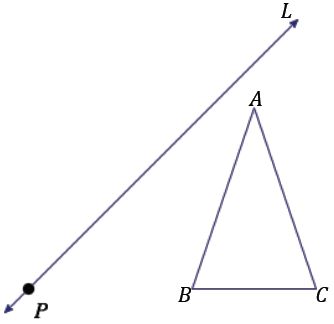
Lesson 13: Properties of Similarity Transformations

Classwork

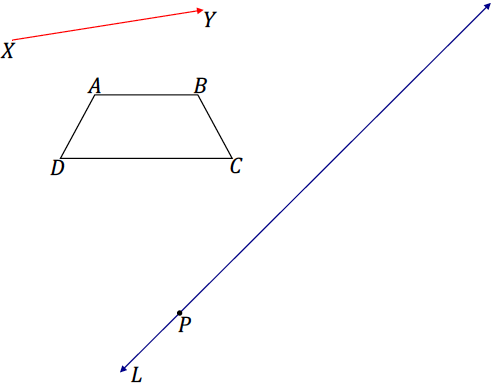
**Example 1**

Similarity transformation consists of a rotation about the point by , followed by a dilation centered at with scale factor , and then a reflection across line . Find the image of the triangle.



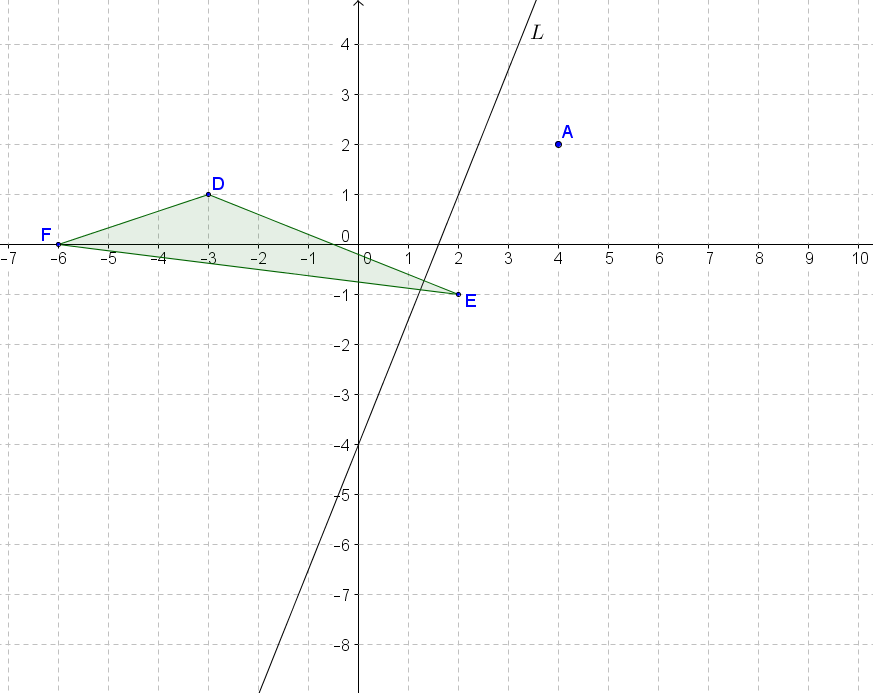
**Example 2**

A similarity transformation applied to trapezoid consists of a translation by vector , followed by a reflection across line , and then followed by a dilation centered at with scale factor . Recall that we can describe the same sequence using the following notation: . Find the image of .



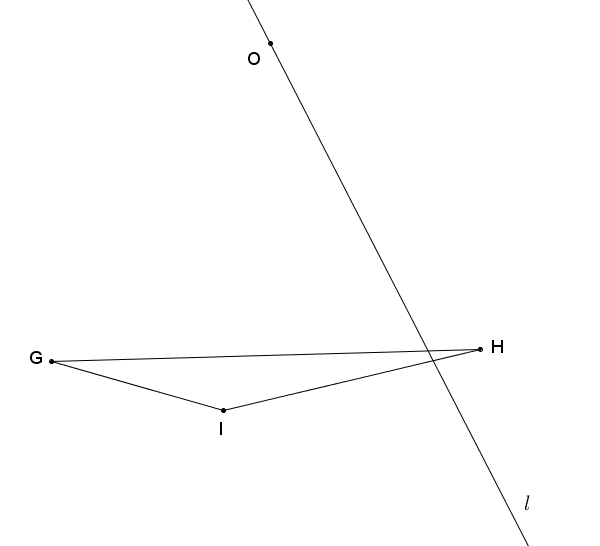
Exercise 1

A similarity transformation for triangle is described by . Locate and label the image of triangle under the similarity.



