Unit 09: Similarity

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 23**
Length: **3 Weeks**
Status: **Published**

Unit Overview

In this unit, students will study ratios and proportions through a geometric approach using similar triangles and similar polygons. They will use scale factors to solve for missing pieces in similar plane figures. Students will investigate how to prove triangles similar, as well as the difference between congruence and similarity.

Standards

MA.G-CO.C.10	Prove theorems about triangles.
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.4	Prove theorems about triangles.
MA.G-SRT.B.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Essential Questions

1) Why is proof necessary?

2) How can the knowledge of algebraic proportions be useful in the study of

triangles?

3) Why would it be important to be able to prove similarity in real-world situations?

Application of Knowledge and Skills...

Students will know that...

- 1) similar figures have side lengths that are proportional.
- 2) the geometric mean, b, of a and c can be found by solving a/b = b/c or by calculating b = √(ac).
- 3) ratios and proportions are different in that one simplifies a ratio but solves a proportion. They are similar because a proportion is composed of two ratios.
- 4) AA, AAS similarity, and SSS similarity are ways to determine if two triangles are similar; they cannot be used with other polygons.
- 5) when an extended proportion is created to solve for missing sides in similar triangles, the numerators are sides of one triangle, and the denominators are the corresponding sides of the other triangle.

Students will be skilled at...

Students will be able to:

- a) solve problems containing proportional relationships.
- b) find the geometric mean of two numbers.
- c) solve for missing parts of similar polygons.
- d) determine if two triangles are similar using the definition of similar triangles, AA, SAS similarity, or SSS similarity.
- e) prove triangles similar.

Assessments

- Daily Formative Assessments Formative: Other written assessments Formative assessments, such as Do-Now assignments, homework assignments, Tickets-to-Leave, and SmartPal response board practice problems, will provide daily data for teachers.
- Pre-Assessment Diagnostic: Other written assessments Students will be assessed on their prior knowledge of similar figures, including classifying and finding missing measurements.
- Unit Quiz Formative: Written Test Students will be assessed on calculating geometric mean, calculating ratios of similar figures, finding missing measurements of similar figures, and proving that triangles are similar.
- Unit Test Summative: Written Test Students will be assessed on their ability to calculate geometric mean, calculate ratios of similar figures, find missing measurements of similar figures, prove that triangles are similar, prove statements using congruence of angles and the proportionality of segments, and prove the proportionality.

Activities

Communicator Practice

Students will complete differentiated practice problems on SmartPal response boards.

Cooperative Problem-Solving

Students will work cooperatively on challenge problems. This work may be presented by students, discussed as a class, or submitted for grading and comments.

Similar Figures Investigation

Complete an investigation in which students measure angles and segment lengths of two similar pictures to find that angles are congruent and side lengths are proportional in similar figures. They will use these concepts to determine whether different sets of figures are similar.

Activities to Differentiate Instruction

Interactive Smartboard Activities will be utilized.

Students will work in mixed-level groups.

Students will be assigned optional and mandatory challenge problems on homework assignments.

Enrichment worksheets will be available for classwork and/or homework.

Guided notes and study guides will be provided accordingly.

Appropriately-leveled problems for students to complete. Proofs can range from having few steps to requiring multiple steps using multiple geometric figures.

Integrated/Cross-Disciplinary Instruction

Students will understand that writing geometry proofs is similar to writing persuasive essays. They must take given information, build supporting details, and draw a conclusion.

Resources

McDougal Littell *Geometry for Enjoyment and Challenge* textbook and resources

Smartboard

Smart Exchange

McDougal Littell *Activity Generator* CD-ROM

Smart Exchange

21st Century Skills

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.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
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.