



Congruence and Similarity

Name: _____

Notes

Date: _____

Keepin' it Real

Joshua works for a film studio. His job is designing the animal models for the new movie about lab rabbits that are injected with growth hormone. The giant killer bunnies go on a rampage in the community. The final images will be animated as computer graphics, but first there must be physical models to use. One scene requires models that match mutant rabbits weighing approximately 150 pounds. Joshua must determine the dimensions of a rabbit at this stage and choose the ideal building materials to use.



Vocabulary

Write the definition of the term and include an image or example that represents it.

Term	Definition	Example
<i>Congruent</i>		
<i>Similar Shapes</i>		
<i>Proportion</i>		
<i>Congruence Transformation</i>		
AAS		
ASA		

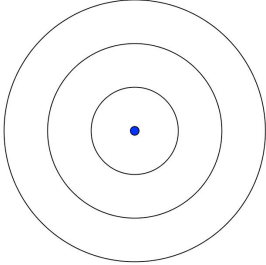
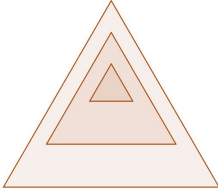
Term	Definition	Example
SSS		
SAS		
AAA		
AA		

Key Concept (a)

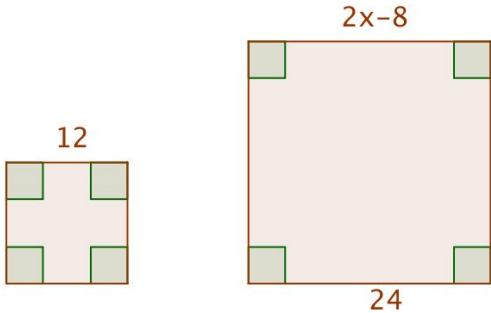
Congruence and Similarity	Extra! Extra!
<p>Shapes that are <i>congruent</i> are exactly the “same”, such that you can move one onto the other and have their sides exactly align.</p> <p>Shapes that are <i>similar</i> are enlargements/reductions of one another. If two regular polygons are similar, then their angles are congruent, and their sides are in proportion.</p>	

What is the difference between congruent and similar (but not congruent)? Sketch examples of each.

Similar (but not Congruent)	Congruent (and Similar)

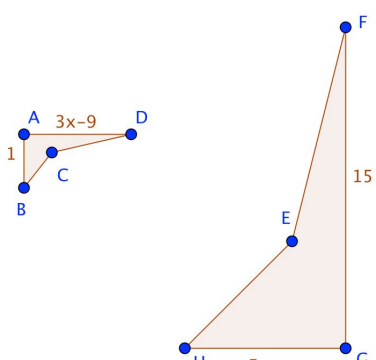
Similarity	Extra! Extra!
<p>All circles are similar to one another. Their “size” is based on their radii.</p>  <p>All equilateral triangles are similar to one another. They vary only in the lengths of their sides. The angles are all 60°.</p> 	

Skill Practice #1

Similarity	Notes
<p>The two shapes are squares. Find x and the scale factor.</p> 	

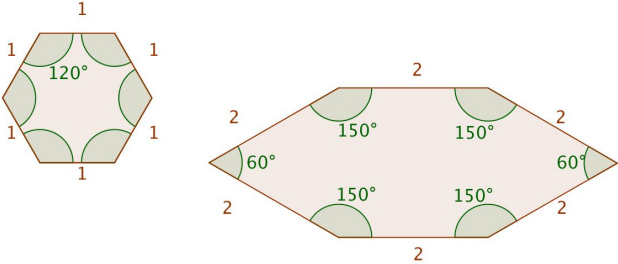
Similarity in Other Shapes	The Conceptualizer!
<p>If the shapes are similar, then the sides are in proportion. There is a constant scale factor, and a constant proportion, between pairs of corresponding sides.</p>	

Skill Practice #2

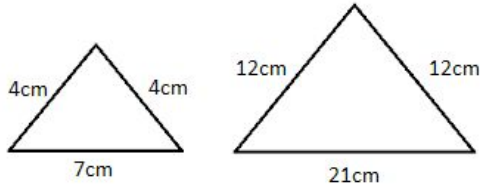
Similar Shapes	Notes
 <p>With $ABCD \sim GHEF$, what is AD?</p>	

Similar Shapes	The Conceptualizer!
<p>You can work the relationship backward. If the corresponding angles are congruent and the corresponding sides are in proportion, then the shapes are similar.</p>	

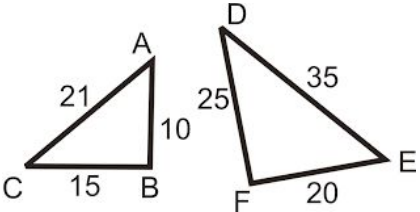
Skill Practice #3

Similar Shapes	Notes
<p>Are the shapes similar?</p>  <p>The first polygon is a regular hexagon with side length 1 and an interior angle of 120°. The second polygon is a hexagon with side length 2 and interior angles of 150°, 150°, 60°, 150°, and 60°.</p>	

