Unit 10: Triangle Trigonometry

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 4**
Length: **2 weeks**
Status: **Published**

Brief Summary of Unit

Students will be able to find the missing pieces of right, acute, and obtuse triangles and apply this knowledge to physics, architecture, surveying, etc.

Standards

Students will analyze geometric designs which connects to various cultures. Embracing the diversity within society incorporates the following:

Amistad Commission

This unit also reflects the goals of the Department of Education and the Amistad Commission including the infusion of the history of Africans and African-Americans into the curriculum in order to provide an accurate, complete, and inclusive history regarding the importance of of African-Americans to the growth and development of American society in a global context.

Asian American and Pacific Islander History Law

This unit includes instructional materials that highlight the history and contributions of Asian Americans and Pacific Islanders in accordance with the New Jersey Student Learning Standards in Social Studies.

New Jersey Diversity and Inclusion Law

In accordance with New Jersey's Chapter 32 Diversity and Inclusion Law, this unit includes instructional materials that highlight and promote diversity, including:

economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance.

MA.G-SRT.C.6 Understand that by similarity, side ratios in right triangles are properties of the angles in

	the triangle, leading to definitions of trigonometric ratios for acute angles.
MA.G-SRT.C.7	Explain and use the relationship between the sine and cosine of complementary angles.
MA.G-SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
MA.G-SRT.D.10	Prove the Laws of Sines and Cosines and use them to solve problems.
MA.G-SRT.D.11	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).
LA.K-12.NJSLSA.L4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.
LA.K-12.NJSLSA.L5	Demonstrate understanding of word relationships and nuances in word meanings.
TEC.K-12.8.1	All students will use computer applications to gather and organize information and to solve problems.
TEC.K-12.8.2	All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world as they relate to the individual society, and the environment.
WORK.K-12.9.1	All students will develop career awareness and planning, employability skills and foundational knowledge necessary for success in the workplace.
WORK.K-12.9.2	All students will develop career awareness and planning, employability skills and foundational knowledge necessary for success in the workplace.

Transfer

- Recall basic trigonometry knowledge from Geometry.
- Solving triangles are useful in surveying, navigation, and force within physics.

Essential Questions

- Using basic trigonometric equations, how can one determine missing sides of all types of triangles and how can this knowledge be applied to solve real-life problems?

Essential Understandings

- A triangle can have its missing parts found using the Law of Sines, the Law of Cosines, or the right triangle definitions of the trigonometric functions.
- If two sides and one angle of a triangle are provided and the angle is not the included angle, then there may be one solution, two solutions, or no solution for the triangle. (relate to SSA from geometry.)
- The formula for the area of a triangle is directly related to right triangle trigonometry.
- There is no ambiguous case for the Law of Cosines since cosine is 1-1 on [0,180). since sine is not 1-1 on [0,180), there may be an ambiguous case for the Law of Sines.

Students Will Know

- How to determine if a solution to the Law of Sines is an ambiguous case.
- How to find elevation angles, heights of buildings, and other right angle trigonometry word problems.
- How to find the area of a triangle knowing the lengths of two sides and the measure of the included angle.
- How to use Law of Sines and Cosines to solve vector-related physics problems.
- How to use the Law of Cosines to find the unknown parts of a triangle.
- How to use the Law of Sines to find the unknown parts of a triangle.
- How to use trigonometry to find unknown sides or angles of a right triangle.

Students Will Be Skilled At

- Determining when to use Law of Sine versus Law of Cosine, and what each of these laws can help solve for.
- Exploring the laws for ambiguous cases as well as vector-related problems.
- Recalling from Geometry how to solve for missing sides or angles in a right triangle.
- Solving for the area of a triangle without knowing the measure of all three sides.
- Using trigonometry to find realistic elevation angles and heights.

Evidence/Performance Tasks

Assessments

- Formative: Daily assessments using examples from class notes, NJSLA test bank problems, and/or Albert/AP Classroom assessments
- Summative: Teacher-created assessments, NJSLA test bank problems, Big Ideas Math online platform problems, Albert/AP Classroom and/or Big Ideas Math unit assessments
- Benchmark: IXL or teacher created diagnostic assessments in addition to unit assessments from Big Ideas Math
- Alternative Assessments: Student-centered activities such as scavenger hunts, various projects involving real world applications, and differentiated learning tasks in Khan Academy, DeltaMath, and IXL

- Answer essential questions
- Apply the Law of Sines and the Law of Cosines to solve for missing pieces of non-right triangles.
- Class discussion of daily topic
- Classwork and homework that assess the essential questions
- Explain why there can be additional answers to a Law of Sines problem (using geometric concept of triangle congruency).

- Have students use a geometric exploration program (Geometer Sketchpad) to find the areas of different triangles. Then, have them discover the area formulas through a guided discovery.
- Provide alternative means of assessments for certain students
- Take tests and quizzes that will assess the essential questions.
- Teacher Observation
- Tests and quizzes that assess the essential questions
- Through the assistance of the physics teachers, collect several problems relating trig to real-life examples involving vectors and motion. Have the students solve these problems and create some of their own.
- Use right triangle trigonometry to find missing pieces of triangles.
- Written assignments that assess the essential questions that involves providing explanations

Learning Plan

- Solving right triangles.
- The Law of Cosines.
- Finding the area of right triangles with a possible connection to geometric exploration software.
- Preview the essential questions and connect to learning throughout the unit.
- The graphing calculators will not be needed for this section, although they may be used for the computation. The use of a computer geometry program is suggested to further enhance the concepts.
- The Law of Sines.

Materials

Core instructional materials: Core Book List including PreCalculus Enhanced with Graphing Utilities, Sullivan, Savvas

Supplemental materials: Khan Academy, Edia, and DeltaMath

- District approved textbook
- Khan Academy
- Teacher created activiites
- Teacher created notes
- Whiteboard tables

Suggested Strategies for Modifications

Possible accommodations/modification for CP PreCalc & Trig