

Pre-Calculus CP Unit 4: Additional Topics in Trigonometry

Unit #:	APSDO-00018121	Duration:	5.0 Week(s)	Date(s):	
----------------	----------------	------------------	-------------	-----------------	--

Team:
 Jodi Kryzanski (Author), Tracy Andreana, Sally deGozzaldi, Jennifer Greene, Jeanine LaBrosse, Jaclyn Lawlor, Melinda Litke, Ben Lukowicz, Jennifer Miller, Matthew Mooney, James Murray, Marlaina Napoli, Andrew Riddle, Steven Rivoira

Grades:
 11, 12

Subjects:
 Mathematics

Unit Focus

In this unit, students will solve oblique triangles using Law of Sines and Cosines. Students will study the relationship between complex, rectangular, and polar forms. They will expand their knowledge by applying the properties learned to vectors. Summative assessments may include projects, labs, and tests. Primary instructional materials for this unit include Pre-Calculus, 3rd edition Pearson/Prentice Hall, 2007.

Stage 1: Desired Results - Key Understandings

Established Goals	Transfer	
<p>Common Core <i>Mathematics: 11</i></p> <ul style="list-style-type: none"> Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes. <i>CCSS.MATH.CONTENT.HSN.VM.B.4.A</i> Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, v, v, v). <i>CCSS.MATH.CONTENT.HSN.VM.A.1</i> 	<p>T1 (T50) Based on an understanding of any problem, initiate a plan, execute it and evaluate the reasonableness of the solution.</p> <p>T2 (T53) Articulate how mathematical concepts relate to one another in the context of a problem or in the theoretical sense.</p> <p>T3 (T51) Examine alternate methods to accurately and efficiently solve problems.</p> <p>T4 (T52) Use appropriate tools strategically to deepen understanding of mathematical concepts.</p> <p>T5 (T13) Move from one representation to another without changing the quantity.</p> <p>T6 (T14) Perform operations within the real and complex number system.</p> <p>T7 (T44) Apply appropriate theorems and formulas to determine the unknown.</p>	
	Meaning	
	Understandings	Essential Questions
	U1 (U201) The same value can be	Q1 (Q102) What rule do I know OR what

<ul style="list-style-type: none"> • Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $c(v_x, v_y) = (cv_x, cv_y)$. <i>CCSS.MATH.CONTENT.HSN.VM.B.5.A</i> • Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces). <i>CCSS.MATH.CONTENT.HSG.SRT.D.11</i> • Compute the magnitude of a scalar multiple cv using $cv = c v$. Compute the direction of cv knowing that when $c v < 0$, the direction of cv is either along v (for $c > 0$) or against v (for $c < 0$). <i>CCSS.MATH.CONTENT.HSN.VM.B.5.B</i> • Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. <i>CCSS.MATH.CONTENT.HSN.VM.A.2</i> • Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. <i>CCSS.MATH.CONTENT.HSN.VM.B.4.B</i> • Solve problems involving velocity and other quantities that can be represented by vectors. <i>CCSS.MATH.CONTENT.HSN.VM.A.3</i> • Understand vector subtraction $v - w$ as $v + (-w)$, where $-w$ is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise. <i>CCSS.MATH.CONTENT.HSN.VM.B.4.C</i> • Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary 	<p>represented in multiple ways.</p> <p>U2 (U104) Mathematics is a universal language that uses assumed and logical statements to describe the world.</p> <p>U3 (U105) Mathematicians develop new understandings based on established relationships/ theorems/ postulates.</p> <p>U4 (U408) Trigonometry is based on the relationship between sides and the angles in any triangle.</p> <p>U5 (U511) Placing a problem in a category gives you a familiar approach to solving it.</p> <p>U6 (U512) Mathematicians use diagrams, symbols, and terms to describe problems or situations</p> <p>U7 (U530) Every problem belongs to a category of problems that has a similar structure and set of characteristics; which means it can be solved using a similar model.</p> <p>U8 (U561) Recognition of patterns and structures fosters efficiency in solving problems.</p>	<p>pattern can I recognize to help me make a prediction/solve this problem?</p> <p>Q2 (Q103) What is the value of this number/relationship and how can I represent it in different ways?</p> <p>Q3 (Q405) How do I use measurements about the shape to calculate additional information about it?</p> <p>Q4 (Q406) What is the theorem/formula necessary to solve this problem? (Gr. 5-12)</p> <p>Q5 (Q409) How do some values in a triangle determine others?</p> <p>Q6 (Q511) What characteristics/attributes define this type of problem?</p> <p>Q7 (Q513) How could this strategy be used to solve similar problems?</p> <p>Q8 (Q532) Which model best represents this problem?</p> <p>Q9 (Q572) How does understanding the pattern/structure help me solve the problem?</p>
Acquisition of Knowledge and Skill		
Knowledge	Skills	
	<p>S1</p> <p>Prove the Law of Sines and Cosines and use them to solve problems</p> <p>S2</p> <p>Understand and apply the Law of Sines and Cosines to find unknown measurements in right and non-right triangles</p> <p>S3</p> <p>Derive the formula for the area of a triangle and use the formula to solve problems</p> <p>S4</p>	

<p>numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.</p> <p><i>CCSS.MATH.CONTENT.HSN.CN.B.4</i></p> <ul style="list-style-type: none"> • Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. <i>CCSS.MATH.CONTENT.HSG.SRT.D.9</i> • Prove the Laws of Sines and Cosines and use them to solve problems. <i>CCSS.MATH.CONTENT.HSG.SRT.D.10</i> • Look for and express regularity in repeated reasoning. <i>CCSS.MATH.MP.8</i> • Model with mathematics. <i>CCSS.MATH.MP.4</i> • Reason abstractly and quantitatively. <i>CCSS.MATH.MP.2</i> 		<p>Use Heron's formula to find the area of oblique triangles</p> <p>S5</p> <p>Convert between polar and rectangular coordinates and equations</p> <p>S6</p> <p>Represent complex numbers on the complex plane in rectangular and polar form and explain why the rectangular and polar forms of a given complex number represent the same number</p> <p>S7</p> <p>Understand the difference between a polar and rectangular coordinates</p> <p>S8</p> <p>Perform operations with vectors</p> <p>S9</p> <p>Find the components of a vector</p> <p>S10</p> <p>Solve problems involving velocity and other quantities that can be represented by vectors</p> <p>S11</p> <p>Understand that a vector has both magnitude and direction</p> <p>S12</p> <p>Understand that a vector is represented by directed line segment</p> <p>S13</p>
---	--	---

		Understand the relationship between subtraction of vectors and adding the inverse both algebraically and graphically
--	--	--

Stage 3: Learning Plan

Coding	Code	Description of Learning Activity
--------	------	----------------------------------