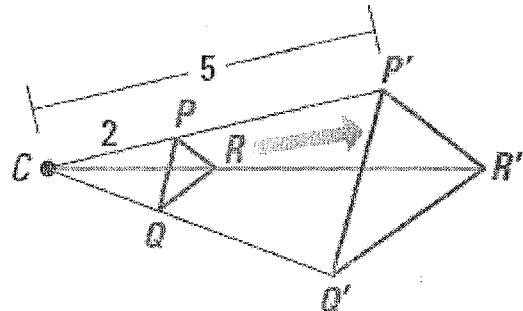
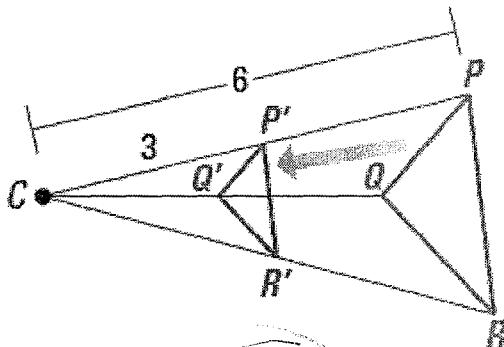


Name: Key

Date: \_\_\_\_\_

## Dilations

The dilation is a **reduction** if  $0 < k < 1$  and it is an **enlargement** if  $k > 1$ .



**SCALE FACTOR:**

(ratio of the lengths of the corresponding sides)

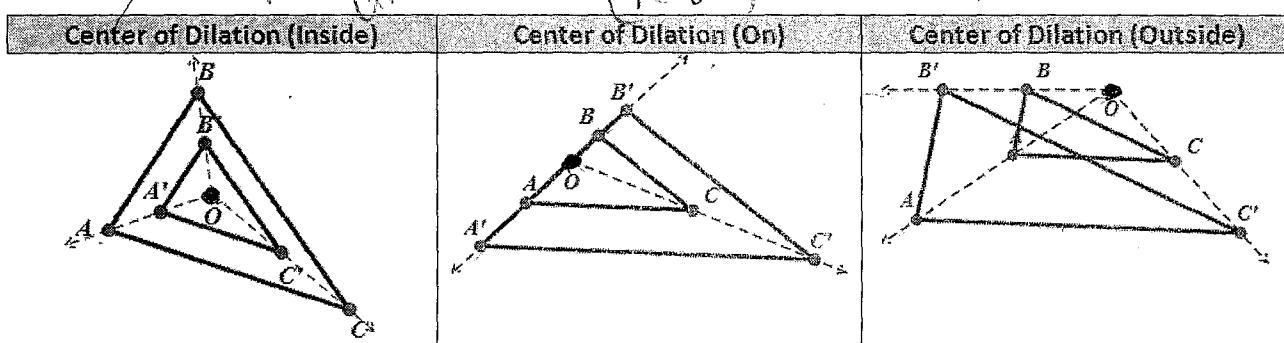
$\therefore$  if  $k > 1$   $\rightarrow$  image is enlarged

$\therefore$  if  $0 < k < 1$   $\rightarrow$  image is reduced

\*  $k=1 \rightarrow$  image is same to figure

→ where to start dilation

( $k=2$ )



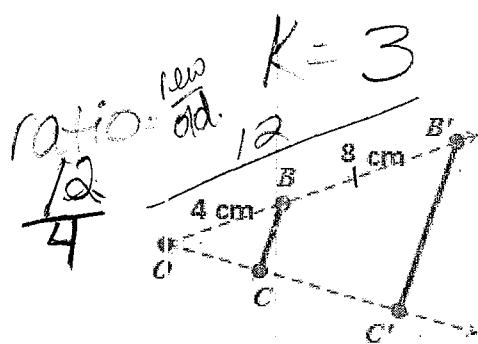
\* on study guide\*

Rule: centered at origin:  $D_k(x,y) \rightarrow (kx, ky)$

(a negative dilation will reflect through the origin) \*graph

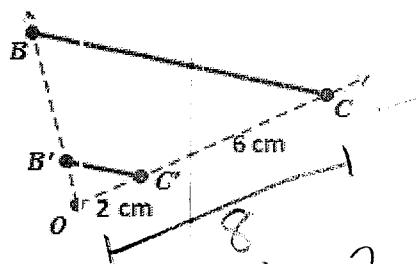
\* ex:  $D_{-2}(5,5) \rightarrow (-10,-10)$

1. In the diagram below, the center of dilation is point O. Find the scale factor. Is this a reduction or enlargement?



enlargement

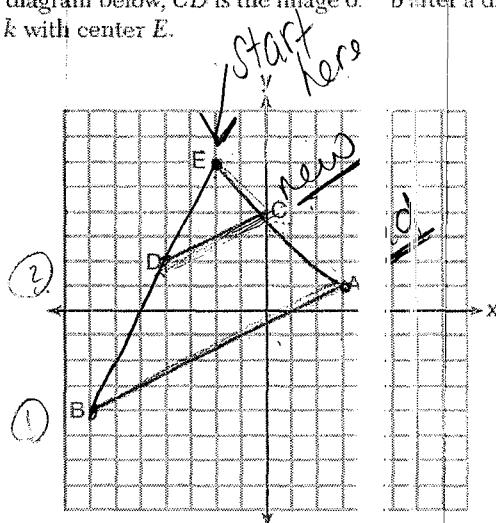
2. In the diagram below, the center of dilation is point O. Find the scale factor. Is this a reduction or an enlargement?



reduction

3.

In the diagram below,  $\overline{CD}$  is the image of  $\overline{AB}$  after a dilation of scale factor  $k$  with center E.



$$K = \frac{\text{new}}{\text{old}} = \frac{EC}{EA}$$

reduction

Which ratio is equal to the scale factor  $k$  of the dilation?

(1)  $\frac{EC}{EA}$

(3)  $\frac{EA}{BA}$

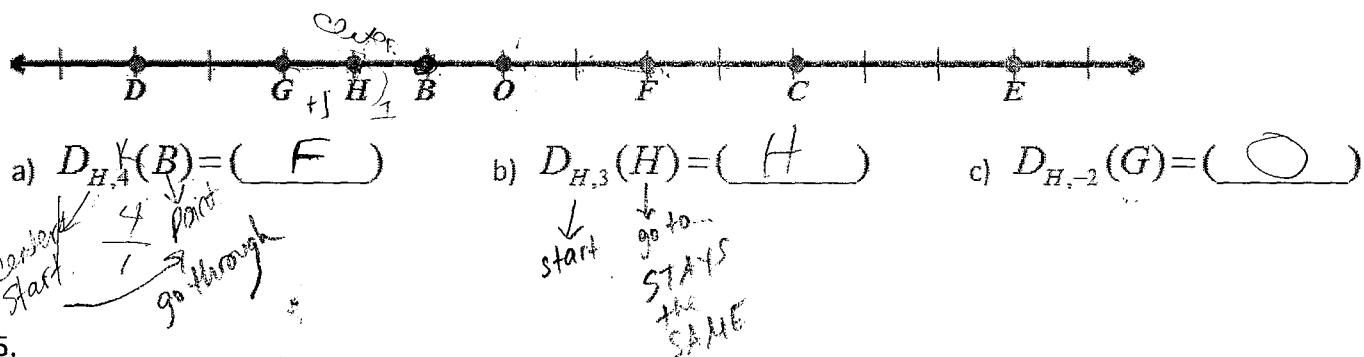
(2)  $\frac{BA}{EA}$

(4)  $\frac{EA}{EC}$

or  $\frac{ED}{EB}$

4.

