

Math 135
Section 9.2

Similitudes and Similarity

Size transformations

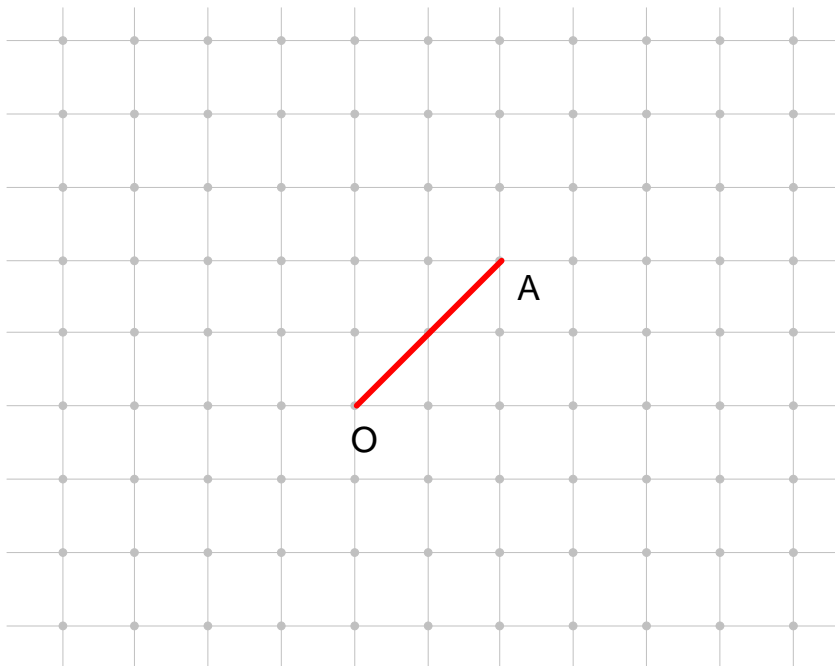
Let O be the center of the size transformation and k be the scale factor. The image of any point A under the size transformation with center O and scale factor k is A' where:

- 1) A' is on ray \overrightarrow{OA}
- 2) $\frac{OA'}{OA} = k$

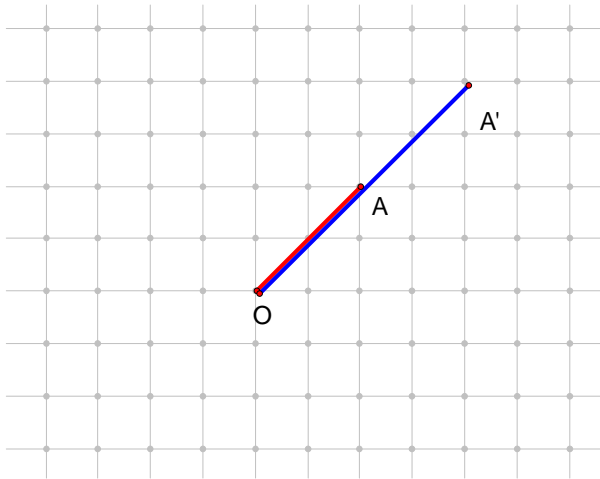
Example 1

On the square lattice portions shown, find the image of \overline{OA} under the size transformation with center O and a scale factor of $k = 2$

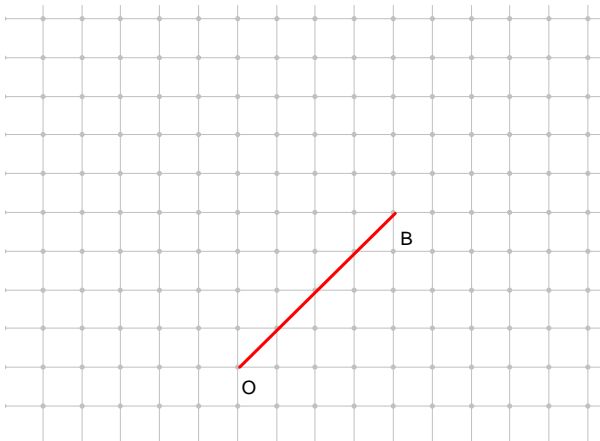
a)