Problem Set

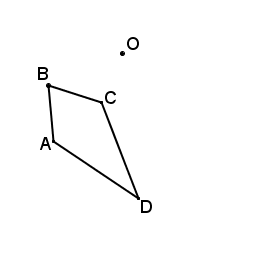
1. A similarity transformation consists of a reflection over line , followed by a dilation from with a scale factor of . Use construction tools to find .



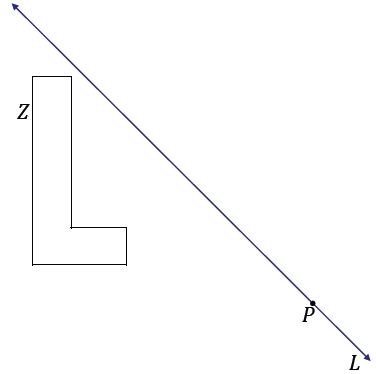
Lesson Summary

Properties of similarity transformations:

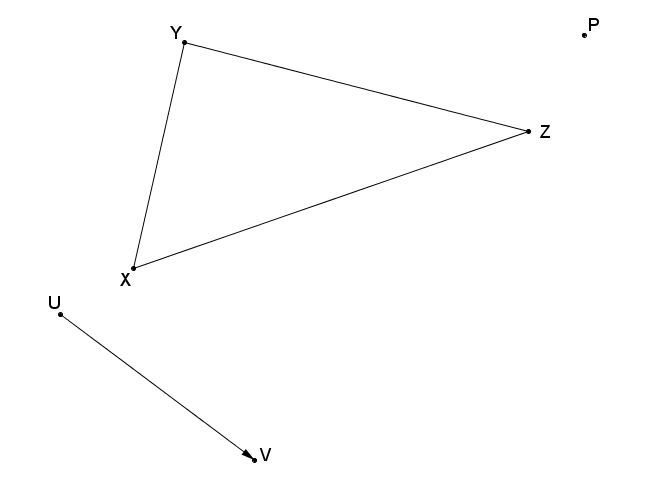
1. Distinct points are mapped to distinct points.
2. Each point in the plane has a pre-image.
3. There is a scale factor for , so that for any pair of points and with images and  
   , then .
4. A similarity transformation sends lines to lines, rays to rays, line segments to line segments, and parallel lines to parallel lines.
5. A similarity transformation sends angles to angles of equal measure.
6. A similarity transformation maps a circle of radius to a circle of radius , where is the scaling factor of the similarity transformation.
7. A similarity transformation consists of a dilation from point with a scale factor of, followed by a rotation about of . Use construction tools to find kite .