Determine the point.



5.

If the dilation  $D_k(-2,4)$  equals  $(1,-2)$ , the scale factor  $k$  is equal to

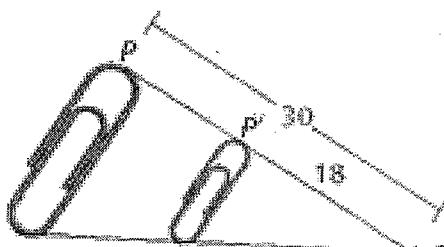
- A)  $\frac{1}{2}$       B) -2      C) 2      (D)  $-\frac{1}{2}$

6. Which transformation represents a dilation?

- 1)  $(8,4) \rightarrow (11,7)$   
 2)  $(8,4) \rightarrow (-8,4)$   
 3)  $(8,4) \rightarrow (-4,-8)$   
 (4)  $(8,4) \rightarrow (4,2)$

$$k = \frac{1}{2}$$

7. Find the scale factor. Is this a reduction or an enlargement?



reduction

$$k = \frac{\text{NEW}}{\text{OLD}} = \frac{18}{30} = \frac{3}{5} (\text{K} < 1)$$

8.

mathematical concepts from your previous studies

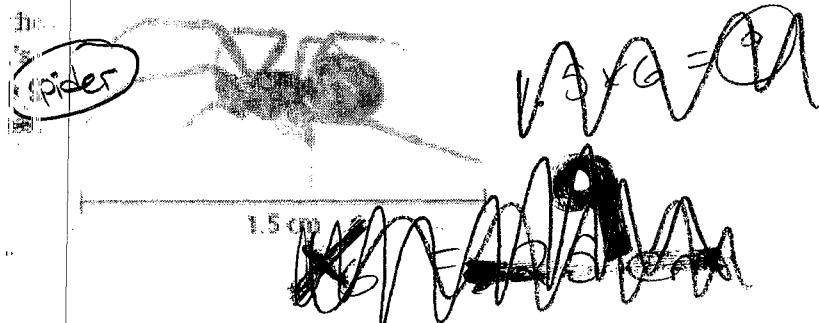
"new" You are using a magnifying glass that shows an image of an object that is six times the object's size. Determine the length of the "original" of the spider seen through the magnifying glass.

"original"

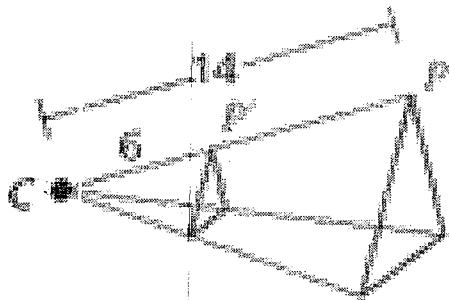
$$\frac{31.5}{9.0} = 3.5$$

$$1.5$$

$$\frac{1.5}{6} = 0.25$$



9. Find the scale factor. Is this a reduction or an enlargement?



reduction

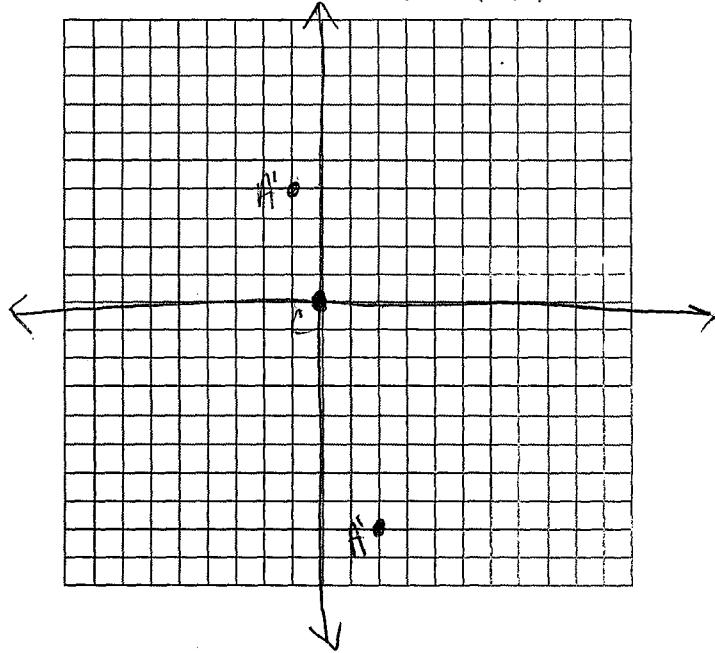
$$K = \frac{6}{14} = \frac{3}{7}$$

Name: Key

Date: \_\_\_\_\_

## Dilations

1. What are the coordinates of point  $(-1, 4)$  under dilation  $D_{-2}$ , centered at the origin?



$$(2, -8)$$

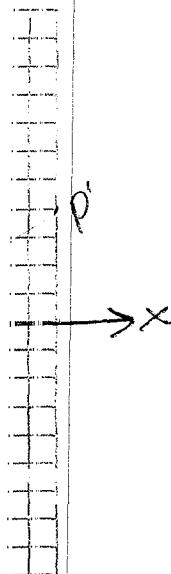
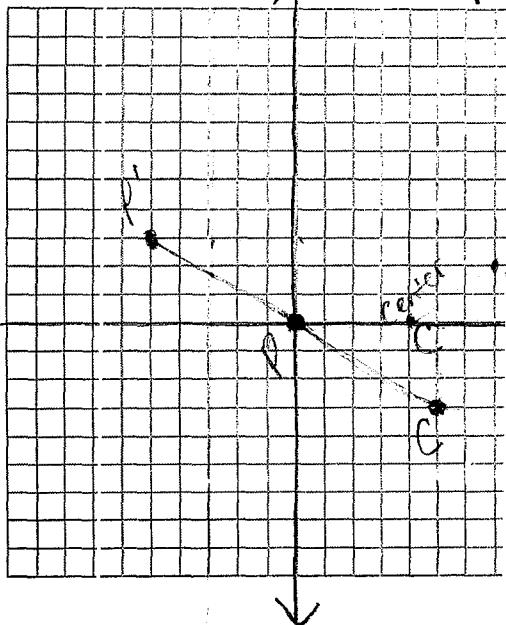
2. A. The image of point A after a dilation, centered at the origin, of  $\frac{3}{3}$  is  $(6, 15)$ . What was the original location of point A?

