

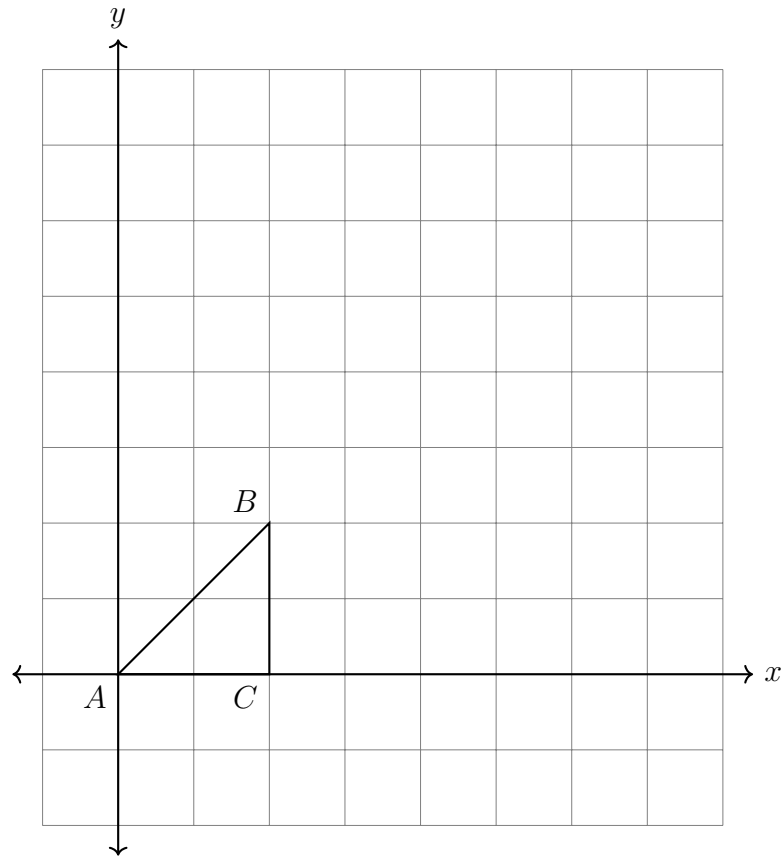
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### 9.11 Test: Dilation, transformations, and similarity

I can solve problems using similarity criteria.

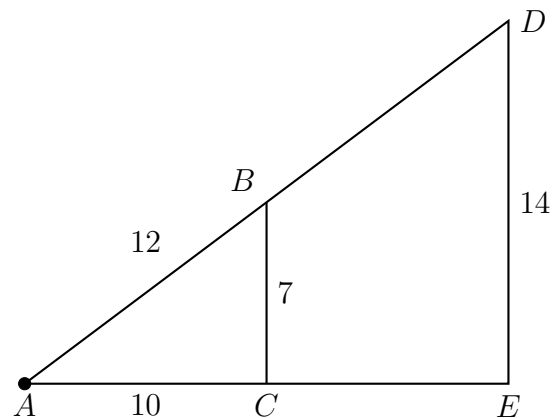
CCSS.HSG.SRT.B.5

1. Dilate  $\triangle ABC \rightarrow \triangle A'B'C'$  by a factor of  $k = 3$  centered at the origin,  
 $(x, y) \rightarrow (3x, 3y)$ . Plot and label the image on the axes.



2. A dilation centered at  $A$  with scale factor  $k = 2$  maps  $\triangle ABC \rightarrow \triangle ADE$ . Given the lengths  $AC = 10$ ,  $BC = 7$ ,  $AB = 12$ , and  $DE = 14$ .

