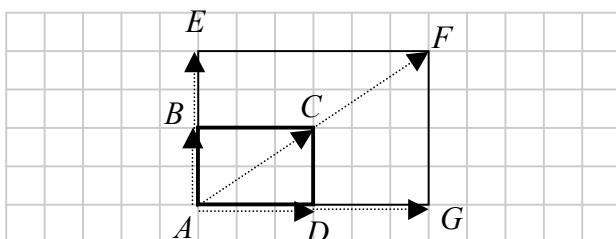


PS 8– Dilations and Similar Figures (8.G.4)

A *dilation* is a transformation that does *not* preserve distance, so it is *not* a rigid transformation. But it is a very important kind of transformation. Informally, a dilation makes a figure get “bigger” or “smaller” without changing its shape or distorting it.

A **dilation** has a center-point and a scale factor. If the scale factor is 2, then everything moves twice as far away from the center-point. If the scale factor is $\frac{1}{2}$, then every point moves half as far away from the center-point. The rectangle $A'EFG$ is a dilation of the rectangle $ABCD$. The center-point is at A , and the scale factor is 2.



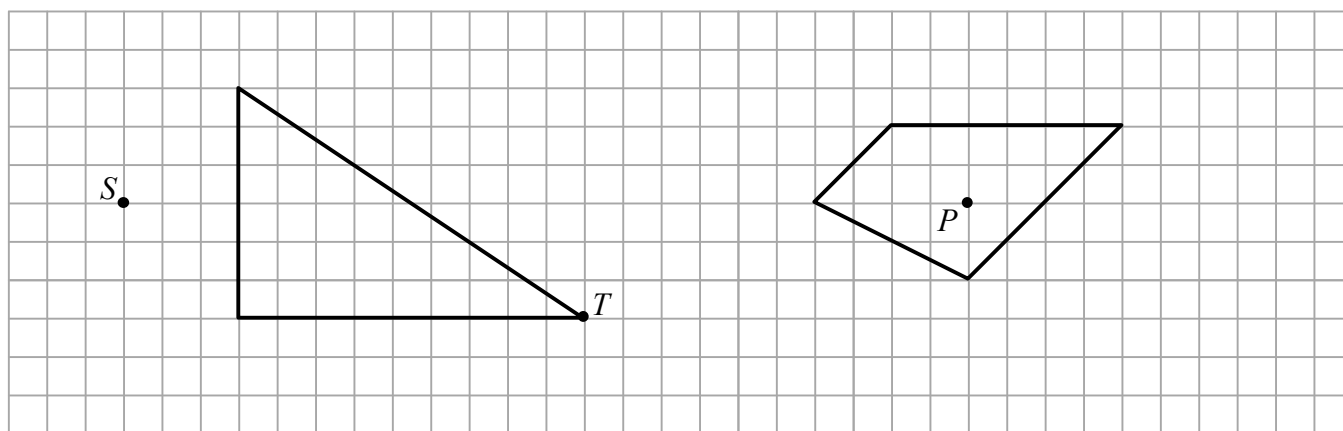
1. Draw the dilation of rectangle $ABCD$ that has center point A and scale factor $\frac{1}{2}$.
2. On the grid below, draw the dilation of rectangle R with center-point P and scale factor 2. Then draw the dilation of rectangle S with center-point Q and scale factor 3.



3. Find the length, width, and area of each of the rectangles in problems 1 and 2. What do you notice about the changes in the length and the width when a rectangle is dilated? What do you notice about the changes in the area?

Rectangle	Length	Width	Area
$ABCD$			
$ABCD'$			
R			
R'			
S			
S'			

4. On the grid below, draw the dilation of the triangle with center-point S and scale factor $\frac{1}{3}$. Then draw the dilation of the triangle using center-point T with the same scale factor.