$$(2, 5)$$

- B. Find the image of  $A(2, -3)$  after the dilation described above.

$$(6, -9)$$

3. A. Find a coordinate rule for the dilation with center  $(5, -3)$  and scale factor 2.



ratio  
 $\frac{0}{1}$

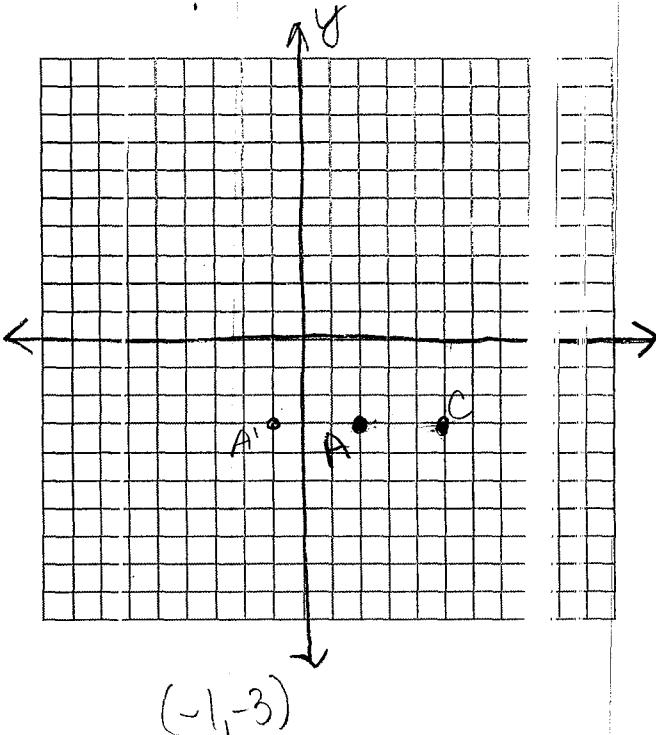
$$(x-5, y+3)$$

$$(2x-10, 2y+6)$$

$$(2x-5, 2y+3)$$

$(5, -3) \xrightarrow{\text{send to origin}} (0, 0)$  then dilate by 2, then send back!

- B. Using your coordinate rule, find the image of  $A(2, -3)$  after the dilation described above.

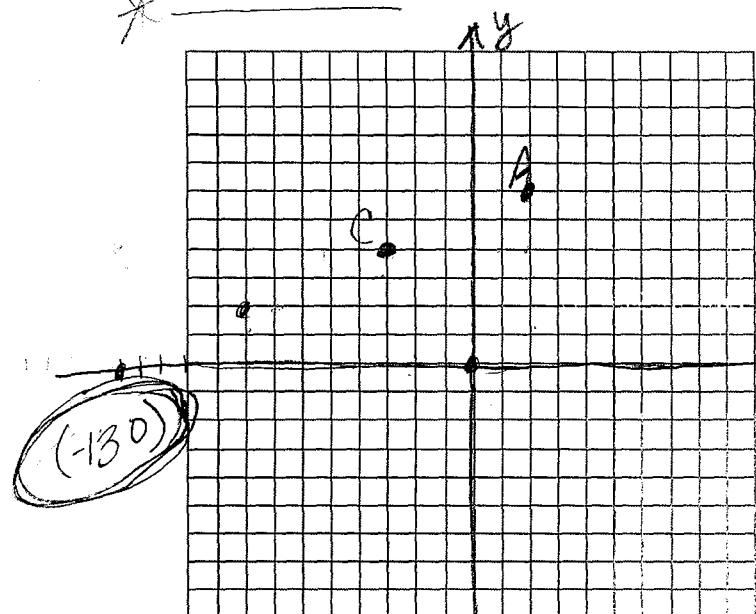


$$y = 2^{+5}$$

$$(2, -3) \rightarrow (2(2)-5, 2(-3)+3)$$

$$\boxed{(-1, -3)}$$

4. Find the coordinates of the image of  $(2, 6)$  after a dilation of scale factor  $-2$  with the center of dilation at  $(-3, 4)$ .



$$K = \frac{\text{new}}{\text{old}}$$

$$(-3, 4) \xrightarrow{-2} (0, 0)$$

$$(x+3, y-4) \xrightarrow{-2} (-2x-6, -2y+8)$$

$$(-2x-6, -2y+8) \rightarrow (-2(2)-6, -2(6)+8)$$

$$\boxed{(-13, 0)}$$

$$(x+3, y-4) \xrightarrow{-2} (-2x-6, -2y+8)$$

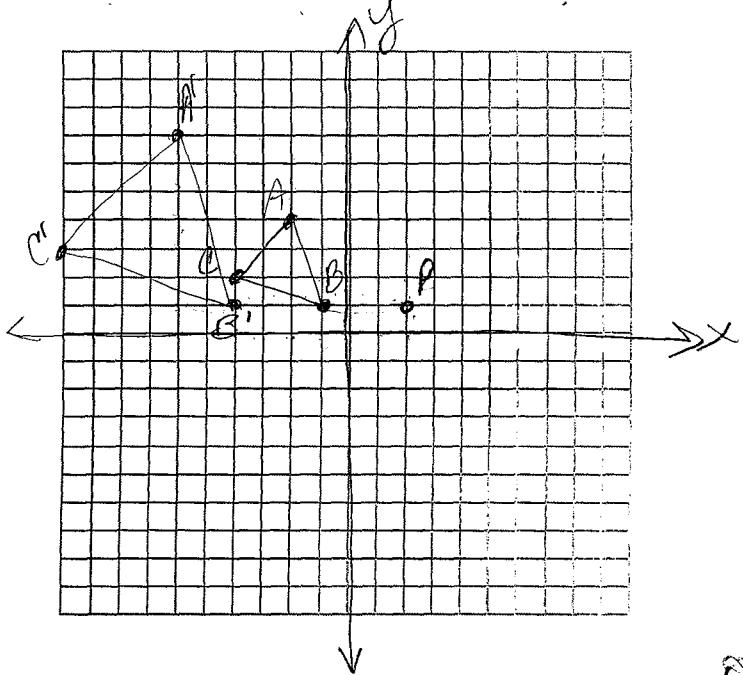
5. The point  $A(6, 3)$  maps onto  $A'(2, 1)$  under a dilation with respect to the origin. What is the constant of dilation?