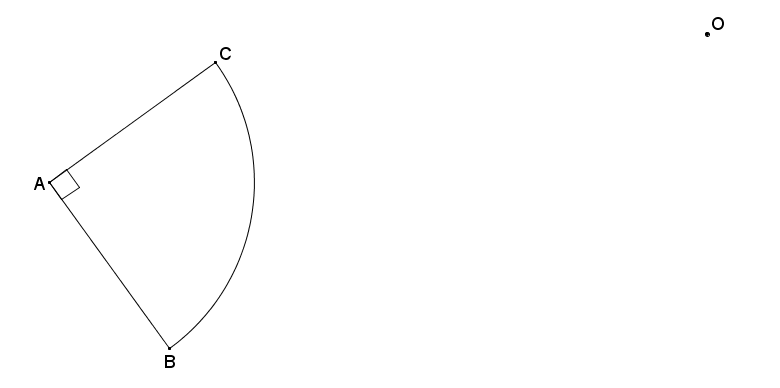


1. For the Figure , find the image of .



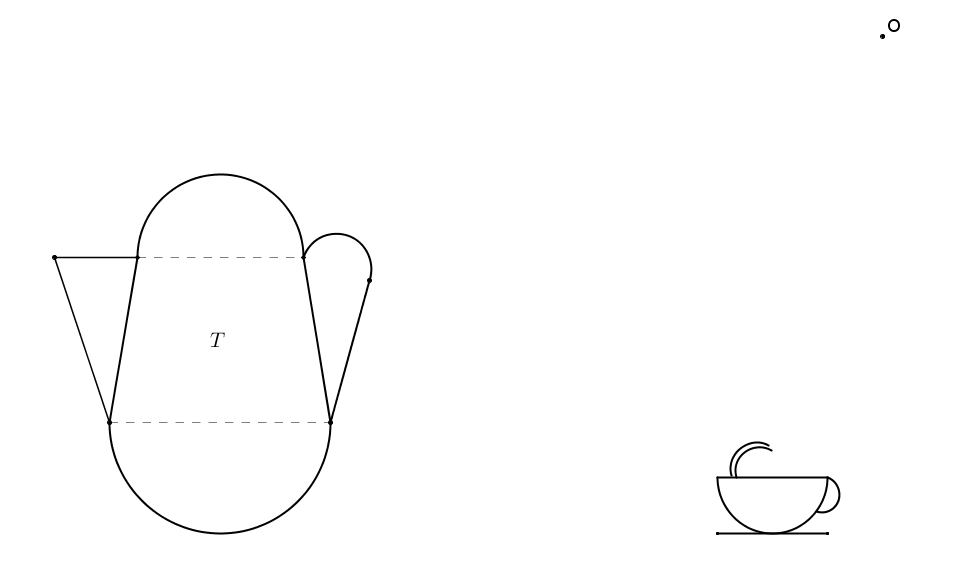
1. A similarity transformation consists of a translation along vector , followed by a rotation of about , then a dilation from with scale factor . Use construction tools to find .

