Unit 09: Triangle Trigonometry

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 4**
Length: **1-2 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.

Revised Date: July 2025

Standards

L.SS.11–12.1	Demonstrate command of the system and structure of the English language when writing or speaking.
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and post-secondary plans.
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
L.VL.11–12.3	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, including technical meanings, choosing flexibly from a range of strategies.
9.2.12.CAP.13	Analyze how the economic, social, and political conditions of a time period can affect the labor market.
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.
G.SRT.C.7	Explain and use the relationship between the sine and cosine of complementary angles.
G.SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
G.SRT.D.10	Prove the Laws of Sines and Cosines and use them to solve problems.
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).
	Mathematical and computational thinking in 9–12 builds on K–8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

Essential Questions

- How can trigonometric equations be applied to real world applications?
- Using basic trigonometric equations, how can one determine missing sides of all types of triangles?

Enduring 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.

Assessment

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

- Class discussion of daily topic
- Classwork and homework that assess the essential questions
- Provide alternative means of assessments for certain students
- Teacher Observation
- Tests and quizzes that assess the essential questions
- Written assignments that assess the essential questions that involves providing explanations

Learning Plan

The following list is meant to create a day-to-day plan. Teachers are encouraged to slow down or condense days as appropriate to the student population in the class. Assessment(s) should be given when appropriate.

- Recall how to solve a right triangles by Pythagorean Theorem, as well as three basic trigonometric ratios.
- Prove triangles are either right, acute, or obtuse by using the Pythagorean Theorem.
- Solve for the area of a right triangle.
- Define the Law of Sines and Law of Cosines and when to use each.
- Solve triangles using the Laws of Sines and Cosines.
- Throughout the unit, wrap in real world scenarios to use this knowledge.

Graphing calculators are encouraged to be used as an extension of these topics.

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

Integrated Accommodation & Modifications

Possible accommodations/modification for CP PreCalc & Trig