$$D \frac{1}{3}$$

$$\boxed{(-2x-2, -2y+2)}$$

6. Graph triangle ABC,  $A(-2, 4)$ ,  $B(-1, 1)$ , and  $C(-4, 2)$ .

Dilate the triangle with a scale factor of 2, centered at  $(2, 1)$ .



$$(x-2, y-1) \xrightarrow{2}$$

$$(2x-4, 2y-2) \xrightarrow{+2}$$

$$(2x-2, 2y-1)$$

$$A'(-6, 7)$$

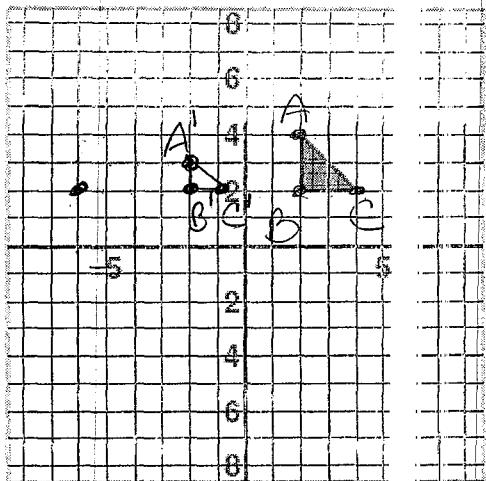
$$B'(-4, 1)$$

$$C'(-10, 3)$$

~~graphically~~

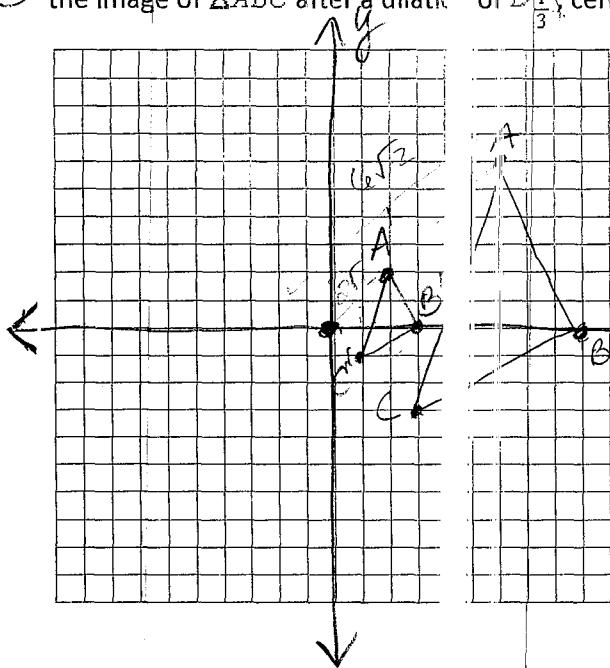
7. Graphing is optional.

Dilate by  $\frac{1}{2}$ , center  $(-6)$



Do Thus.

8. Triangle ABC has vertices  $A(6, 6)$ ,  $B(9, 0)$ , and  $C(3, -3)$ . State and label the coordinates of  $\Delta A'B'C'$ , the image of  $\Delta ABC$  after a dilation of  $D_{\frac{1}{3}}$ , centered at the origin.



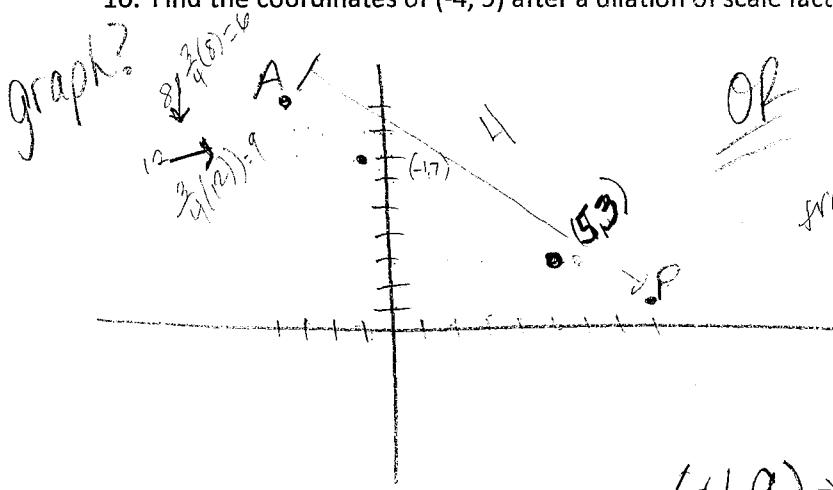
$$\begin{aligned}A' & (2, 2) \\B' & (3, 0) \\C' & (1, -1)\end{aligned}$$

9. What are the coordinates of point  $(-1, 4)$  under dilation  $D_{(0,0)}$  centered at the origin?

repeat  
ques.

$(2, -8)$  enlarges by 2  
reflects  
through  
 $(0, 0)$   
 $(x, y) \rightarrow (-x, -y)$ .

10. Find the coordinates of  $(-4, 9)$  after a dilation of scale factor  $\frac{1}{4}$  with the center of dilation at  $(8, 1)$ .



of  $(8, 1) \rightarrow (0, 0)$

trans.  $(x-8, y-1) \rightarrow$  dil.

$$\left(\frac{1}{4}x + 6, \frac{1}{4}y + \frac{3}{4}\right)$$

$$\left(\frac{1}{4}x + 6, \frac{1}{4}y + \frac{3}{4}\right) \text{ g. } \frac{1}{4} \text{ s. } \frac{3}{4}$$

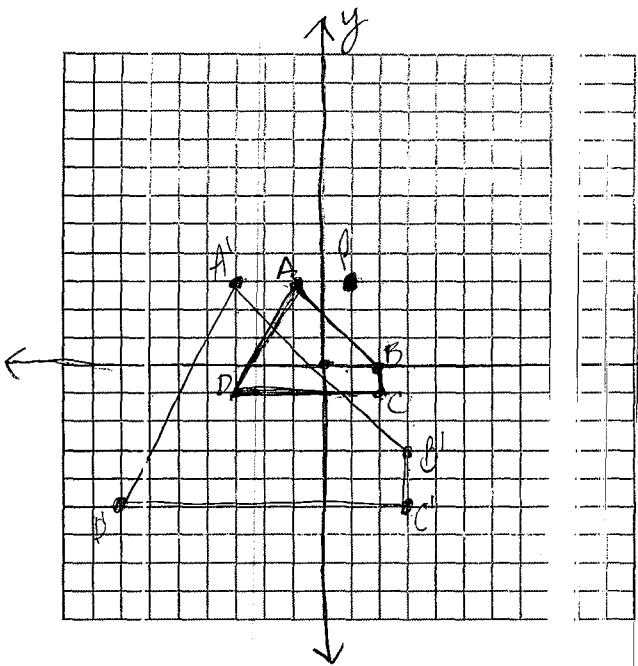
$$(-4, 9) \rightarrow \left(\frac{1}{4}(-4) + 6, \frac{1}{4}(9) + \frac{3}{4}\right) \rightarrow \boxed{(5, 3)}$$

11. The image of point A after a dilation, centered at the origin, of 3 is  $\frac{6}{3}, \frac{15}{3}$ . What was the original location of point A?

$$A(2, 5)$$

repeat  
ques.