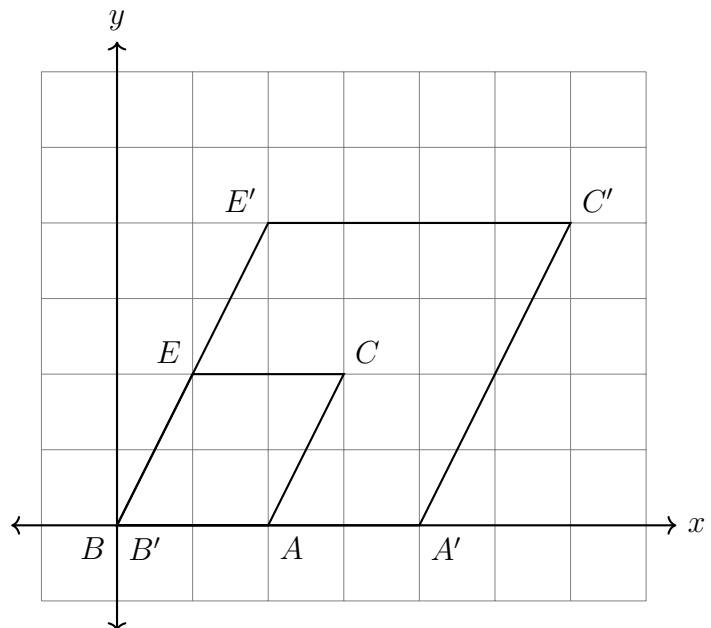
How long are  $AD$  and  $AE$ ?



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3. Given  $\triangle ABC \sim \triangle DEF$ ,  $m\angle A = 35^\circ$ , and  $m\angle F = 105^\circ$ . Find  $m\angle C$ .

4. What is the transformation mapping parallelogram  $BECA \rightarrow B'E'C'A'$ , as shown in the diagram. (hint: Dilations must specify the center and scale factor.)



5. A dilation maps  $\triangle ABC \rightarrow \triangle ADE$ . Given  $AB = 9$ ,  $AC = 11.1$ ,  $BC = 6$ ,  $DE = 14$ .

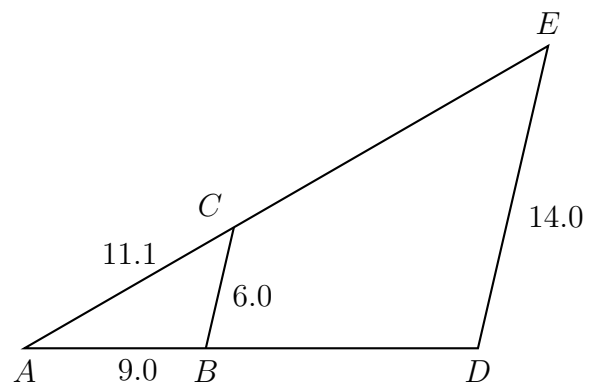
Find the scale factor and side lengths:

$k =$

$AD =$

$AE =$

$BD =$

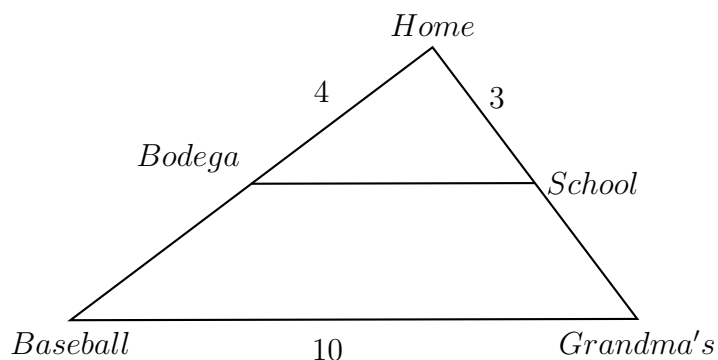


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6. Steven and Marie live close to school and Tio's bodega, but also like to go to Grandma's house and the baseball field, which are further away. A sketch of the locations is shown below, essentially two triangles with a scale factor  $k = 2$  centered at home.

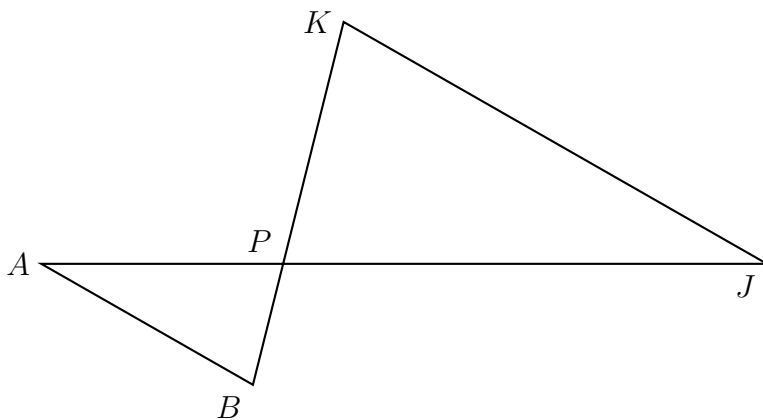
From home it's 3 blocks to school and 4 to the bodega. From Grandma's to the baseball field is 10 blocks. There are twenty blocks to a mile.

