Unit 7: Similarity

Content Area: **Mathematics**
Course(s): **English I, Geometry, Honors Geometry**
Time Period: **January**
Length: **3 weeks**
Status: **Published**

Unit Overview

- Apply the Triangle Proportionality and Triangle Angle-Bisector Theorems.
- Express a proportion in an equivalent form.
- Solve for an unknown term in a given proportion.
- State and apply the properties of similar polygons in proofs.
- Use similar triangle to deduce information about segments or angles.
- Use the AA, SAS, and SSS Similarity Theorems to prove triangles similar.

Enduring Understandings

- A variety of techniques of indirect measurement can be used to represent and solve problems.
- Geometric and algebraic procedures are interconnected and build on one another.
- Integration of various mathematical procedures builds a stronger foundation for finding solutions.
- There are various computational methods, including mental math, pencil and paper techniques and use of calculators to find the solution

Essential Questions

- How can you use algebra to make solving problems in geometry both effective and efficient?
- How do geometric relationships help to solve problems and/or make sense of phenomena?
- How do mathematical representations reflect the needs of society?
- What makes a computational strategy both effective and efficient?

Lesson Titles/Objectives

- To apply the triangle proportionality theorem and its corollary
- To atate and apply the triangle angle-bisector theorem
- To express a given proportion in an equivalent form
- To express a ratio in simplest form
- To solve for an unknown term in a given proportion
- To state and apply the properties of similar polygon
- To use similar triangles to deduce information about segments or angles
- Use the AA similarity postulate, The SAS similarity theorem, and the SSS similarity theorem to prove

triangles are similar

Standards

	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MA.N-Q	Quantities
	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MA.G-CO.C.10	Prove theorems about triangles.
MA.G-SRT	Similarity, Right Triangles, and Trigonometry
MA.G-SRT.A	Understand similarity in terms of similarity transformations
MA.G-SRT.B	Prove theorems involving similarity
MA.G-MG.A	Apply geometric concepts in modeling situations

Indicators

MA.N-Q.A	Reason quantitatively and use units to solve problems.
MA.N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
MA.N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
MA.G-CO.C.10	Prove theorems about triangles.
MA.G-SRT.A.1	Verify experimentally the properties of dilations given by a center and a scale factor:

MA.G-SRT.A.1b	The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
MA.G-SRT.A.2	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
MA.G-SRT.A.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
MA.G-SRT.B.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
MA.G-MG.A.2	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

21st Century Skills and Career Ready Practices

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Inter-Disciplinary Connections

LA.RI.11-12.7	Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.
LA.L.11-12.6	Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
ARCH.9-12.9.4.12.B.22	Create and implement project plans to accomplish realistic planning in design and construction situations, considering available resources and requirements of a

project/problem.

Instructional Strategies. Learning Activities. and Levels of Blooms/DOK:

- Intro. AA similarity postulate
- Intro. applying triangle proportionality theorem
- Intro. how to tell if two polygons are similar
- Intro. means and extremes
- Intro. Properties of proportions
- Intro. proportions
- Intro. ratios
- Intro. SAS similarity theorem
- Intro. scale factors
- Intro. similar polygons
- Intro. solving proportions
- Intro. solving silimarity proofs
- Intro. SSS similarity theorem
- Intro. triangle angle-bisector theorem
- Intro. Triangle proportionalilty theorem
- Review anticipatory Set
- Review Homework
- Review HSPA warmup
- Review Quiz
- Students will take a chapter 7 test
- Students will take a quiz on 7.1-7.3
- Students will take a quiz on 7.4-7.6

Modifications:

ELLs Modifications

- 1:1 testing
- Offer alternate/or modify assessments
- Utilize explicit learning strategies that are well planned in advance (intentional planning)

IEP & 504 Modifications

- allowing co-teaching with general education and special education teachers in the same classroom so that the special education teacher can re-teach students with special needs in a different way in a smaller group (pulled to the side)
- students could use calculator and/or other math tools (x grids, chips, etc)
- teaching the main ideas/concepts (limiting not needed details)to be taught and repeating them in several different ways over several different days (goal is 7 different ways same concept for students with learning disabilities)

G&T Modifications

- Determine where students' interests lie and capitalize on their inquisitiveness. (Is there a Invite students to explore different points of view on a topic of study and compare the two.
- Encourage students to make transformations- use a common task or item in a different way.
- Math- provide additional rigorous challenge problems for advanced students

Formative Assessment

- closure use parallels in similar figures to solve for segment lengths
- closure use similar figures in right triangle
- journal write
- pass out of class
- think-pair-share
- warm up find corresponding parts of similar figures
- warm up solve proportion

Summative Assessment

- Test proportion parallel and triangle similarity
- Test similarity in polygons and dilation

Resources & Technology

Resources and Materials

- Geometry Text Book- McDougal – Littell
- Manipulatives
- Protractors
- Ruler

- Study Guide and Practice Sheet – Glencoe/McGraw Hill
- Teacher Created worksheets
- Teacher Generated worksheets

Technology

- Geometer sketchpad
- Mathxl
- Smart Board
- Ti-84 calculator
- Videos

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.