12. On the accompanying grid, graph and label quadrilateral  $ABCD$ , whose coordinates are  $A(-1, 3)$ ,  $B(2, 0)$ ,  $C(2, -1)$ , and  $D(-3, -1)$ . Graph, label, and state the coordinates of  $A'B'C'D'$ , the image of  $ABCD$  under a dilation of 2, where the center of dilation is  $(1, 3)$ .

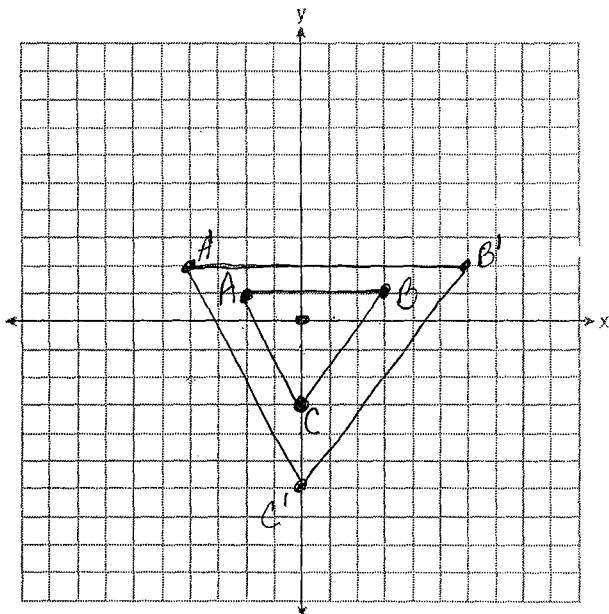


$A'(-3, 3)$   
 $B'(3, 0)$   
 $C'(3, -5)$   
 $D'(-7, -5)$

13. Under a dilation where the center of dilation is the origin, the image of  $A(-2, -3)$  is  $A'(-6, -9)$ . What are the coordinates of  $B'$ , the image of  $B(4, 0)$  under the same dilation?

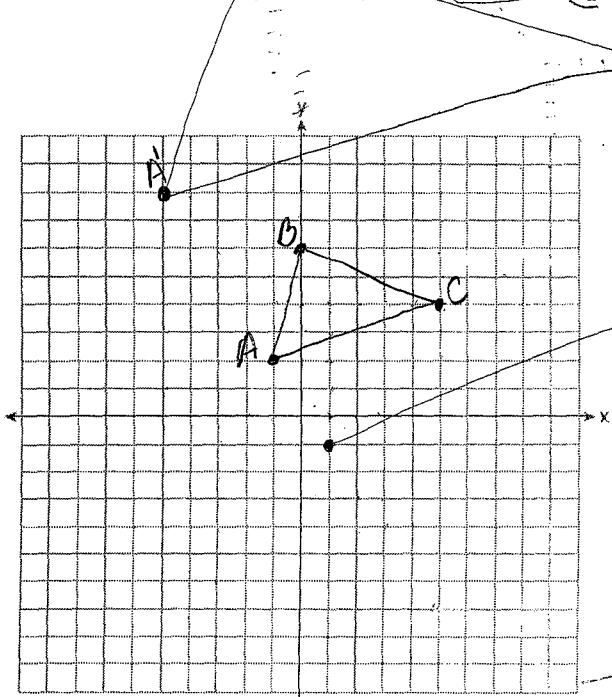
$$D_3 \rightarrow B'(12, 0) \quad D_3$$

14. Triangle ABC has coordinates  $A(-2, 1)$ ,  $B(3, 1)$ , and  $C(0, -3)$ . On the set of axes below, graph and label  $\Delta A'B'C'$ , the image of  $\Delta ABC$  after a dilation of 2. w/r/t origin?



$A'(-4, 2)$   
 $B'(6, 2)$   
 $C'(0, -6)$

- #12 15. On the accompanying set of axes, graph  $\Delta ABC$  with coordinates  $A(-1, 2)$ ,  $B(0, 6)$ , and  $C(5, 4)$ . Then graph  $\Delta A'B'C'$ , the image of  $\Delta ABC$  after a dilation of 3, centered at  $(1, -1)$ . Hint: Your image will not fit on the grid unless you change your scale. (by 2)



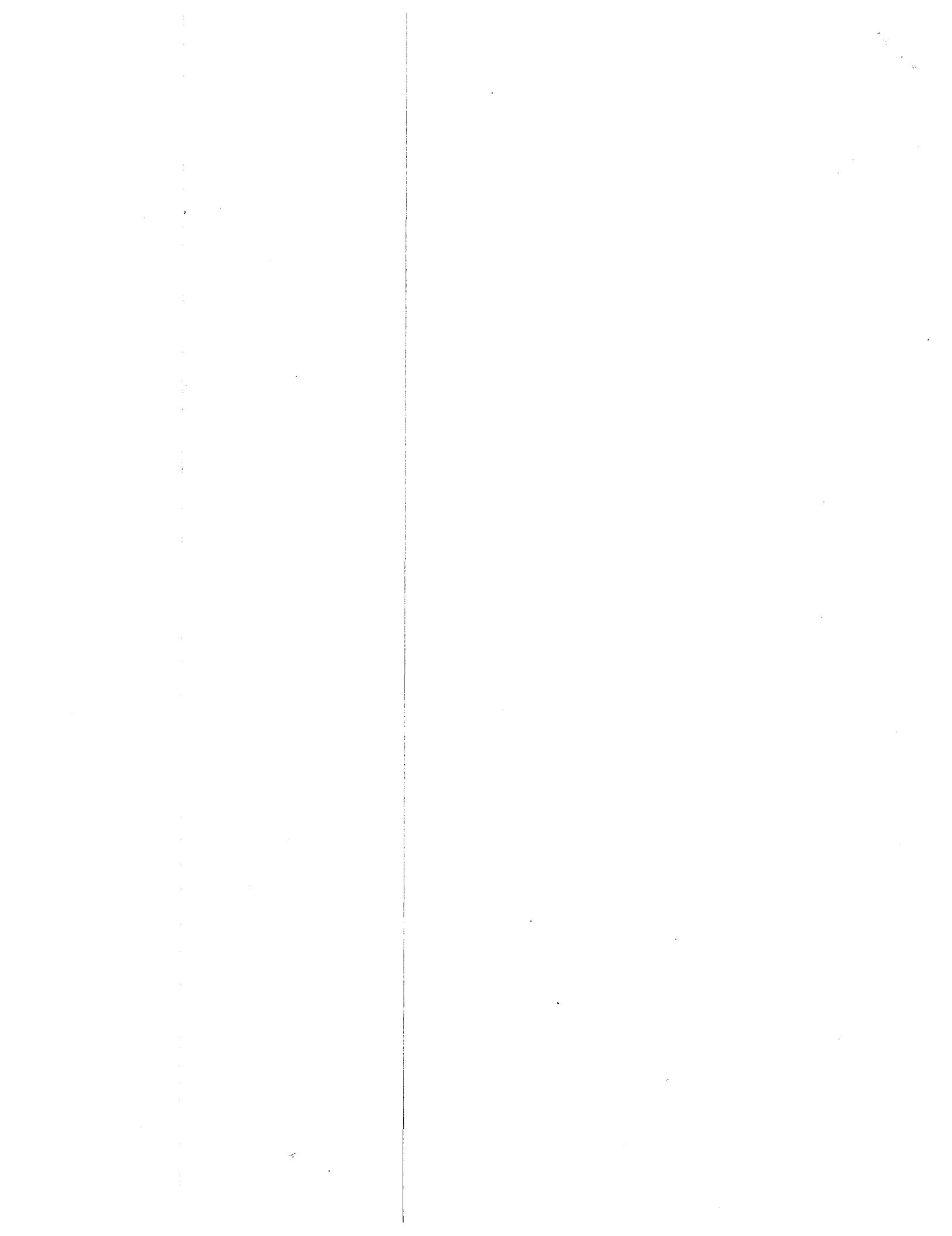
$A'(-5, 8)$   
 $B'(-2, 20)$   
 $C'(13, 14)$

