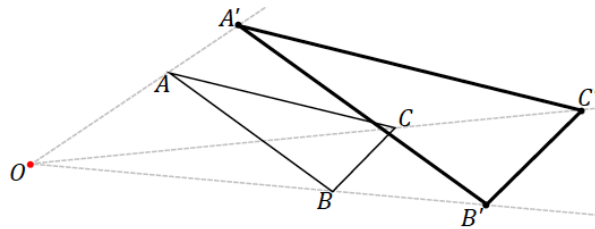


## Lesson 3: Making Scale Drawings Using the Parallel Method

### Classwork

#### Opening Exercise

Dani dilated  $\triangle ABC$  from center  $O$ , resulting in  $\triangle A'B'C'$ . She says that she completed the drawing using parallel lines. How could she have done this? Explain.



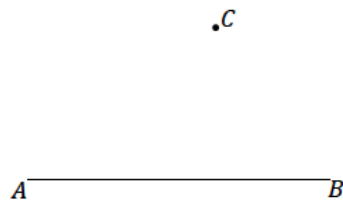
#### Example 1

- a. Use a ruler and setsquare to draw a line through  $C$  parallel to  $AB$ . What ensures that the line drawn is parallel to  $AB$ ?

$\cdot C$



- b. Use a ruler and setsquare to draw a parallelogram  $ABCD$  around  $AB$  and point  $C$ .



**Example 2**

Use the figure below with center  $O$  and a scale factor of  $r = 2$  and the following steps to create a scale drawing using the parallel method.

Step 1. Draw a ray beginning at  $O$  through each vertex of the figure.

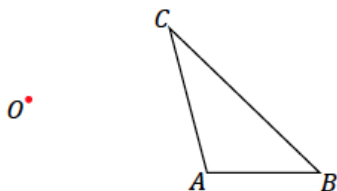
Step 2. Select one vertex of the scale drawing to locate; we have selected  $A'$ . Locate  $A'$  on ray  $\overrightarrow{OA}$  so that  $OA' = 2OA$ .

Step 3. Align the setsquare and ruler as in the image below; one leg of the setsquare should line up with side  $AB$ , and the perpendicular leg should be flush against the ruler.

Step 4. Slide the setsquare along the ruler until the edge of the setsquare passes through  $A'$ . Then, along the perpendicular leg of the setsquare, draw the segment through  $A'$  that is parallel to  $AB$  until it intersects with  $\overrightarrow{OB}$ , and label this point  $B'$ .

Step 5. Continue to create parallel segments to determine each successive vertex point. In this particular case, the setsquare has been aligned with  $AC$ . This is done because, in trying to create a parallel segment from  $BC$ , the parallel segment was not “reaching”  $B'$ . This could be remedied with a larger setsquare and longer ruler, but it is easily avoided by working on the segment parallel to  $AC$  instead.

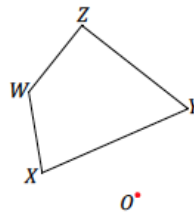
Step 6. Use your ruler to join the final two unconnected vertices.



**Exercises 1–3**

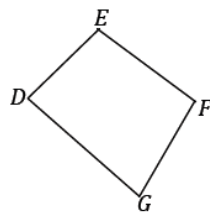
- With a ruler and setsquare, use the parallel method to create a scale drawing of  $WXYZ$  by the parallel method.  $W'$  has already been located for you. Determine the scale factor of the scale drawing. Verify that the resulting figure is in fact a scale drawing by showing that corresponding side lengths are in constant proportion and that corresponding angles are equal in measurement.

$W'$

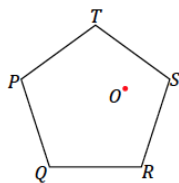


- With a ruler and setsquare, use the parallel method to create a scale drawing of  $DEFG$  about center  $O$  with scale factor  $r = \frac{1}{2}$ . Verify that the resulting figure is in fact a scale drawing by showing that corresponding side lengths are in constant proportion and that the corresponding angles are equal in measurement.

$O$

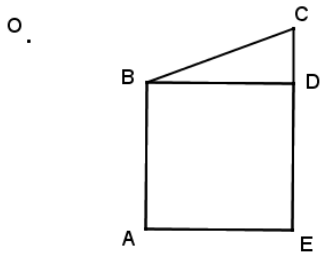


3. With a ruler and setsquare, use the parallel method to create a scale drawing of pentagon  $PQRST$  about center  $O$  with scale factor  $\frac{5}{2}$ . Verify that the resulting figure is in fact a scale drawing by showing that corresponding side lengths are in constant proportion and that corresponding angles are equal in measurement.



