Course: Geometry **Unit 4 - Special Right Triangles and Trigonometry**	**Year of Implementation:** 2021-2022

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Stage One - Desired Results

Link(s) to New Jersey Student Learning Standards for this course:
https://www.state.nj.us/education/cccs/2020/

Unit Standards:
G-SRT.C.6-8, G-SRT.D.9-11

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas
9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities

Transfer Goal: Students will be able to independently use their learning to apply and transfer basic geometric concepts and problem-solving techniques to unfamiliar, varied and real-world situations.

As aligned with LRHSD Long Term Learning Goal(s):
Problem-Solving: apply and transfer autonomously and collaboratively mathematical concepts and problem-solving techniques to unfamiliar, varied and real-world situations
Reasoning: reason abstractly and quantitatively by applying mathematical representations, symbols and estimation techniques when engaging in problem-solving
Critical Thinking: construct and effectively communicate valid conclusions and critique the reasoning of others
Modeling: demonstrate mastery of concepts by evaluating models that others have constructed or by creating appropriate models of their own
Tools: identify the correct tools to solve problems, if applicable
Precision: determine an answer's appropriateness as a means of determining its validity, while using proper mathematical notation and units
Structure: use multiple representations, critical thinking skills, and prior knowledge to solve problems in new situations
Habits of Mind: approach new situations with curiosity, persistence, resourcefulness, and confidence; take risks, monitor their progress, accept and learn from setbacks, make adjustments, and reflect on their performance

Enduring Understandings Students will understand that. . . *EU 1* trigonometry can be used to solve various types of problems. *EU 2* patterns exist in triangles. *EU 3* right triangles can be used to model and solve real world situations.	*Essential Questions* *EU 1, 2* ● How do we know which method to use when solving right triangle problems? ● When is it more efficient to use one method over another? *EU 3* ● When solving real world problems, what assumptions have to be made?
Knowledge Students will know . . . *EU 1* ● trigonometric relationships exist between specific angles and sides of triangles. (G-SRT.C) ● trigonometry can be used for non right triangles. (G-SRT.D) *EU 2* ● the side lengths of special right triangles can be determined by applying the known rules (without using the Pythagorean Theorem). (G-SRT.C.8) *EU 3* ● the angles of elevation and depression are the acute angles of a right triangle formed by a horizontal distance and a vertical height. (G-SRT.C)	*Skills* Students will be able to. . . *EU 1* ● use trigonometric ratios in right and non-right triangles to find side lengths and angle measures. (G-SRT.C.6) ● use the Law of Sines and Law of Cosines to solve triangle problems. (G-SRT.D.10) *EU 2* ● use the properties of special right triangles. (G-SRT.C.8) *EU 3* ● solve real life problems involving angles of elevation and depression. (G-SRT.C) *EU 1, 2, 3* ● determine the most appropriate method to use in order to provide the best possible answer. (G-SRT.C, G-SRT.D)

Stage Two - Assessment

Other Evidence:

- Assessed elements from the Performance Task
- Other teacher–graded evaluations
- Warm-Ups/Exit Tickets
- Special Right Triangles on Desmos - finding missing side lengths
  https://teacher.desmos.com/activitybuilder/custom/58a98b4e96b880a4050e12ca
- Desmos Trigonometry Practice & Word Problem Extensions
  https://teacher.desmos.com/activitybuilder/custom/5b42f323980e50321b1d4a73

Stage Three - Instruction

Learning Plan: **Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: Each learning activity listed must be accompanied by a learning goal of A= Acquiring basic knowledge and skills, M= Making meaning and/or a T= Transfer.**

- Special Right Triangles on Desmos - finding missing side lengths (A, EU 2)
  https://teacher.desmos.com/activitybuilder/custom/58a98b4e96b880a4050e12ca
- 30-60-90 Discovery on Desmos (M, EU 2)
  https://teacher.desmos.com/activitybuilder/custom/5c37264514e83563c52575c3
- Pirate Ship Attack! (use right triangles to determine if an eyewitness report of a pirate attack was possible; create your own example) (M/T, EU 1, 2) *https://www.radford.edu/rumath-smpdc/Performance/src/Rachel%20Grzech%20-%20Pirate%20Attack.pdf*
- Desmos Trigonometry Practice & Word Problem Extensions (A/M/T, EU 1, 3)
  https://teacher.desmos.com/activitybuilder/custom/5b42f323980e50321b1d4a73

- 3 Act Task - Car ramp (M/T, EU 1, 3)
  https://whenmathhappens.com/2020/07/03/car-ramp/

- 3 Act Task - The impossible Measurement (M/T, EU 1, 3)
  https://www.savvasrealize.com/community/program/3162d61e-4b73-3fad-87e7-0a9e0f539531/43/tier/3c313a87-4507-3b2d-a9c8-b40c6a5f8c41/45/lesson/a7fa4833-c80c-3f7b-ab77-c10159ffaf3a/43

- Minigolf Hole Project (M/T, EU 1, 2, 3)
  https://www.achieve.org/files/CCSS-CTE-Task-MiniatureGolf-FINAL.pdf

The following is the suggested sequence of learning activities.

Approximate timeline: 24 Days

- Properties of special right triangles (45-45-90 and 30-60-90)
- Find area of right triangles using special right triangle rules
- Use trigonometric ratios to find side and angle measures
- Find area of right triangles using trigonometry
- Solve word problems using trigonometry
- Law of Sines and Cosines