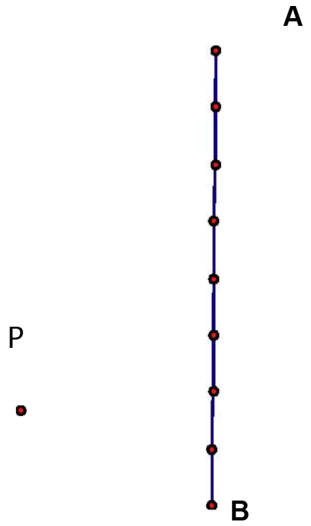
LEARNING & TEACHING GEOMETRY
WestEd

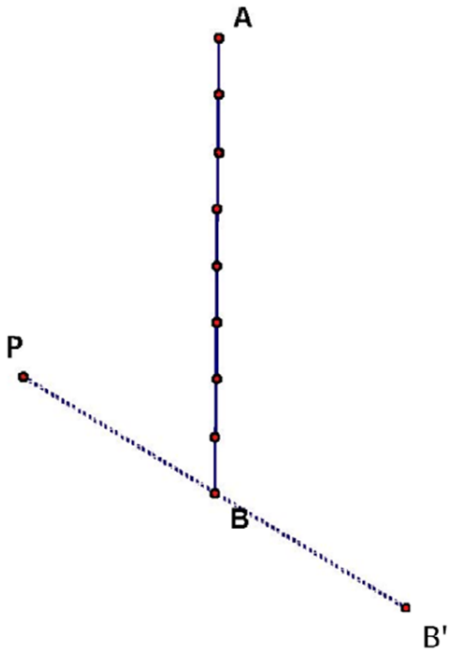
Dilating Shapes (Problems 1–3)

Foundation Module, Session 2 Handout

1. Here is a point P and a line segment $\overline{AB}$.
   The line segment has been divided into 8 equal parts.



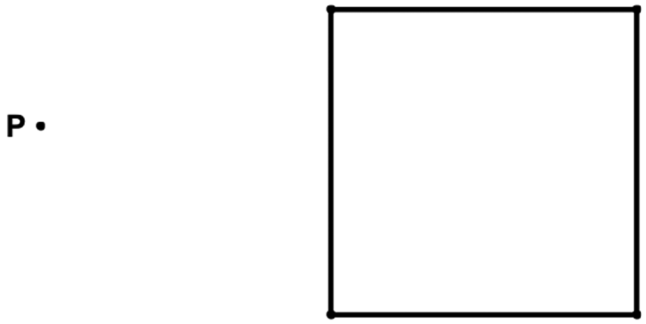
You are going to create what is called a 2-dilation of the segment, also called a dilation of the segment by a factor of 2, with P as the center of the dilation. To do this, use a straight edge (a 3x5 card works well*) and mark the distance from P to one of the points on the segment. Then double this distance and mark a new point that is twice the distance from P along the same line. Repeat this process for all of the points. We have done it for point B, in the picture below.



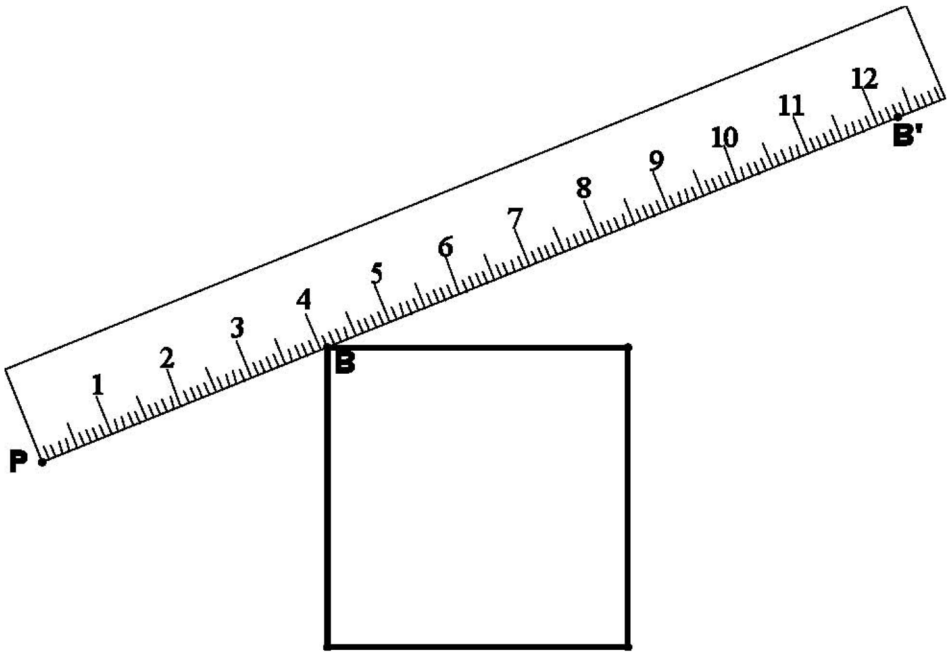
*For all of these problems, we suggest locating the dilated points by "measuring" with an index card or an unmarked straight edge. Doing so has the potential to reinforce the notion of measurement as iterating a generalized unit and emphasizes the motion involved in doing a dilation. In problem 1, the distance from the center of dilation to point B is 1 unit. Thus, in a 2-dilation, the distance from the center of dilation to point B′ is twice as far, or 2 units.

Now it is your turn to dilate. Go to the "Templates for Dilating Shapes" handout that has the copy of $\overline{AB}$. Do a 2-dilation for each of the 8 points shown on $\overline{AB}$. Connect the 8 resulting points. You should get another line segment. Do you? Compare the length of this new line segment with the original line segment $\overline{AB}$.

2. Here is a point P and a square that is 4 cm on each side:

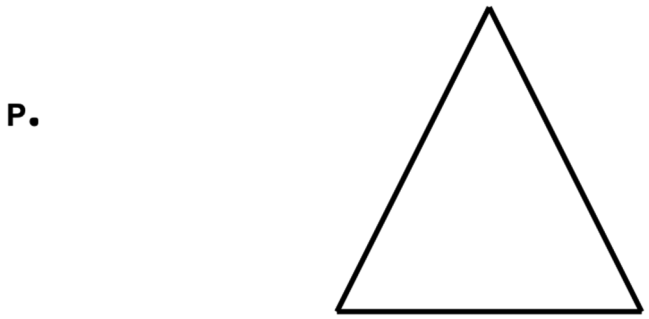


You are going to create a 3-dilation of the square, also called a dilation of the square by a factor of 3, with P as the center of the dilation. On the templates handout, use your straight edge to triple the distances from P to the vertices of the original square to locate the corresponding vertices of the dilated square.



Now do this for all the vertices of the square. What kind of geometric figure do you get from dilating the square? How do you know? Compare the dimensions of the dilated square with the original one. **NOTE:** A copy of the square and the point P are provided in the "Templates for Dilating Shapes" handout. Perform your dilation on that handout.

3. Now make a 3-dilation of this isosceles triangle (on the templates handout), with center of dilation P.



What geometric figure do you get from this 3-dilation? How do you know? Compare the base and height lengths of the dilated triangle to the base and height lengths of the original triangle.