Lesson 14: Similarity

Classwork

**Example 1**

We said that for a figure $A$ in the plane, it must be true that $A\~A$. Describe why this must be true.

Example 2

We said that for figures $A$ and $B$ in the plane so that $A\~B$, then it must be true that $B\~A$. Describe why this must be true.

Example 3

Based on the definition of *similar,* how would you show that any two circles are similar?

Example 4

Suppose $△ABC\leftrightarrow △DEF$ and under this correspondence, corresponding angles are equal and corresponding sides are proportional. Does this guarantee that $△ABC$ and $△DEF$ are similar?

Example 5

* 1. In the diagram below, $△ABC\~△A'B'C'$. Describe a similarity transformation that maps
	$△ABC$ to $△A'B'C'$.



* 1. Joel says the sequence must require a dilation and three rigid motions, but Sharon is sure there is a similarity composed of just a dilation and just two rigid motions. Who is right?

Problem Set

1. If you are given any two congruent triangles, describe a sequence of basic rigid motions that will take one to the other.

Lesson Summary

Similarity is reflexive because a figure is similar to itself.

Similarity is symmetric because once a similarity transformation is determined to take a figure to another, there are inverse transformations that will take the figure back to the original.

1. If you are given two similar triangles that are not congruent triangles, describe a sequence of dilations and basic rigid motions that will take one to the other.
2. Given two line segments, $\overbar{AB}$ and $\overbar{CD}$, of different lengths, answer the following questions.
	1. It is always possible to find a similarity transformation that maps $\overbar{AB}$ to $\overbar{CD}$ sending $A$ to $C$ and $B$ to $D$. Describe one such similarity transformation.
	2. If you are given that $\overbar{AB}$ and $\overbar{CD}$ are not parallel, are not congruent, do not share any points, and do not lie in the same line, what is the least number of transformations needed in a sequence to map $\overbar{AB}$ to $\overbar{CD}$? Which transformations make this work?
	3. If you performed a similarity transformation that instead takes $A$ to $D$ and $B$ to $C$, either describe what mistake was made in the similarity transformation, or describe what additional transformation is needed to fix the error so that $A$ maps to $C$ and $B$ maps to $D$.
3. We claim that similarity is transitive, i.e., that if$ A$, $B$, and $C$ are figures in the plane such that $A\~B$ and $B\~C$, then $A\~C$. Describe why this must be true.
4. Given two line segments, $\overbar{AB}$ and $\overbar{CD}$, of different lengths, we have seen that it is always possible to find a similarity transformation that maps $\overbar{AB}$ to $\overbar{CD}$, sending $A$ to $C$ and $B$ to $D$ with one rotation and one dilation. Can you do this with one reflection and one dilation?
5. Given two triangles, $△ABC\~△DEF$, is it always possible to rotate $△ABC$ so that the sides of $△ABC$ are parallel to the corresponding sides in $△DEF$; i.e., $\overbar{AB}∥\overbar{DE}$, etc.?