

## Unit 5 Similarity and Proportions

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<b>Stage 1: Desired Results</b> <b>Unit Goals</b>	
<ul style="list-style-type: none"><li>• Students will use similarity and proportional reasoning to analyze triangles and various polygons.</li><li>• Students will explore the similarities/differences between similar and congruent figures.</li><li>• Students will use similarity and proportional reasoning to indirectly determine the size of something.</li><li>• Students will examine proportions regarding side length, area, and volume of geometric figures.</li></ul>	
<b>Enduring Understandings</b> ( <i>Student will understand that...</i> )	<b>Essential Questions</b>
<ul style="list-style-type: none"><li>• Similar figures are proportional.</li><li>• Similarity and proportional reasoning allow us to determine the size of something indirectly.</li><li>• Proportion works by comparing the relationships of parts.</li><li>• Knowing the relationships between parts are sometimes more important than knowing the size of each part.</li></ul>	<ul style="list-style-type: none"><li>• What makes two figures ‘similar’?</li><li>• Why is similarity useful?</li><li>• What does proportion mean? How does it work?</li><li>• Why use ratios and proportions instead of actual numbers?</li></ul>
<b>Knowledge</b> ( <i>Student will know...</i> )	<b>Skills</b> ( <i>Student will be able to...</i> )
<ul style="list-style-type: none"><li>• Triangle shortcuts</li><li>• The difference between similarity and congruence.</li><li>• Indirect use of similarity/proportional reasoning in analyzing figures.</li></ul>	<ul style="list-style-type: none"><li>• Write ratios and proportions.</li><li>• measure indirectly<ul style="list-style-type: none"><li>◦ triangle similarity shortcut</li><li>◦ using similarity in problem-solving</li><li>◦ area &amp; volume relationships in similar polygons and polyhedra</li></ul></li></ul>

<b>Familiarity</b> ( <i>Student will be familiar with...</i> )	
<ul style="list-style-type: none"> <li>• Different polyhedra and polygons</li> <li>• Quadratic formula (algebra review)</li> </ul>	
Stage 2 – Assessment Evidence	
<p>Performance Tasks:</p> <ul style="list-style-type: none"> <li>• <u>Class work assignments/warm up problems:</u></li> <li>• <u>Quizzes/Miniproject:</u></li> <li>• <u>Project:</u> “Building Blocks” – Surveying and Triangle Similarity. Students will create a booklet that explains and demonstrates several methods of finding heights indirectly (using stick method, mirror method), and performing verifications using “alternative methods.” Then, students will collaboratively create a scale drawing of their neighborhood blocks, with each student being responsible for one building.</li> </ul>	<p>Other Evidence:</p> <ul style="list-style-type: none"> <li>• <u>Homework assignments:</u> daily</li> <li>• <u>Journals:</u> bi-weekly reflections on learning and EQs.</li> </ul>
Stage 3 - Learning Plan	
<p>Learning Activities: Daily learning activities will introduce and reinforce key course concepts. These include:</p> <ul style="list-style-type: none"> <li>• Daily Warm up problems</li> </ul>	

<ul style="list-style-type: none"> <li>• Small group investigation activities to introduce new concepts.Partner activities to work through example problems reinforcing new topics.</li> <li>• Partner assignments in which students work together to construct their knowledge of key concepts.</li> <li>• “Guest teacher” presentations in which students teach mini-lessons on specific topics or problems.Teacher led discussion to introduce or reinforce key concepts or skills.</li> <li>• Investigation activities using graphing calculators and geometer’s sketchpad</li> <li>• Almost nightly homework assignments</li> </ul> <p>***See Canvas for more detailed outlines of class work, including course documents</p>	
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### **SLA Math Department Standards:**

A-Computation and operations--Students can perform computational and algebraic operations to the appropriate level of course.

B-Visual-- Students can visually represent mathematical situations through graphs and diagrams.

C-Verbal and written communication skills-- Students can clearly communicate mathematical problem solving process.

D-Problem solving- Choose and apply various problem-solving strategies to model and solve a wide variety of problems.

### **Unit 6: Similarity & Proportions**

34 D Can determine similarity using shortcuts

35 D Can use similarity to calculate missing parts

36 D Use triangle similarity to solve application problems

40 A Use knowledge of similar figures to calculate ratio of sides, area and volume

### **PA Common Core Standards Covered:**

#### **The Standards of Mathematical Practices**

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.

- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

### **PA Common Core Standards Covered:**

*CC.2.1.HS.F.3 Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.*

*CC.2.3.HS.A.5 Create justifications based on transformations to establish similarity of plane figures.*

*CC.2.3.HS.A.6 Verify and apply theorems involving similarity as they relate to plane figures*

*CC.2.3.HS.A.13 Analyze relationships between two-dimensional and three-dimensional objects*

*CC.2.3.HS.A.14 Apply geometric concepts to model and solve real world problems.*

### **Goals/Activities by Week**

#### **Week 1 (2/24/14 - 2/28/14) - only 1 day**

- Similarity shortcuts
- Similarity practice

#### **Week 2 (3/3/14 - 3/7/14)**

- Indirect Measurements
  - Shadow method
  - Mirror method
  - Stick method
  - Word problems (indirect measurements)
- Mirror Lab investigation

#### **Week 3 (3/10/14 - 3/14/14)**

- BM work time
- Similarity Review
- Similarity Quiz

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#### **Week 1 (2/25/13) 4 days**

- Quiz from Unit 5 (Standards 37, 38, 39, 41)
- Ratios and Proportions
- Quiz Corrections/Review
- Similar triangles

#### **Week 2 (3/4/13) 4 days**

- Indirect measurements?
- Introduce BM
- Mirror
- BM work time

**Week 3 (3/11/13) 4 days**

- BM work time

**Week 4 (3/18/13) 4 days**

- Day 1 - BM due; Longer warm-up/application problem, BM reflection period
- Day 2 - Review for quiz 5.2
- Day 3 - Quiz 6.1 (Standards 34, 35, 36)
- Day 4 - Area & Perimeter investigation