$$(x-1, y+1)^{D_3} = \overline{(3x-3, 3y+3)}$$

$\overline{(3x-2, 3y+2)}$

$A'(-5, 8)$   
 $B'(-2, 20)$   
 $C'(13, 14)$

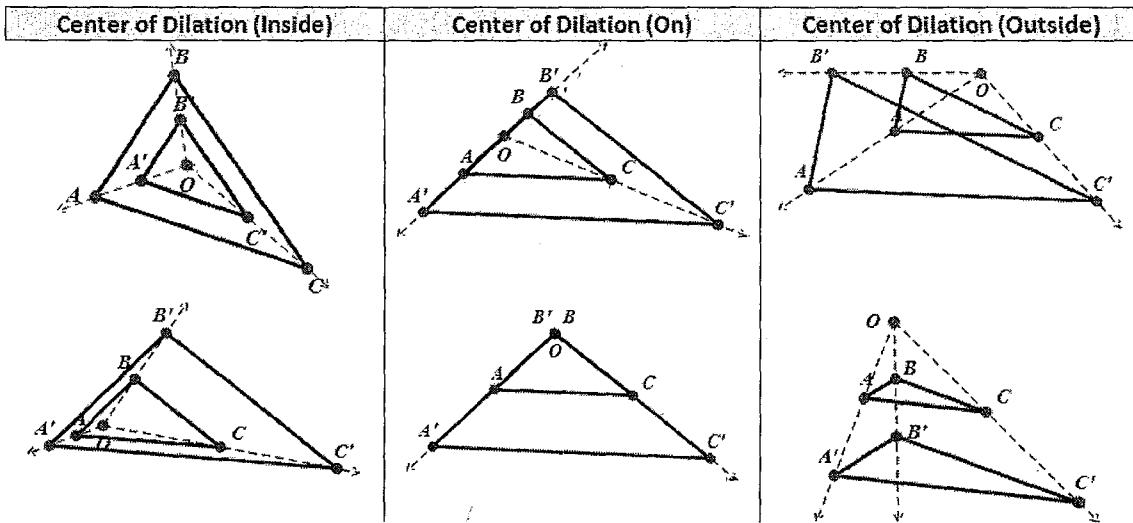
General Rule //



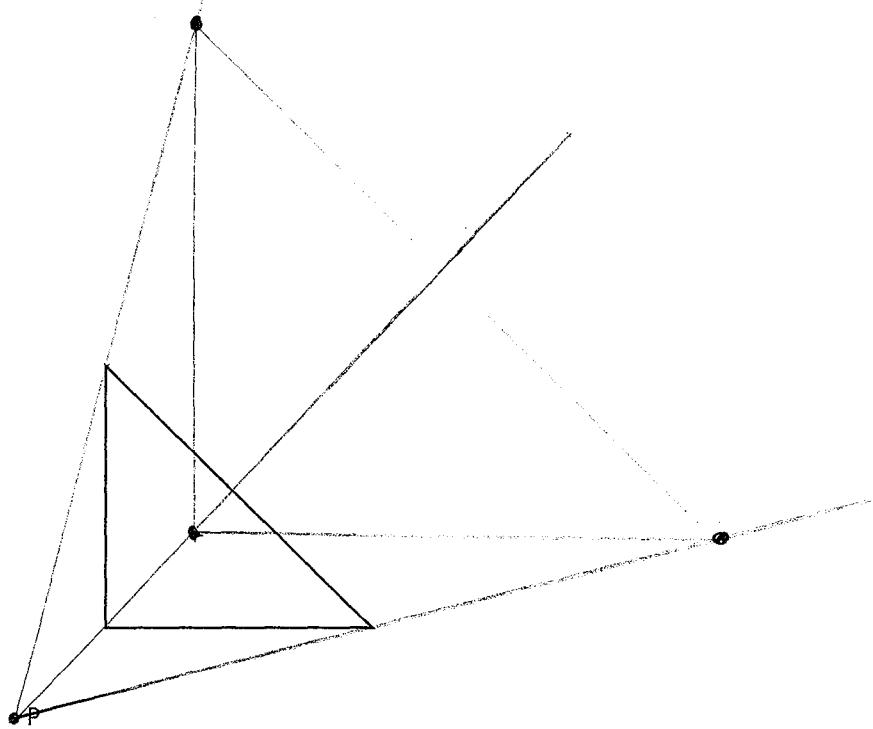
SCANName: Key

Date: \_\_\_\_\_