- (a) Steven stops at the bodega before continuing on his way to school. How far does he walk on this way to school, in terms of both blocks and miles?

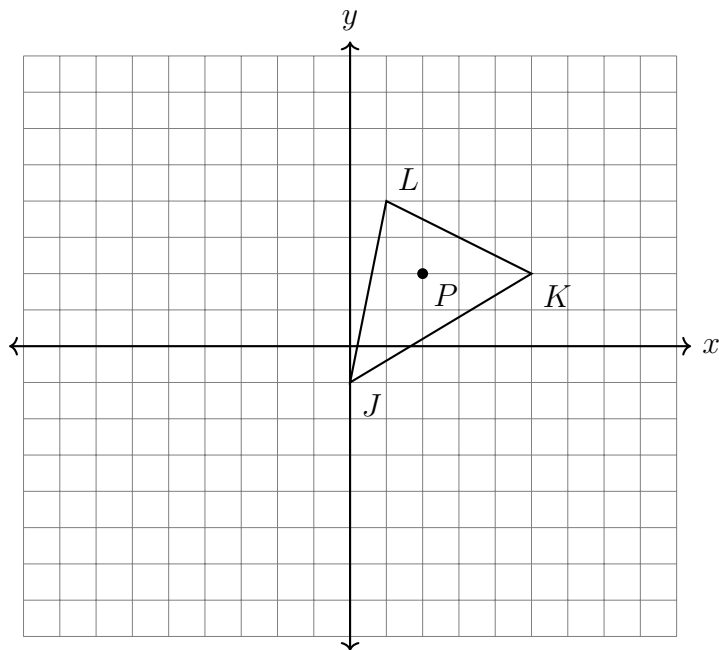


- (b) Marie plays baseball after school. Which route from school to baseball is shorter, passing by the bodega or the way by Grandma's? By how many blocks is it shorter? Justify your answer.

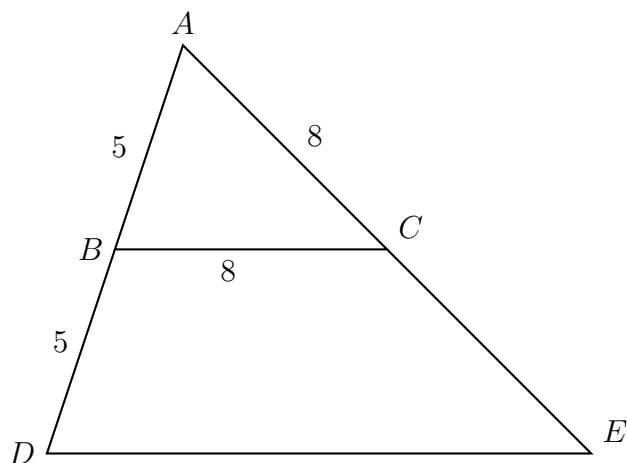
7. Given  $\triangle ABP \sim \triangle JKP$  as shown below.  $AB = 10$ ,  $AP = 9.0$ ,  $PK = 12.5$ , and  $JK = 25$ . Find  $JP$  and  $BP$ .



8. The vertices of  $\triangle JKL$  have the coordinates  $J(0, -1)$ ,  $K(5, 2)$ , and  $L(1, 4)$ , as shown.
- (a) Apply a dilation to  $\triangle JKL \rightarrow \triangle J'K'L'$ , centered at  $P(2, 2)$  and with a scale factor  $k = 2$ . Draw the image  $\triangle J'K'L'$  on the set of axes below, labeling the vertices.