**Problem Set**

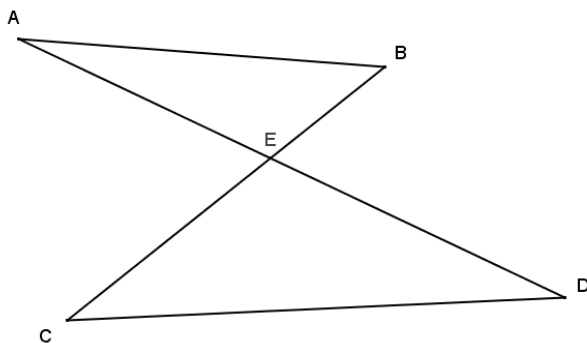
- With a ruler and setsquare, use the parallel method to create a scale drawing of the figure about center  $O$ . One vertex of the scale drawing has been provided for you.



$A'$

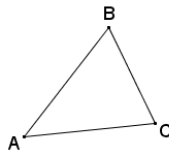
Determine the scale factor. Verify that the resulting figure is in fact a scale drawing by showing that corresponding side lengths are in constant proportion and that the corresponding angles are equal in measurement.

- Determine the scale factor. Verify that the resulting figure is in fact a scale drawing by showing that corresponding side lengths are in constant proportion and that the corresponding angles are equal in measurement.



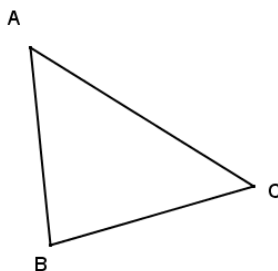
$O$

3. With a ruler and setsquare, use the parallel method to create the following scale drawings about center  $O$ : (1) first use a scale a factor of 2 to create  $\triangle A'B'C'$ , (2) then, with respect to  $\triangle A'B'C'$ , use a scale factor of  $\frac{2}{3}$  to create scale drawing  $\triangle A''B''C''$ . Calculate the scale factor for  $\triangle A''B''C''$  as a scale drawing of  $\triangle ABC$ . Use angle and side length measurements and the appropriate proportions to verify your answer.



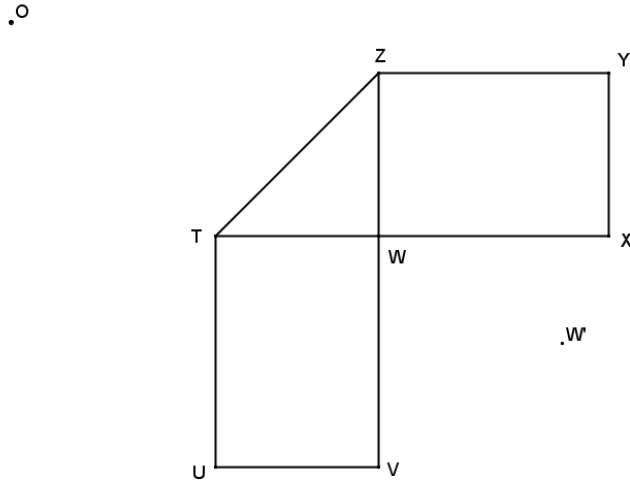
O ·

4. Follow the direction in each part below to create three scale drawings of  $\triangle ABC$  using the parallel method.
- With the center at vertex  $A$ , make a scale drawing of  $\triangle ABC$  with a scale factor of  $\frac{3}{2}$ .
  - With the center at vertex  $B$ , make a scale drawing of  $\triangle ABC$  with a scale factor of  $\frac{3}{2}$ .
  - With the center at vertex  $C$ , make a scale drawing of  $\triangle ABC$  with a scale factor of  $\frac{3}{2}$ .



- d. What conclusions can be drawn about all three scale drawings from parts (a)–(c)?

5. Use the parallel method to make a scale drawing of the line segments in the following figure using the given  $W'$ , the image of vertex  $W$ , from center  $O$ . Determine the scale factor.



Use your diagram from Problem 1 to answer this question.

6. If we switch perspective and consider the original drawing  $ABCDE$  to be a scale drawing of the constructed image  $A'B'C'D'E'$ , what would the scale factor be?