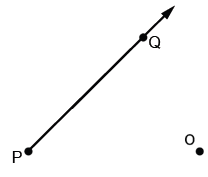
Lesson 8: How Do Dilations Map Rays, Lines, and Circles?

Classwork

Opening Exercise

* 1. Is a dilated ray still a ray? If the ray is transformed under a dilation, explain how.
  2. Dilate the ray by a scale factor of from center



* + 1. Is the figurea ray?
    2. How, if at all, has the segment been transformed?
    3. Will a ray always be mapped to a ray? Explain how you know.

**Example 1**

Will a dilation about center and scale factor map to ? Explain.

Example 2

The line that contains does not contain point . Will a dilation about center and scale factor map to ?

Example 3

The line that contains contains point . Will a dilation about center and scale factor map ray to a ray ?

* 1. Examine the case where the endpoint of coincides with the center of the dilation.
  2. Examine the case where the endpoint of is between and on the line containing ,, and .
  3. Examine the remaining case where the center of the dilation and point are on the same side of on the line containing ,, and .

Example 5

Will a dilation about a center and scale factor map a circle of radius onto another circle?

* 1. Examine the case where the center of the dilation coincides with the center of the circle.
  2. Examine the case where the center of the dilation is not the center of the circle; we call this the general case.

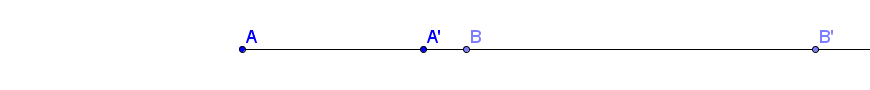
Problem Set

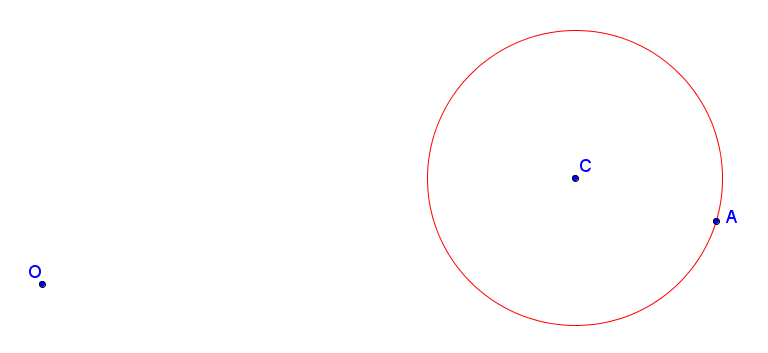
Lesson Summary

* **Dilation theorem for rays**: A dilation maps a ray to a ray sending the endpoint to the endpoint.
* **Dilation theorem for lines**: A dilation maps a line to a line. If the center of the dilation lies on the line or if the scale factor of the dilation is equal to 1, then the dilation maps the line to the same line. Otherwise, the dilation maps the line to a parallel line.
* **Dilation theorem for circles**: A dilation maps a circle to a circle, and maps the center to the center.

1. In Lesson 8, Example 2, you proved that a dilation with a scale factor maps a ray to a ray . Prove the remaining case that a dilation with scale factor maps a ray to a ray .

Given the dilation , with maps to and to , prove that maps to .

1. In the diagram below, is the image of under a dilation from point with an unknown scale factor, maps to and maps to . Use direct measurement to determine the scale factor , and then find the center of dilation .
2. Draw a line and dilate points and from center where is not on . Use your diagram to explain why a line maps to a line under a dilation with scale factor .
3. Let be a line segment, and let be a line that is the perpendicular bisector of . If a dilation with scale factor maps to (sending to and to ) and also maps line to line , show that is the perpendicular bisector of .
4. Dilate circle with radius from center with a scale factor .



1. In the picture below, the larger circle is a dilation of the smaller circle. Find the center of dilation .