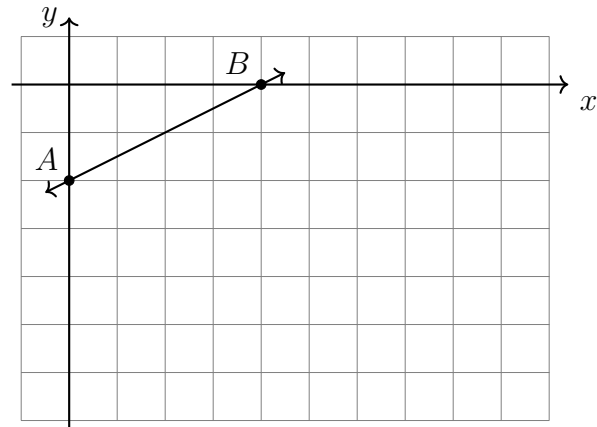


- (b) What is the ratio of the area of  $\triangle JKL$  to  $\triangle J'K'L'$ ?
9. Triangle  $ADE$  is drawn with  $\overline{BC} \parallel \overline{DE}$ , as shown. Given  $AB = 5$ ,  $BC = 8$ ,  $AC = 8$ , and  $BD = 5$ .  $m\angle A = 72^\circ$ .
- Find  $m\angle ABC$  and  $m\angle E$ .



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10. The line  $\overleftrightarrow{AB}$  has the equation  $y = \frac{1}{2}x - 2$ . Apply a dilation mapping  $\overleftrightarrow{AB} \rightarrow \overleftrightarrow{A'B'}$  with a factor of  $k = 2.5$  centered at the origin. Draw and label the image on the grid. Write the equation of the line  $\overleftrightarrow{A'B'}$ .

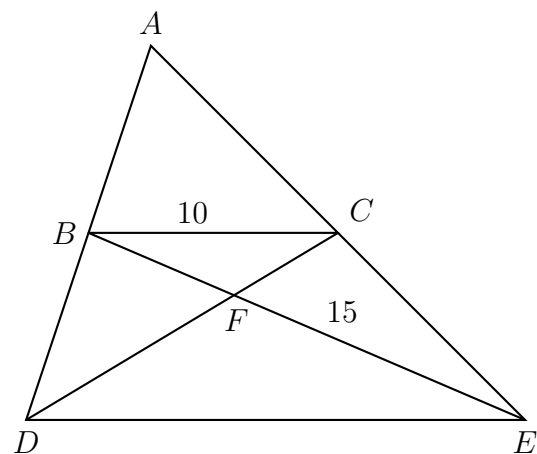


11. Triangle  $ADE$  and its midline  $\overline{BC}$  are drawn, with  $B$  the midpoint of  $\overline{AD}$  and  $C$  the midpoint of  $\overline{AE}$ . The two medians  $\overline{BE}$  and  $\overline{CD}$  are drawn, as shown, intersecting in point  $F$ , the centroid. Given  $BC = 10$ ,  $FE = 15$ .

(a) Write down  $DE$ .

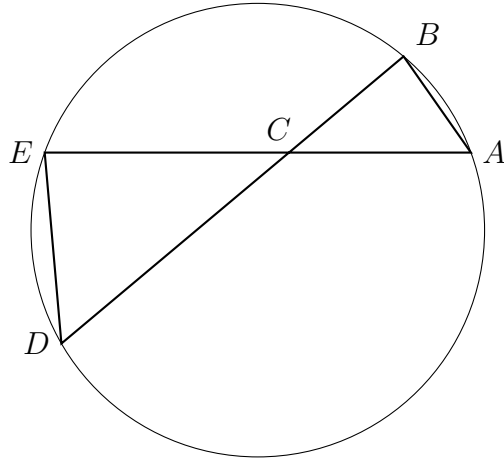
(b) Given  $\triangle FCB \sim \triangle FDE$  with scale factor  $k = 2$ .

Find  $BF$ .

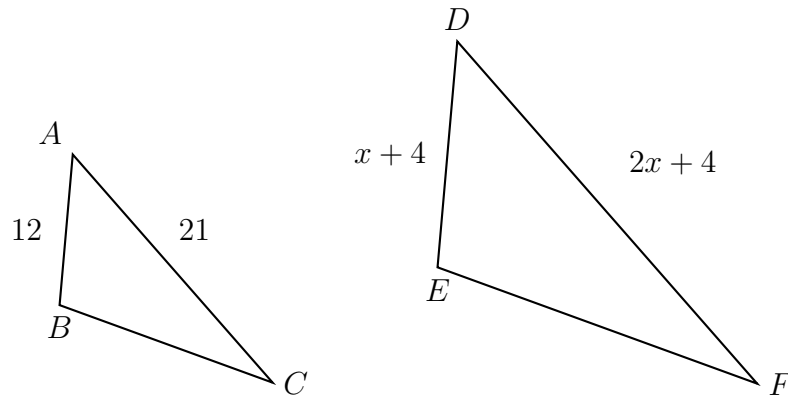


(c) Given the area of  $\triangle ABC$  is 50, find the area of  $\triangle ADE$ .

