Course: Geometry **Unit 2 - Triangles and Similarity**	**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-CO.A.5, G-CO.B.6-8, G-CO.C.9,10, G-SRT.B.4,5

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
Patterns: analyze data and recognize patterns in a variety of situations
Habits of Mind: approach new situations with curiosity, persistence, resourcefulness, and confidence; take risks, monitor their

<table>
<tr><td colspan="2">progress, accept and learn from setbacks, make adjustments, and reflect on their performance</td></tr>
<tr><td><u>Enduring Understandings</u>
Students will understand that. . .

EU 1
classifying helps to develop and share connections among mathematical ideas.

EU 2
properties of geometric figures can be proven.

EU 3
proportionality express how quantities change in relation to each other.</td><td><u>Essential Questions</u>

EU 1, 2, 3
● Why is it important to classify geometric figures?
● How can geometric properties be used to prove relationships between the angles and sides of geometric figures?

EU 1, 3
● How is congruence similar or different from similarity?

EU 2
● What are the minimal conditions needed to prove triangles congruent?
● Under what conditions can triangles exist?</td></tr>
<tr><td><u>Knowledge</u>
Students will know . . .

EU 2
● the minimum amount of information that is needed to prove triangles are similar. (G-CO.B.6-8, G-CO.C.9,10, G-SRT.B.4,5)

EU 1, 2, 3
● proportional equations are useful in solving problems in a variety of applications. (G-SRT.B.4,5)
● figures are similar if and only if their corresponding sides are proportional and corresponding angles are congruent. (G-CO.A.5, G-SRT.B.4,5)</td><td><u>Skills</u>
Students will be able to. . .

EU 1
● classify triangles. (G-SRT.B.4,5)

EU 2
● prove triangles congruent by selecting the appropriate congruence theorem. (G-CO.B.6-8, G-CO.C.9,10)

EU 1, 2, 3
● identify corresponding parts. (G-SRT.B.4,5)

EU 3</td></tr>
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	• *use proportions to solve for missing information in similar triangles. (G-CO.A.5, G-CO.C.9,10, G-SRT.B.5)*

Stage Two - Assessment

Other Evidence:

- *Tests and quizzes to include: identifying types of triangles; writing and solving algebraic equations to find interior and exterior angle measures and lengths of sides in polygons; proofs of and with congruent triangles, isosceles triangles; coordinate proofs with triangles; determining with three given segment lengths can form a triangle; constructions of and with triangles (congruent triangles, altitudes, medians, angle bisectors, perpendicular bisectors); ratios and proportions; using proportions to show similar triangles; identifying similar triangles using the AA similarity postulate and the SSS, SAS similarity theorems*
- *Assessed elements from the Performance Task*
- *Other teacher-graded evaluations*
- *Warm-Ups/Exit Tickets*

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.**

- *Investigating Congruent Triangles (A, M, EU 1, 2, 3)*
  https://teacher.desmos.com/activitybuilder/custom/5accb0a8b204b709fe66a08f
- *3 Act Math - Pythagorean Theorem (A, M, EU 2, 3)*
  http://threeacts.mrmeyer.com/tacocart/

- *Discovering the Triangle Inequality Theorem (A, M, EU 2, 3)*
  https://teacher.desmos.com/activitybuilder/custom/59b96baa174ded09890f34c7
  https://teacher.desmos.com/activitybuilder/custom/5953e815c1e80c02fb2f1caa#preview/c2bdc4d5-c85e-4852-bc4f-61819cd23bdf

- *Congruence in design (M, T, EU 2, 3)*
  https://www.bigideasmath.com/protected/content/stem/video.php?book=104&id=100833980
  https://static.bigideasmath.com/protected/content/pt/hsbts/hscc_geo_05_stem_performancetask.pdf

- *NYC Flatiron Building - Find the measurements of the building using knowledge of similar triangles (M, T, EU 2, 3)*
  https://betterlesson.com/lesson/393756/similar-triangles-and-the-flatiron-building

The following is the suggested sequence of learning activities.

Approximate timeline for ACC: 30 days

- Identify and classify triangles and use the pythagorean theorem and its converse
- Area of triangles
- Use the relationship about interior angles of a triangle to find angle measure
- Use the relationship between exterior angles of a triangle and remote interior angles to find angle measures
- Use properties of isosceles and equilateral triangles to find lengths of sides and angle measures
- Use congruent triangle theorems to test for congruent triangles
- Prove triangles congruent and corresponding parts congruent
- Use right triangle theorems to prove triangles congruent
- Write coordinate proofs about triangles
- Perpendicular and angle bisectors in triangles
- Identify medians and altitudes in triangles
- Inequalities in one triangle
- Writing ratios and solving proportions
- Using proportions to identify similar polygons
- Similarity Transformations
- Solving problems using the properties of similar polygons
- Identifying similar triangles using AA, SSS, SAS
- Prove triangles are similar
- Proportions in Triangles

- Triangle midsegment
- Allow days for aforementioned activities and assessments