## Dilation Constructions



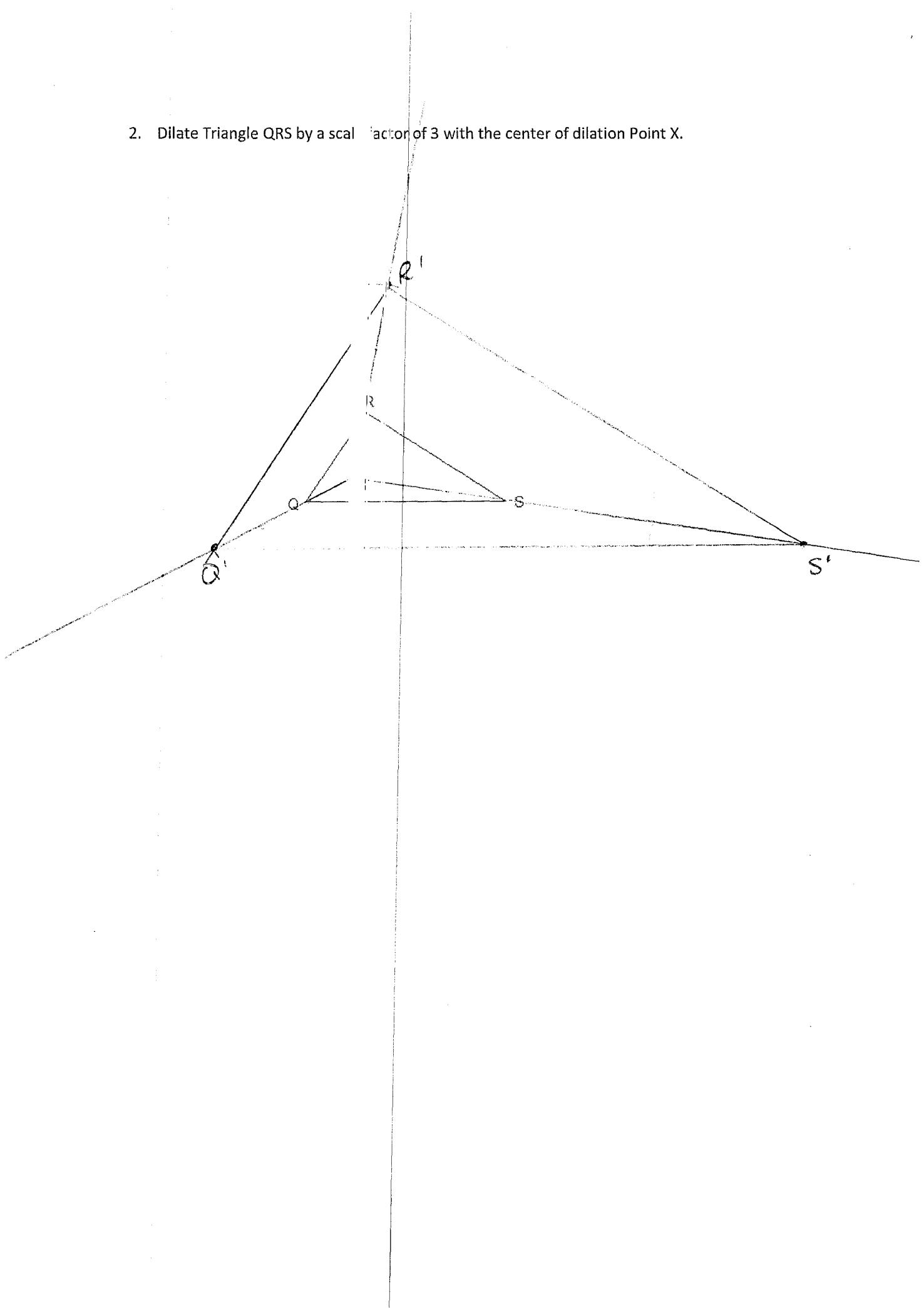
1. Using a compass and a straightedge, dilate the given triangle by a scale factor of 2 with the center of dilation at Point P.



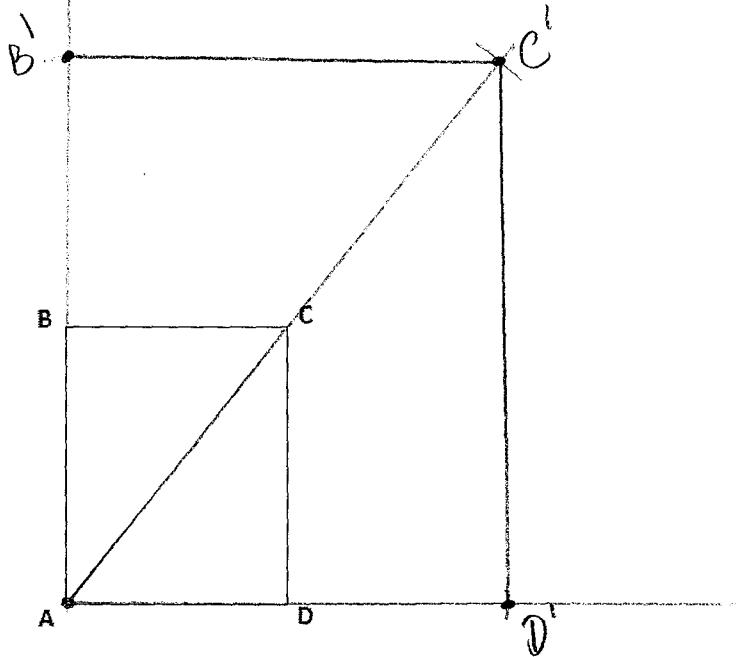
\* draw  
lines  
1st \*

\* Start  
at  
center!

