Unit 4: Similarity
Geometry

5 Class Meetings
Revised May 2023

Essential Questions

- How can you use proportions to find side lengths in similar polygons?
- How can you identify similar polygons and triangles?

Enduring Understandings with Unit Goals

EU 1: Ratios and proportions are used to determine the lengths of sides in similar polygons.
- Write and solve proportions to find side lengths.

EU 2: Using ratios and proportions between two polygons, you can determine if the polygons are similar.
- Calculate scale factor to determine similarity

Standards

<u>Common Core State Standards</u>:

- **HSG.SRT.B.5:** Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
- **HSG.GPE.B.5:** Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.
- **HSG.SRT.B.4:** Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*

ISAAC Vision of the Graduate Competencies

Competency 1: Write effectively for a variety of purposes.
Competency 2: Speak to diverse audiences in an accountable manner.
Competency 3: Develop the behaviors needed to interact and contribute with others on a team.
Competency 4: Analyze and solve problems independently and collaboratively.
Competency 5: Be responsible, creative, and empathetic members of the community.

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Unit Content Overview

1. **Ratios and Proportions**
   - Writing a Ratio
   - Using an Extended Ratio
   - Solving a Proportion
   - Writing Equivalent Proportions

2. **Similar Polygons**
   - Determining Similarity
   - Finding Scale Factor
   - Using Similar Polygons to Solve for Side Lengths

3. **Geometric Mean**
   - Simplifying Radicals
   - Finding Geometric Mean

4. **Proportions in Triangles**
   - Using the Side-Splitter Theorem
   - Using the Triangle-Angle-Bisector Theorem

Interdisciplinary Connection:
- Language Arts - Word Problems
- Science – Word Problems

Daily Learning Objectives with *TWPS Activities*

Students will be able to…
- Write ratios and solve proportions
- Identify similar polygons using scale factor
- Reduce radicals to simplest form
  - *Describe the strategy you use to reduce radicals.*
- Calculate the geometric mean of two numbers
  - *How is the geometric mean different from an arithmetic mean?*
- Solve proportions using the Side-Splitter Theorem
- Solve proportions using the Triangle-Angle-Bisector Theorem

Instructional Strategies/Differentiated Instruction

- **HLP:** Academically Productive Talk
- **HLP:** Writing to Learn (TWPS)
- **HLP:** Effective Feedback
- Whole-group instruction

- Creating authentic connections for students
- Rephrasing and restatement of information and concepts
- Guided notes
- Student-led instruction
- Independent problem-solving
- Collaborative problem-solving
- Cross-curricular problem solving (independent and collaborative)
- Accountable Talk
- Manipulatives
- Cumulative Homework
- Visuals to support instruction
- Small group instruction
- Pre-teaching and reteaching

EL DIFFERENTIATED INSTRUCTION:

- Word Walls with visuals
- TWPS (Think, Write, Pair, Share)
- Pre-reading strategies
- Culturally responsive teaching
- Explicit Modeling
- Key Vocabulary
- Graphic Organizers
- Strategic Grouping
- Non-verbal Assessments

Assessments

FORMATIVE ASSESSMENTS:

- Accountable Talk Discussions
- Daily Think-Write-Pair Share (TWPS)
- Daily Do Now
- Whiteboards
- Mid-class check-ins
- Exit Slips
- Cumulative Homework
- Performance Task – Triangle Pool
    - Problem Solving Rubric

SUMMATIVE ASSESSMENTS:

- Edulastic Quiz – EU 1, EU 2
- Unit 4 Test – EU 1, EU 2
- Performance Task – Triangle Pool

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Unit Task

Unit Task Name: Triangle Pool

Description: Students will use information learned in this unit about how ratios and proportions are used to determine the lengths of sides in similar polygons (EU 1) and how by using ratios and proportions between two polygons, you can determine if the polygons are similar (EU 2), in order to decide where to hit a pool ball in order to bank a shot into a middle pocket. Students will be given a picture of a pool table and measurements of the dimensions of the pool table. They will need to use geometric tools to construct two triangles on the table and use similar triangles to determine where the cue ball should be hit in order to make a bank shot off the wall of the table. Students will turn in their pool table drawing along with all equations that led them to their answer and a well-developed paragraph explaining how they came to their answer.

Evaluation: Problem Solving Rubric

Unit Resources

- Worksheets
- Calculator
- Laptops
- SBAC Prep Online
- Edulastic
- Kahn Academy
- Gimkit
- Quizizz
- Individual Whiteboards
- 2 Truths & One Lie
- State Common Core Standards Transition Tasks
- Online resources