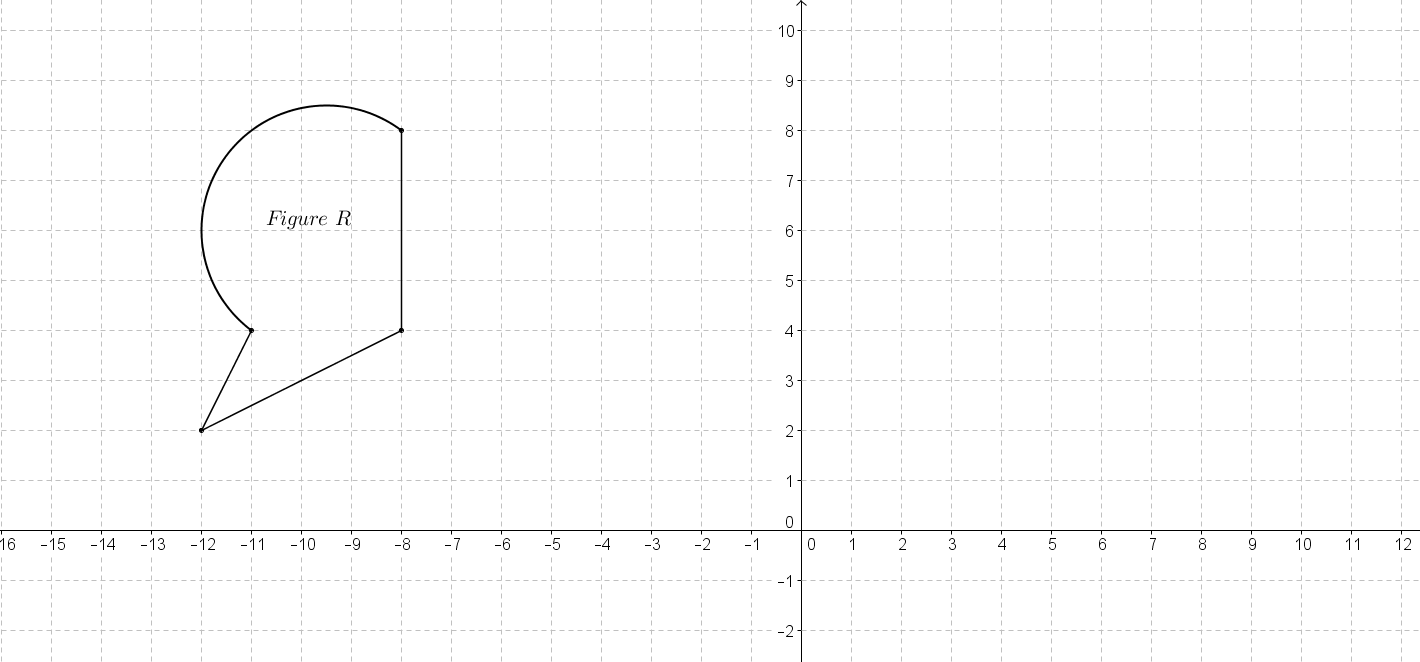


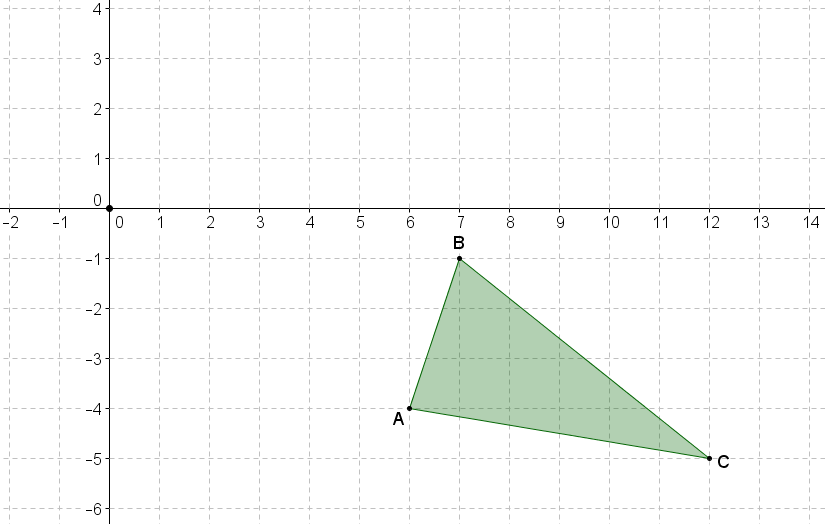
1. Given the quarter-circular figure determined by points ,, and , a similarity transformation consists of a rotation about point , followed by a dilation from point with a scale factor of . Find the image of the figure determined by points , , and .

Describe a different similarity transformation that would map quarter-circle to quarter-circle .

1. A similarity transformation consists of a dilation from center with a scale factor of , followed by a rotation of about point . Complete the similarity transformation on Figure to complete the drawing of Figure .



1. Given Figure on the coordinate plane shown below, a similarity transformation consists of a dilation from with a scale factor of , followed by a reflection over line , then by a vertical translation of units down. Find the image of Figure .

1. Given , with vertices , , and , locate and label the image of the triangle under the similarity transformation .
2. In Problem 8, describe the relationship of to , and explain your reasoning.
3. Given and quadrilateral , with , , , and , what are the coordinates of the vertices of the image of under the similarity transformation ?
4. Given triangle as shown on the diagram of the coordinate plane:
   1. Perform a translation so that vertex maps to the origin.
   2. Next, dilate the image from the origin using a scale factor of .
   3. Finally, translate the image so that the vertex maps to the original point .
   4. Using transformations, describe how the resulting image relates to the original figure .

1. 1. In the coordinate plane, name the single transformation that is the result of the composition of the two dilations shown below:

followed by

(Hint: Try it!)

* 1. In the coordinate plane, name the single transformation that is the result of the composition of the two dilations shown below:

followed by

(Hint: Try it!)

* 1. Using the results from parts (a) and (b), describe what happens to the origin under both similarity transformations.