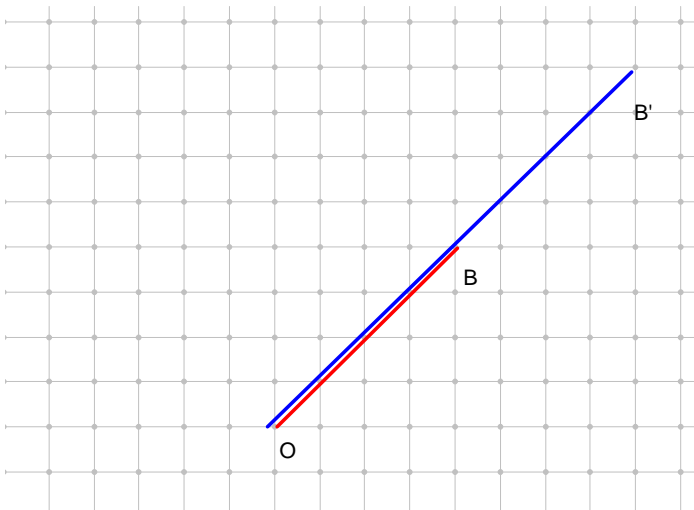
To find the image of B, we extend \overline{OA} through B and mark off B' where $OB' = 2(OA)$



b)

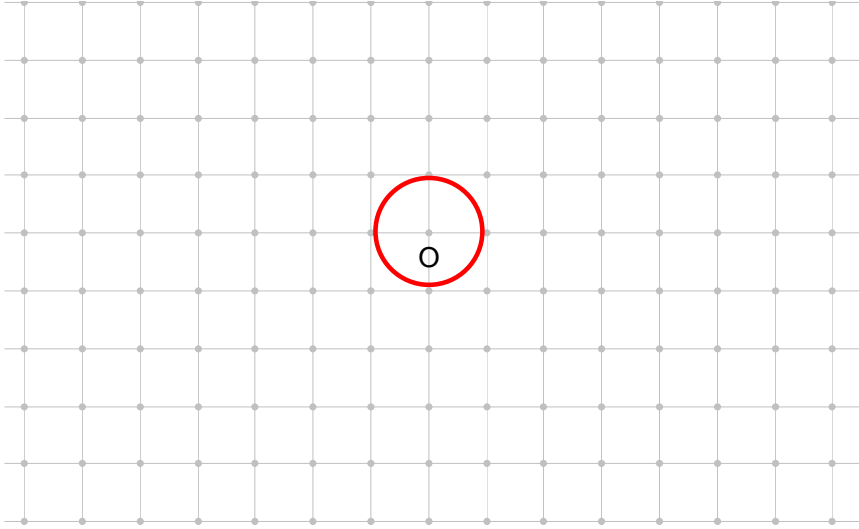


Solution:

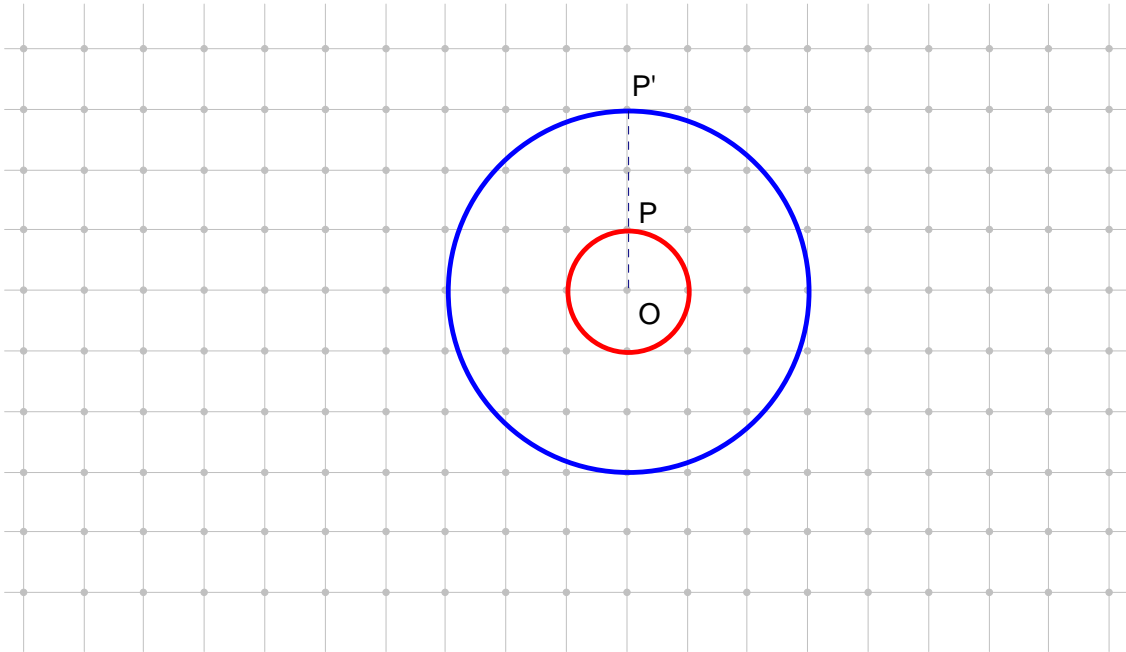


Example 2

On the square lattice portions shown find the image of the circle under the size transformation with center O and a scale factor of $k = 3$.

