Lesson 7: Informal Proofs of Properties of Dilation

Classwork

Exercise

Use the diagram below to prove the theorem: *Dilations preserve the measures of angles.*

Let there be a dilation from center $O$ with scale factor $r$. Given $∠PQR,$ show that since $P'=Dilation(P)$, $Q'=Dilation(Q)$, and $R'=Dilation(R)$, then $\left|∠PQR\right|=\left|∠P'Q'R'\right|$. That is, show that the image of the angle after a dilation has the same measure, in degrees, as the original.



Problem Set

1. A dilation from center $O$ by scale factor $r$ of a line maps to what? Verify your claim on the coordinate plane.
2. A dilation from center $O$ by scale factor $r$ of a segment maps to what? Verify your claim on the coordinate plane.
3. A dilation from center $O$ by scale factor $r$ of a ray maps to what? Verify your claim on the coordinate plane.
4. Challenge Problem:

Prove the theorem: *A dilation maps lines to lines.*

Let there be a dilation from center $O$with scale factor $r$so that $P'=Dilation(P)$ and $Q'=Dilation(Q)$. Show that line $PQ$ maps to line $P'Q'$ (i.e., that dilations map lines to lines). Draw a diagram, and then write your informal proof of the theorem. (Hint: This proof is a lot like the proof for segments. This time, let$U$ be a point on line $PQ$, that is not between points $P$ and $Q$.)