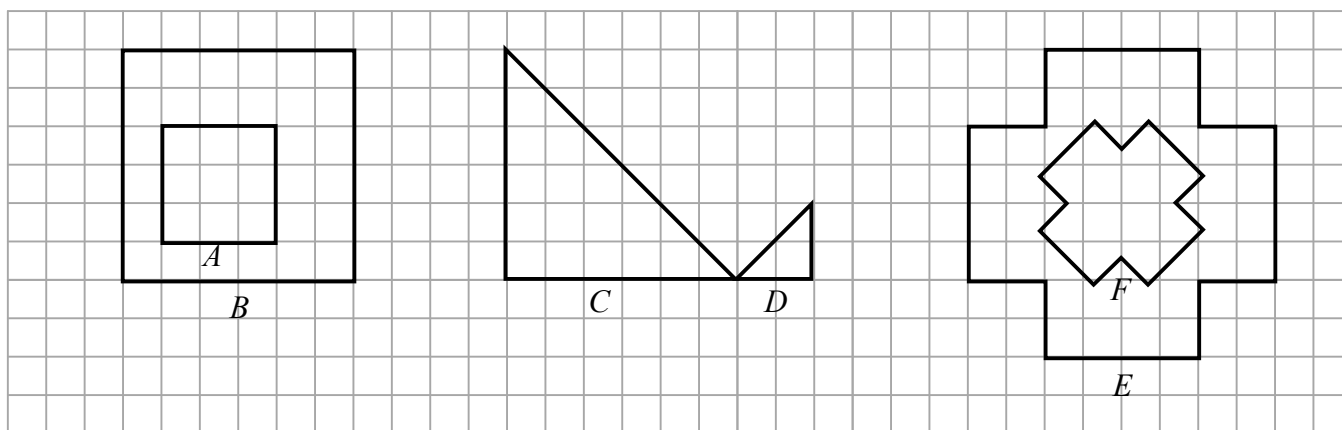
5. Compare the sides of the two dilations with each other as well as with the original triangle. (You do not need to measure them with a ruler—you can do this with patty paper or the grid.) Describe what you find.
6. Compare angles of the original triangle with the images of the triangle after the dilations. Describe what you find.
7. On the grid above, draw the dilation of the quadrilateral with center-point P and scale factor $1\frac{1}{2}$. Compare the sides and angles before and after the dilation. Describe what you find.

Two figures are said to be *similar* if one figure can be transformed into the other using only dilations, translations, reflections, and rotations. Similar polygons have the following two properties:

- Corresponding angles are equal.
- Ratios between corresponding sides are equal.

Together, these two properties guarantee that similar figures are the “same shape”, but possibly enlarged or shrunk according to the scale factor of a dilation.

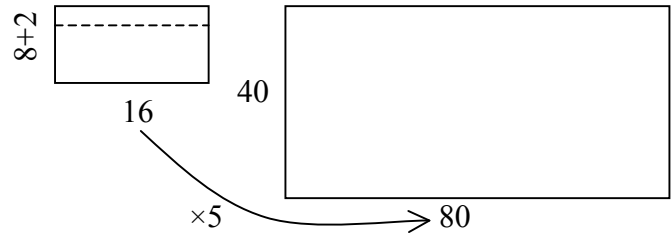
8. Three pairs of similar figures are shown below. Show how one is the image of the other by finding and describing the appropriate transformations. For each dilation, show the center and determine the scale factor.



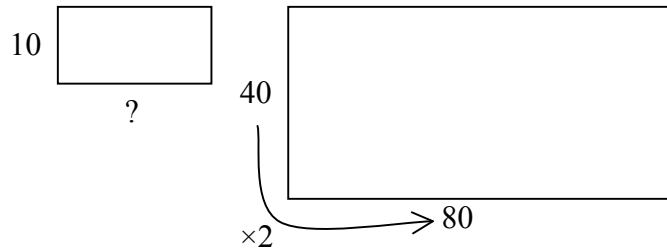
9. The kids in Mr. Candelaria’s class were making a model of the Empire State Building. The real building is 1250 feet tall and 80 feet wide along Broadway. If the model is to be 5 feet tall, explain how to find corresponding width.

10. Mr. Lujan's students were designing a poster that was going to be 40 inches high and 80 inches wide. He wanted the students to draw a scaled-down version of their ideas for the poster and gave them all a 10 inch high by 16 inch wide piece of paper, but they had different ideas about what to do.

- a. Rosa drew the following picture and said, " $80 \div 16 = 5$. The poster will be 5 times as wide and 5 times as high as the piece of paper. Since $40 \div 5 = 8$, I should cut 2 inches off of my paper." Is she correct? Explain.



- b. Kenny drew the picture below and said, "The poster is twice as wide as it is high, so the paper needs to be twice as wide as it is high. Since it is 10 inches high, it must be 20 inches wide, so the paper isn't big enough." Is he correct? Explain.



11. After doing a unit on dilations, Kiki said that she had learned that if you measure the shadow of a flagpole and then measure the length of the shadow of a person standing next to the flagpole, you can tell the height of the flagpole by using the height of the person. She said,

“I went outside with Beverly who is four and a half feet tall, and her shadow was 8 feet long. There was a flagpole with a shadow that was 40 feet long. I think the flagpole is 22.5 feet tall.”

Beverly said,

“I was with Kiki when she figured it all out, but I don’t understand. She set up a proportion, but it didn’t make any sense to me. Why can we use ratios and proportions to figure out the height of the flagpole?

Is Kiki right? If so, why can we use ratios and proportions to find the height of the flagpole? If not, how should we solve this problem? Explain!