12. In the diagram below, the chords  $\overline{AE}$  and  $\overline{BD}$  intersect at  $C$ , with  $\triangle ABC \sim \triangle DEC$ ,  $BC = 4$ ,  $AC = 5$ , and  $BD = 11.5$ . Determine the length of  $\overline{CE}$ .



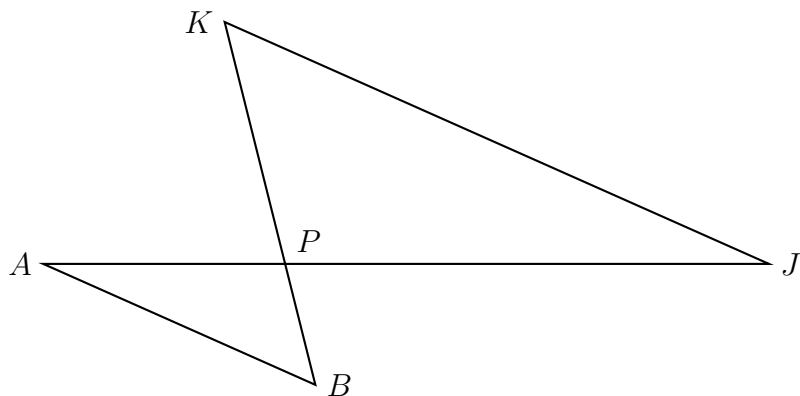
13. In the diagram below  $\triangle ABC \sim \triangle DEF$ ,  $DE = x+4$ ,  $AB = 12$ ,  $AC = 21$ ,  $DF = 2x+4$ . Solve for  $x$ .



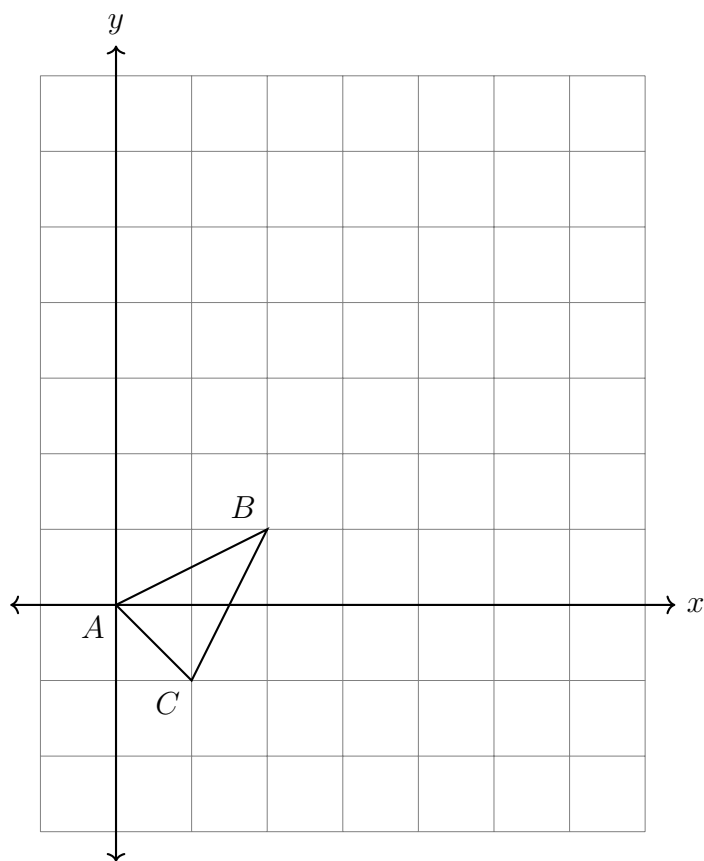
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**Extra**

