**Problem Set**

Lesson Summary

**Definition:** A dilation, a transformation of the plane with center $O$, with scale factor $r$ ($r>0$) is a rule that assigns to each point $P$of the plane a point $Dilation(P)$ so that

1. $Dilation(O)=O$, (i.e., a dilation does not move the center of dilation.)



1. If $P\ne O$, then the point $Dilation(P)$, (to be denoted more simply by $P^{'}$) is the point on the ray $\vec{OP}$ so that $\left|OP^{'}\right|=r\left|OP\right|$.

In other words, a dilation is a rule that moves points in the plane a specific distance, determined by the scale factor $r$, from a center $O$. When the scale factor $r>1$, the dilation magnifies a figure. When the scale factor $0<r<1,$ the dilation shrinks a figure. When the scale factor $r=1$, there is no change in the size of the figure; that is, the figure and its image are congruent.

1. Let there be a dilation from center $O$. Then $Dilation(P)=P^{'}$ and $Dilation(Q)=Q^{'}$.Examine the drawing below. What can you determine about the scale factor of the dilation?



1. Let there be a dilation from center $O$. Then $Dilation(P)=P^{'}$, and $Dilation(Q)=Q^{'}$.Examine the drawing below. What can you determine about the scale factor of the dilation?



1. Let there be a dilation from center $O$with a scale factor $r=4$. Then $Dilation(P)=P^{'}$ and $Dilation(Q)=Q^{'}$.$\left|OP\right|=3.2$cm,and $\left|OQ\right|=2.7$ cm, as shown. Use the drawing below to answer parts (a) and (b). Drawing not to scale.



* 1. Use the definition of dilation to determine the length of $OP^{'}$.
	2. Use the definition of dilation to determine the length of $OQ’.$
1. Let there be a dilation from center $O$with a scale factor $r$. Then $Dilation(A)=A^{'}$*,* $Dilation\left(B\right)=B^{'},$and $Dilation(C)=C'$. $ \left|OA\right|=3$, $\left|OB\right|=15$, $\left|OC\right|=6$,and $\left|OB^{'}\right|=5$, as shown. Use the drawing below to answer parts (a)–(c).



* 1. Using the definition of dilation with lengths $OB$and $OB^{'}$*,* determine the scale factor of the dilation.
	2. Use the definition of dilation to determine the length of $OA^{'}$.
	3. Use the definition of dilation to determine the length of $OC^{'}$.