

Unit 6: Analytical Trigonometry
Pre-Calculus Honors
12 Class Meetings – Revised June 2016

Essential Questions

- How are the algebraic properties related to trigonometric functions?

Enduring Understandings with Unit Goals

EU #1: If you know three parts of a triangle, you can solve any triangle using the Law of Sines and/or the Law of Cosines.

- Solve any triangle using the Law of Sines and/or Law of Cosines.

EU #2: The interrelationships among the six basic trigonometric functions make it possible to write trigonometric expressions in various equivalent forms.

- Prove expressions are equivalent using trigonometric identities.

Standards

Common Core State Standards/College and Career Readiness Anchor Standards :

- **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.
- **CCSS.Math.Content.HSG.SRT.D.11** – Understand and apply the Law of Sines and Law of Cosines to find unknown measurements in right and non-right triangles.

MSMHS 21st Century Learning Expectations

Competency 1: Read and write effectively for a variety of purposes.

Competency 3: Make decisions and solve problems independently and collaboratively.

Competency 5: Contribute to a positive learning environment with respect and responsibility.

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Unit Content Overview

1. The Law of Sines

- Solving triangles
- Applications

2. The Law of Cosines

- Solving triangles
- Finding area of a triangle
- Applications

3. Fundamental Identities

- Identities
- Basic trig identities
- Pythagorean identities
- Odd-even identities
- Simplifying trig expressions
- Solving trig equations

4. Proving Trigonometric Identities

- Proving identities

5. Multiple-Angle Identities

- Double-angle identities

Learning Objectives

Students will be able to...

- Explain how to solve a variety of problems using the Law of Sines.
- Explain how to solve acute and obtuse triangles and to determine the area of a triangle in terms of the measures of the sides and angles using the Law of Cosines.
- Explain how to simplify trigonometric expressions and solve trigonometric equations using the fundamental identities.
- Determine whether an equation is an identity and confirm identities analytically.
- Create an equivalent expression using the double-angle and half-angle identities.

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Assured Learning Experiences

Differentiated Instruction/Instructional Strategies

- Lecture with notes
- Guided notes
- Accountable talk
- Student-led instruction
- Flipped classroom videos
- Student notes
- Independent problem-solving
- Collaborative problem-solving
- Navigation Error Performance Task (practical application)
 - Rubric 3: Problem Solving
- Cross-curricular problem solving (independent and collaborative)
- Homework

Interdisciplinary Connections

- Language Arts - Word problems
- Marine Science – Word problems

Assessments

FORMATIVE ASSESSMENTS:

- Warm ups (SAT)
- ABCD Cards
- Whiteboards
- Mid-class check-ins
- Exit Slips
- Student-led instruction
- Homework
- Rubric 5: Civic and Social Responsibility
- Navigation Error Performance Task
 - Rubric 3: Problem Solving

SUMMATIVE ASSESSMENTS:

- Quiz 1 - Law of Sines/Cosines – EU #1
- Unit 6 Test
- Navigation Error Project

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Unit Task

Unit Task Name: Navigation Error

Description: Students will use information learned in this unit about how the interrelationships among the six basic trigonometric functions make it possible to write trigonometric expressions in various equivalent forms (EU #2), and how if you know three parts of a triangle, you can solve any triangle using the Law of Sines and/or the Law of Cosines (EU #1) in order to determine how far a ship is away from where it is supposed to be. Students will be given a problem where a ship is setting off on a course and was blown off course by a certain degree. Students will need to use their computers to create a picture/map of the situation and use the Law of Sines and Cosines to determine how far away the ship is from where it is supposed to be. Students will present their findings in a document including the picture they have created on their computer along with the equations they have used to determine the distance the ship needs to travel to get back on course.

Evaluation: Rubric 3: Problem Solving

Unit Resources

- Textbook
- MSMHS School-wide Rubrics
- Flipped Classroom Videos
- Worksheets
- Graphing Calculator
- Laptops
- SAT Prep Online