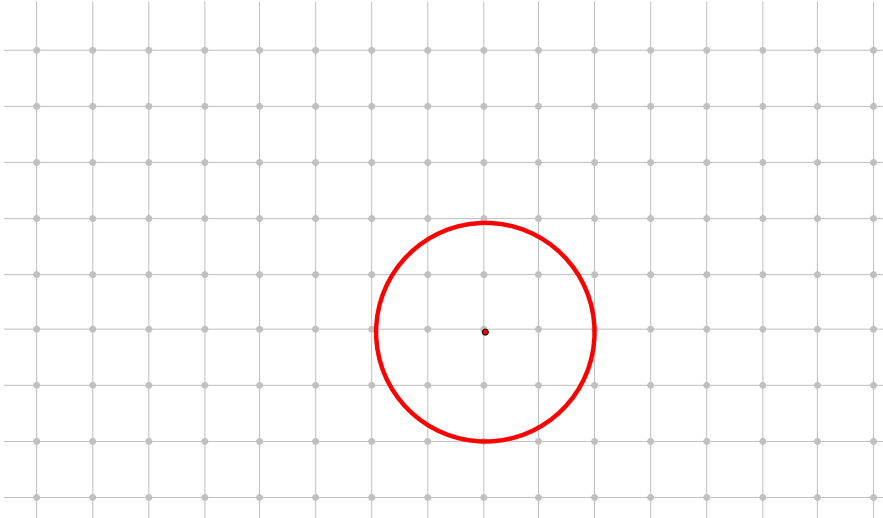


Draw radius OP where P is on circle O. Extend OP' so that $OP' = 3(OP)$

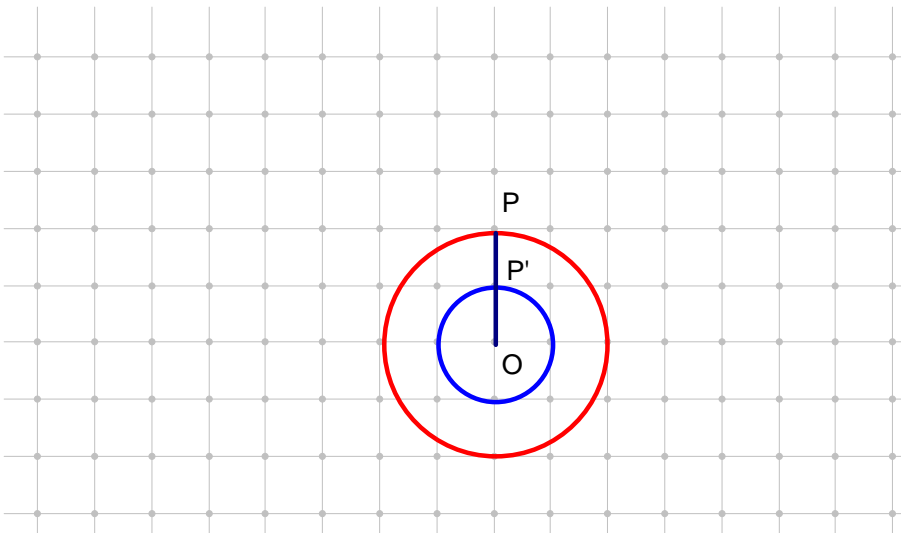


Example 3

On the square lattice portions shown find the image of the circle under the size transformation with center O and a scale factor of $k = \frac{1}{2}$.

