

Unit C - Similarity

Overview

This unit extends students' understanding of relationships between triangles (and shapes in general). They will learn what it means for shapes to be similar (congruent angles and proportional sides) and solve for sides of similar triangles. Students measuring the height of unknown objects using similarity. The second half of the unit focuses on right triangles, using the idea of similarity to introduce the concept of Trigonometry.

21st Century Capacities: Collective Intelligence, Analyzing

Stage 1 - Desired Results

<p>ESTABLISHED GOALS/ STANDARDS</p> <p>MP 1 Make sense sense of problems and persevere in solving them MP4 Model with Mathematics MP8 Look for and express regularity in repeated reasoning</p> <p>Understand similarity in terms of similarity transformations</p> <p>CCSS.MATH.CONTENT.HSG.SRT.A.1 Verify experimentally the properties of dilations given by a center and a scale factor:</p> <p>CCSS.MATH.CONTENT.HSG.SRT.A.1.A A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.</p> <p>CCSS.MATH.CONTENT.HSG.SRT.A.1.B The dilation of a line segment is longer or shorter in the ratio given by the scale factor.</p>	<p>Transfer:</p>		
	<p><i>Students will be able to independently use their learning in new situations to...</i></p> <ol style="list-style-type: none"> 1. Draw conclusions about graphs, shapes, equations, or objects. (Analyzing) 2. Make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution. (Analyzing) 3. Work respectfully and responsibly with others, exchanging and evaluating ideas to achieve a common objective (Collective Intelligence) 		
	<p>Meaning:</p>		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>UNDERSTANDINGS: <i>Students will understand that:</i></p> <ol style="list-style-type: none"> 1. Mathematicians identify relevant tools, strategies, relationships, and/or information in order to draw conclusions. 2. Mathematicians apply the mathematics they know to solve problems occurring in everyday life. 3. Mathematicians examine relationships to discern a pattern, generalizations, or structure. 4. Mathematicians analyze characteristics and properties of geometric shapes to develop mathematical arguments about geometric relationships. </td> <td style="width: 50%; vertical-align: top;"> <p>ESSENTIAL QUESTIONS: <i>Students will explore & address these recurring questions:</i></p> <ol style="list-style-type: none"> A. How can understanding a pattern help me? B. How can I use symbols to communicate? C. How can I use what I know to help me find what is missing? </td> </tr> </table>	<p>UNDERSTANDINGS: <i>Students will understand that:</i></p> <ol style="list-style-type: none"> 1. Mathematicians identify relevant tools, strategies, relationships, and/or information in order to draw conclusions. 2. Mathematicians apply the mathematics they know to solve problems occurring in everyday life. 3. Mathematicians examine relationships to discern a pattern, generalizations, or structure. 4. Mathematicians analyze characteristics and properties of geometric shapes to develop mathematical arguments about geometric relationships. 	<p>ESSENTIAL QUESTIONS: <i>Students will explore & address these recurring questions:</i></p> <ol style="list-style-type: none"> A. How can understanding a pattern help me? B. How can I use symbols to communicate? C. How can I use what I know to help me find what is missing?
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Geometry Level 3 Curriculum

Acquisition:		
	<i>Students will know...</i>	<i>Students will be skilled at...</i>
<p>CCSS.MATH.CONTENT.HSG.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.</p> <p>CCSS.MATH.CONTENT.HSG.SRT.A.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.</p> <p>Prove theorems involving similarity</p> <p>CCSS.MATH.CONTENT.HSG.SRT.B.4 Prove theorems about triangles. <i>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.</i></p> <p>CCSS.MATH.CONTENT.HSG.SRT.B.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.</p>	<ol style="list-style-type: none"> 1. The symbol for similarity 2. That corresponding angles in similar figures are congruent and corresponding sides are proportional, according to a scale factor 3. How to prove triangles are similar by AA~, SAS~ and SSS~ 4. Similar triangles can be used to solve many real world problems 5. That the pythagorean theorem can be used to classify right, acute, and obtuse triangles 6. The patterns for ratios of sides in special right triangles (45 - 45- 90 and 30 - 60- 90) 7. Right triangle trigonometry is based on similar triangles and ratios for specific angles 8. SOHCAHTOA 9. Vocabulary: similar, corresponding, scale factor, AA, SAS~, SSS~, special right triangles, 45 - 45 - 90, 30 - 60- 90, trigonometry, SOHCAHTOA, sine, cosine, tangent, opposite, adjacent, hypotenuse, inverse, angles of elevation, angles of depression 	<ol style="list-style-type: none"> 1. Finding corresponding sides and angles 2. Determining sides of similar triangles using proportions and scale factors 3. Proving triangles are similar 4. Using similar triangles to solve real world problems 5. Classifying triangles using the converse of the pythagorean theorem 6. Determining sides of special right triangles using the ratio pattern, rather than full pythagorean theorem 7. Solving for sides and angles using SOHCAHTOA 8. Creating diagrams for word problems using angles of elevation and depression