

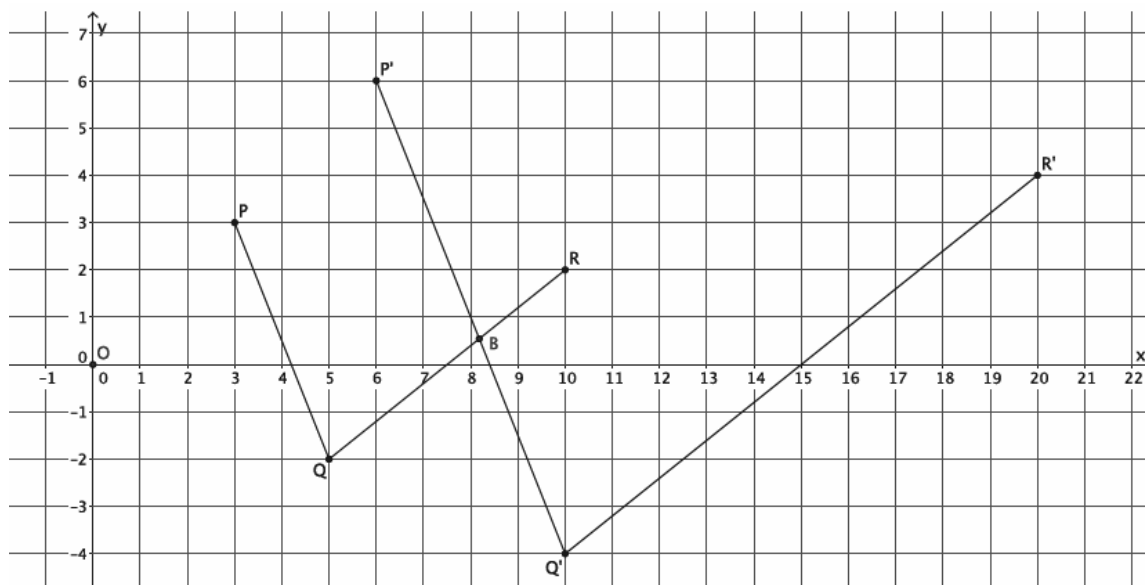
## Lesson 7: Informal Proofs of Properties of Dilation

### 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  $\angle PQR$ , show that since  $P' = \text{Dilation}(P)$ ,  $Q' = \text{Dilation}(Q)$ , and  $R' = \text{Dilation}(R)$ , then  $|\angle PQR| = |\angle P'Q'R'|$ . 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  $P' = \text{Dilation}(P)$  and  $Q' = \text{Dilation}(Q)$ . 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  $Q$ .)