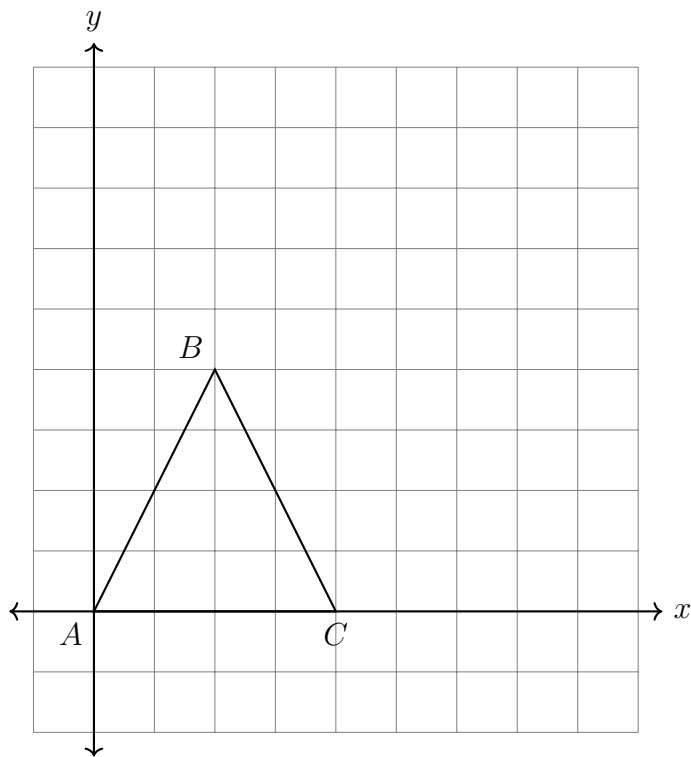
14. Given  $\triangle ABP \sim \triangle JKP$ .  $AB = 7$ ,  $AP = 6.3$ ,  $KP = 8.8$ ,  $JK = 16.0$ ,  $m\angle A = 25^\circ$ ,  $m\angle JPK = 105^\circ$ . Solve the triangles (all angles and lengths).



15. Dilate  $\triangle ABC \rightarrow \triangle A'B'C'$  by a factor of  $k = 3$  centered at the origin,  $(x, y) \rightarrow (3x, 3y)$ . Plot and label the image on the axes.



16. Dilate  $\triangle ABC \rightarrow \triangle A'B'C'$  by a factor of  $k = 1.5$  centered at the origin,  $(x, y) \rightarrow (1.5x, 1.5y)$ . Plot and label the image on the axes. Make a table of the vertices and their coordinates.

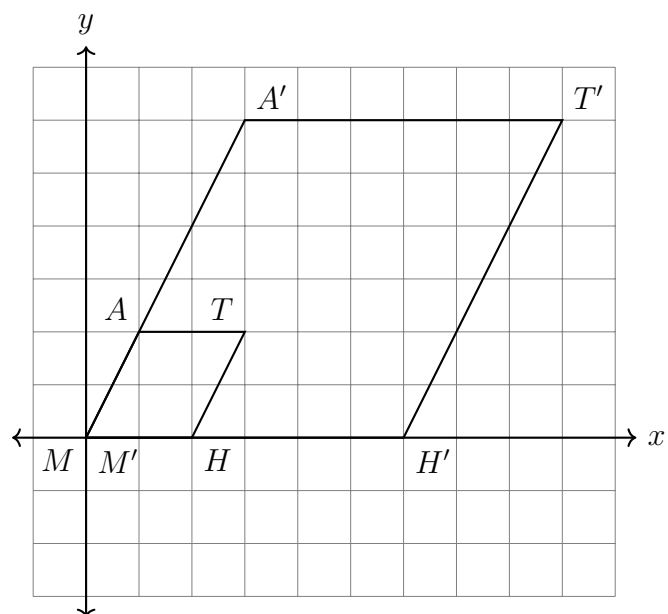


17. A transformation is performed on a parallelogram,  $MATH \rightarrow M'A'T'H'$ , as shown in the diagram.

What is the transformation? (Hint: Is it a translation, reflection, rotation, or dilation? What is its center? What is the scale factor,  $k$ ?)



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18. Dilate  $\triangle ABC \rightarrow \triangle A'B'C'$  by a factor of  $k = 1.5$  centered at the origin,  $(x, y) \rightarrow (1.5x, 1.5y)$ . Plot and label the image on the axes. Make a table of the vertices and their coordinates.

