MATH 113
Section 9.2: Similarity

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Similarity and Congruence

As you have no doubt noted by now, terminology is very important in Geometry. When we say to shapes are equal, that has a very precise meaning. In the same way, when we say two shapes are similar, we mean something specific.

**Similarity**

Two polygons are similar if and only if all corresponding angles are congruent and corresponding sides are proportional.

**Example**

How does the definition above differ from the definition of **congruent** polygons?

**Example**

- If two polygons are similar, are they congruent?
- If two polygons are congruent, are they always similar?
To help us better understand similarity, consider this example.

**Example**

Give a justification for the claim that the two rectangles below are similar.
At the beginning of chapter 9, we talked about several different types of transformations. Which of these are similarity transformations?

### Types of Transformations

<table>
<thead>
<tr>
<th>Name</th>
<th>What Changes</th>
<th>What Doesn’t</th>
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<tbody>
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<td>Translation</td>
<td>Position</td>
<td>Size, Shape, Orientation</td>
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<tr>
<td>Reflection</td>
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<td>Rotation</td>
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<td>Distortion</td>
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All types but the last, distortions, are similarity transformations.
Similarity and Perspective

Another way to think of similarity is as an enlargement or reduction of an image along lines of perspective.

Similarity Along Lines of Perspective

The following polygon has been enlarged by extending perspective lines from a single point through each vertex.

Example

A triangle has vertices $A(1, 4)$, $B(3, 2)$ and $C(1, 1)$. Draw a similar triangle by multiplying each coordinate by 3. Sketch the perspective lines for these similar figures.
Important Concepts

Things to Remember from Section 9.3

1. Definition of similarity for polygons
2. Similarity transformations
3. Sketching similar figures using lines of perspective.