions and that there exist other number systems to allow for solutions to these equations.
	B. Data
	  Measurement and Approximation
	  B1.Students understand the relationship between precision and accuracy.
	    a. Express answers to a reasonable degree of precision in the context of a given problem.
	    b. Represent an approximate measurement using appropriate numbers of significant figures.
	    c. Know that most measurements are approximations and

	explain why it is useful to take the mean of repeated measurements.

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Related Maine Learning Results	C. Geometry
	Geometric Figures
	C1. Students justify statements about polygons and solve problems.
	    a. Use the properties of triangles to prove theorems about figures and relationships among figures.
	    b. Solve for missing dimensions based on congruence and similarity.
	    c. Use the Pythagorean Theorem in situations where right triangles are created by adding segments to figures.
	    d. Use the distance formula.
	C2. Students justify statements about circles and solve problems.
	    a. Use the concepts of central and inscribed angles to solve problems and justify statements.
	    b. Use relationships among arc length and circumference, and areas of circles and sectors to solve problems and justify statements.
	C3. Students understand and use basic ideas of trigonometry.
	    a. Identify and find the value of trigonometric ratios for angles in right triangles.
	    b. Use trigonometry to solve for missing lengths in right triangles.
	    c. Use inverse trigonometric functions to find missing angles in right triangles.
	Geometric Measurement
	C4. Students find the surface area and volume of three-dimensional objects.
	    a. Find the volume and surface area of three-dimensional figures including cones and spheres.
	    b. Determine the effect of changes in linear dimensions on the volume and surface areas of similar and other three-dimensional figures.
	D. Algebra
	Symbols and Expressions
	D1. Students understand and use polynomials and expressions with rational exponents.
	    a. Simplify expressions including those with rational numbers.
	    b. Add, subtract, and multiply polynomials.
	    c. Factor the common term out of polynomial expressions.
	    d. Divide polynomials by (ax+b).

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Related Maine Learning Results	Equations and Inequalities
	D2. Students solve families of equations and inequalities.
	   a. Solve systems of linear equations and inequalities in two unknowns and interpret their graphs.
	   b. Solve quadratic equations graphically, by factoring in cases where factoring is efficient, and by applying the quadratic formula.
	   c. Solve simple rational equations.
	   d. Solve absolute value equations and inequalities and interpret the results.
	   e. Apply the understanding that the solution(s) to equations of the form f(x) = g(x) are x-value(s) of the point(s) of intersection of the graphs of f(x) and g(x) and common outputs in table of values.
	   f. Explain why the coordinates of the point of intersection of the lines represented by a system of equations is its solution and apply this understanding to solving problems.
	D3. Students understand and apply ideas of logarithms.
	   a. Use and interpret logarithmic scales.
	   b. Solve equations in the form of $x + b^y$ using the equivalent form $y = \log_b x.$
	
	Functions and Relations
	D4. Students understand and interpret the characteristics of functions using graphs, tables, and algebraic techniques.
	   a. Recognize the graphs and sketch graphs of the basic functions.
	   b. Apply functions from these families to problem situations.
	   c. Use concepts such as domain, range, zeros, intercepts, and maximum and minimum values.
	   d. Use the concepts of average rate of change (table of values) and increasing and decreasing over intervals, and use these characteristics to compare functions.
	D5. Students express relationships recursively and use iterative methods to solve problems.
	   a. Express the (n+1)st term in terms of the nth term and describe relationships in terms of starting point and rule followed to transform one terms to the next.
	   b. Use technology to perform repeated calculations to develop solutions to real life problems involving linear, exponential, and other patterns of change.

Sample Lessons And Activities	▪ Students make up their own trig equations and challenge each other to use trig identities to solve them. ▪ Students make up their own trig identities and challenge each other to verify and then prove them.

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Sample Classroom Assessment Methods	▪ Homework ▪ Quizzes ▪ Chapter tests
Sample Resources	▪ <u>Publications:</u> 　　o <u>Precalculus with Limits – A Graphing Approach</u> ▪ <u>Other Resources:</u> 　　o Graphing calculator 　　o A+ learning system for remediation