2. Dilate Triangle QRS by a scale factor of 3 with the center of dilation Point X.

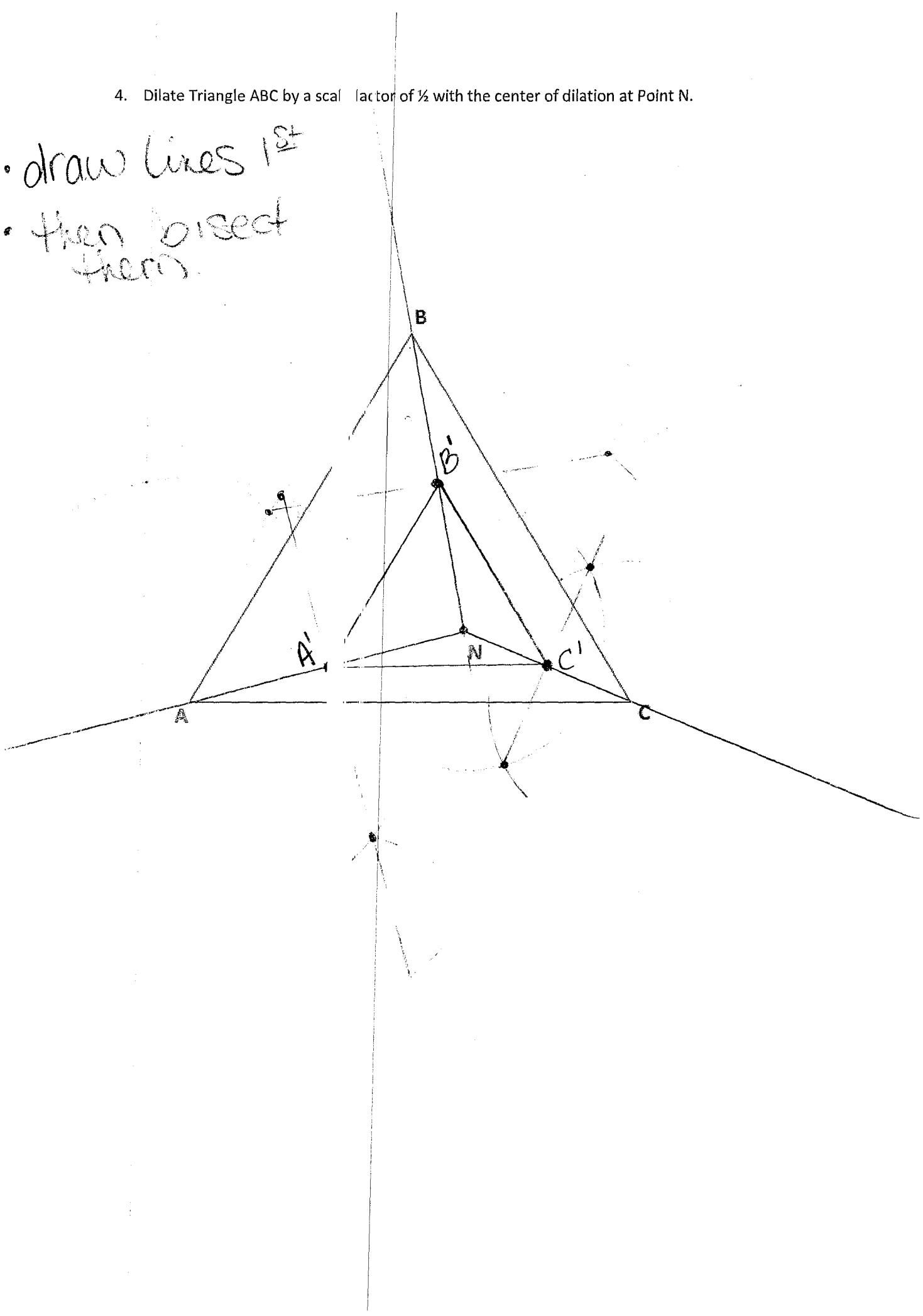


3. Dilate Quadrilateral ABCD by a scale factor of 2 with the center of dilation at Point A.



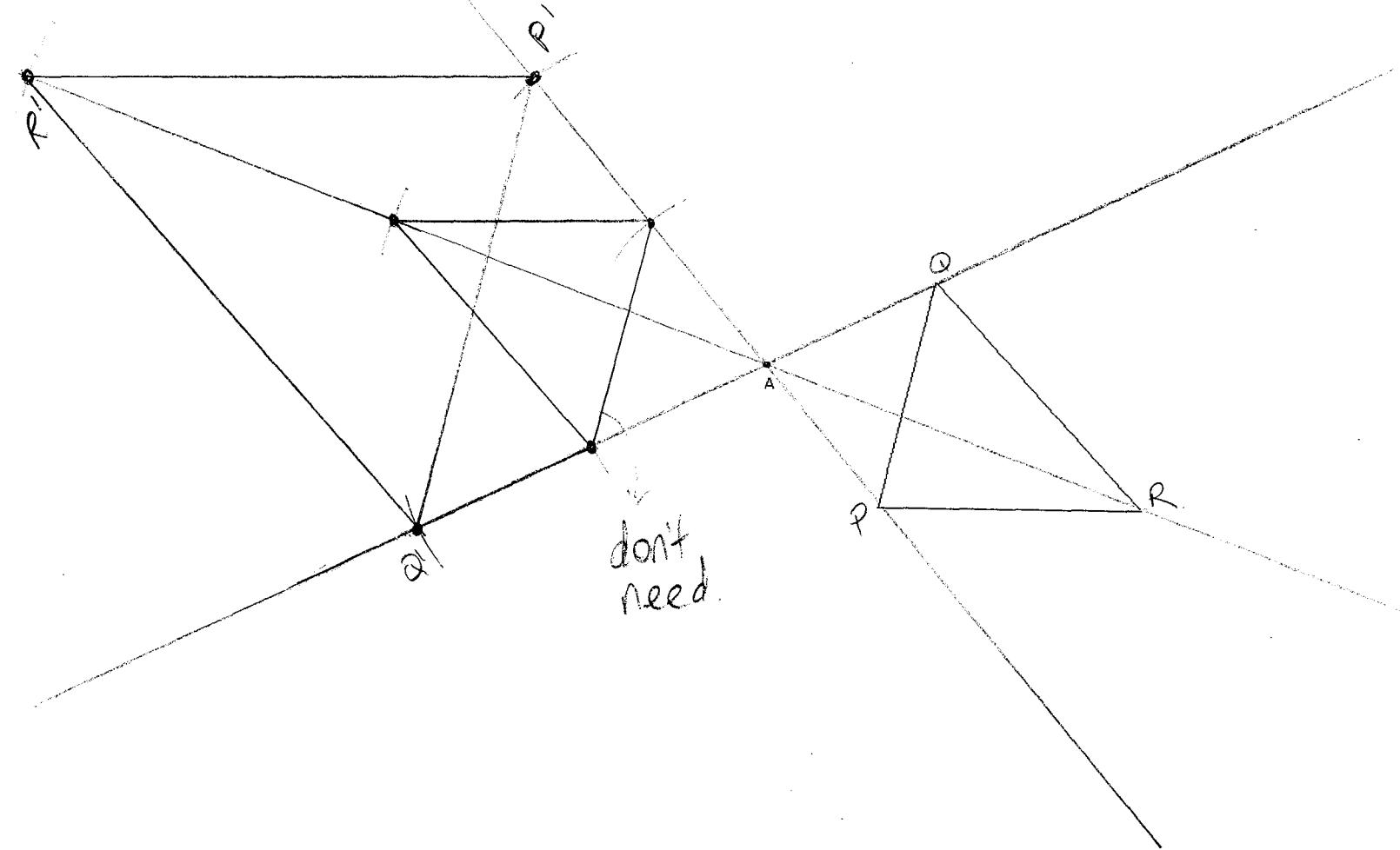
4. Dilate Triangle ABC by a scale factor of  $\frac{1}{2}$  with the center of dilation at Point N.

- draw lines  $1^{\text{st}}$
- then bisect them.



5. Dilate the given triangle by a scale factor of  $\frac{1}{2}$  with the center of dilation at A.

opp. direction



6.)

Dilate the given line segment by a scale factor of  $\frac{1}{3}$  with the center of dilation at A.

(only 3 parts)  $\rightarrow$  1:2 ratio