Similarity in Triangles	The Conceptualizer!
<p>If two non-regular triangles have the same three angles, then they are similar.</p> <p>The scale factor is the ratio of the corresponding pairs of sides.</p> <p>But, the more interesting question is: how <i>little</i> information do you need in order to conclude that two triangles are similar?</p>	

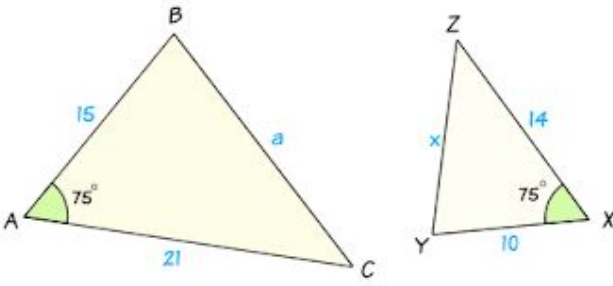
Similarity: SSS	The Conceptualizer!
<p>If the three sides are in proportion, are the triangles similar? You don't know anything about the angles.</p>  <p>Here, the triangle on the right is 3 times larger, in every dimension, than the triangle on the left.</p> <p>Is it possible to draw that triangle, but with different angles?</p> <p>It turns it is impossible. Therefore, two triangles are similar if all three pairs of sides are in proportion.</p> <p>They are similar by side-side-side, or SSS.</p>	

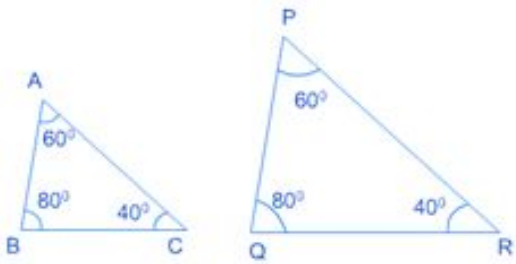
Skill Practice #4

Similarity: SSS	Notes
 <p>Determine whether the two triangles are similar.</p>	

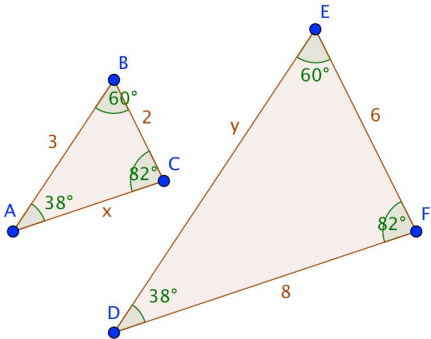
Similarity: SAS	The Conceptualizer!
<p>Consider two triangles with two sides known and the included angles congruent. If the measure of angle A is the same as the measure of angle D, and $\frac{AC}{DF} = \frac{AB}{DE}$, are the triangles similar?</p> <p>There is no other way to draw $\triangle DEF$. It is similar to $\triangle ABC$.</p> <p>That is, if two pairs of sides are in proportion, and their included angles are congruent, then the triangles are similar by side-angle-side, or SAS.</p>	

Skill Practice #5

Similar Triangles	Notes
 <p>If $a = 22.5$, find x.</p>	

Similarity: AAA and AA	The Conceptualizer!
<p>If all three angle pairs are congruent to one another, are the triangles similar?</p>  <p>These triangles are similar by angle-angle-angle, or AAA.</p> <p>The sides will turn out to be in proportion, so if you are given some of the side values, you can find the others by writing the proportion.</p> <p>In fact, you also know the sum of the angles in a triangle is 180 degrees, so if you know that two angle pairs are congruent, you can find the third angle in each triangle -- and that pair will be congruent, too. Therefore, two triangles that have two congruent angles are similar by AA.</p>	

Skill Practice #6

Similar Triangles: AAA	Notes
<p>Find x and y:</p> 	

Key Concept (e)

Congruence	The Conceptualizer!
<p>Congruent figures are the same shape and size, such that one exactly overlays the other.</p> <p>How little information do you need to conclude that two figures are congruent?</p> <p>Generally, for polygons, you would need to know that almost all of the pairs of sides and angles are congruent.</p>	

Applications

Leah's shadow is 16 feet long, and the 10 foot tall flagpole she is next to casts a shadow 40 feet long. How tall is Leah?

A map has a scale of 4 cm : 18 km. Hilliard and Arlington are 9 km apart. How far apart are they on the map?

The base of one triangle is 6 with a height of 8. A second triangle is similar to the first one with a base of 18. What is the area of the second triangle?