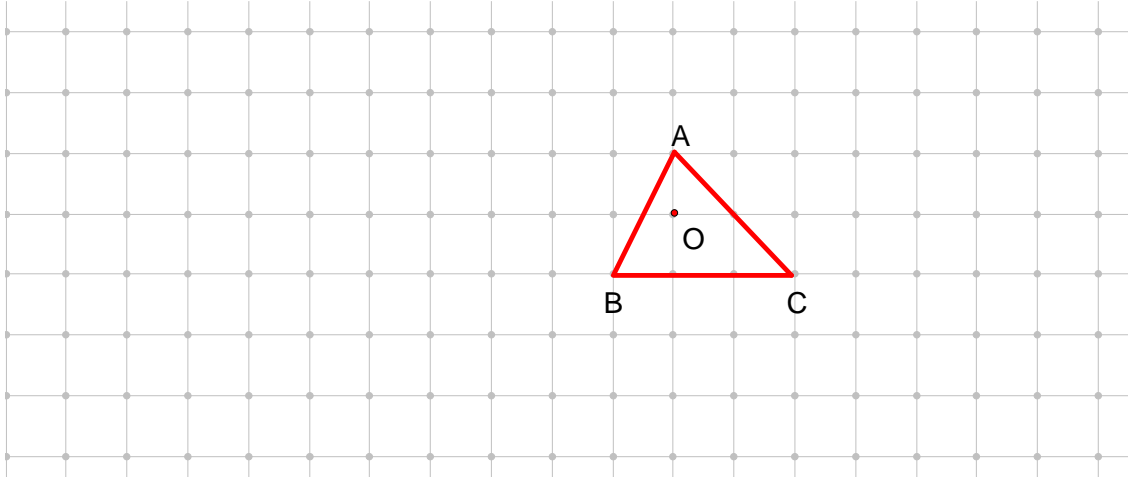


Draw radius OP where P is on circle O. Extend OP' so that $OP' = \frac{1}{2}(OP)$



Example 4

Find the image of $\triangle ABC$ under the size transformation with center O and a scale factor of $k = 2$

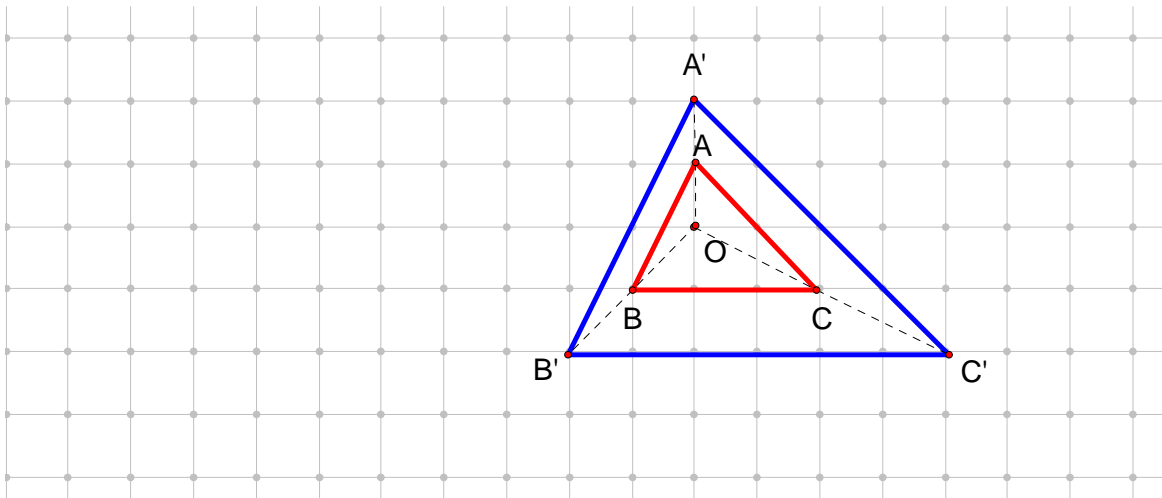


Extend the following segments from the center O

$$OB' \text{ where } OB' = \frac{1}{2}(OB)$$

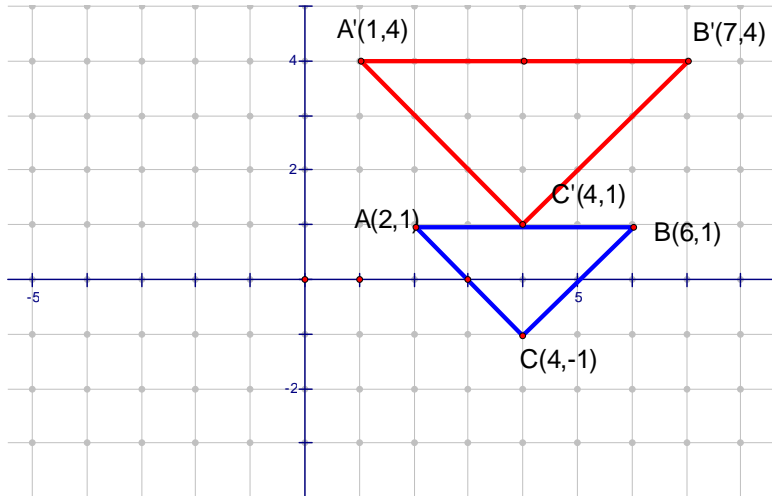
$$OA' \text{ where } OA' = \frac{1}{2}(OA)$$

$$OC' \text{ where } OC' = \frac{1}{2}(OC)$$

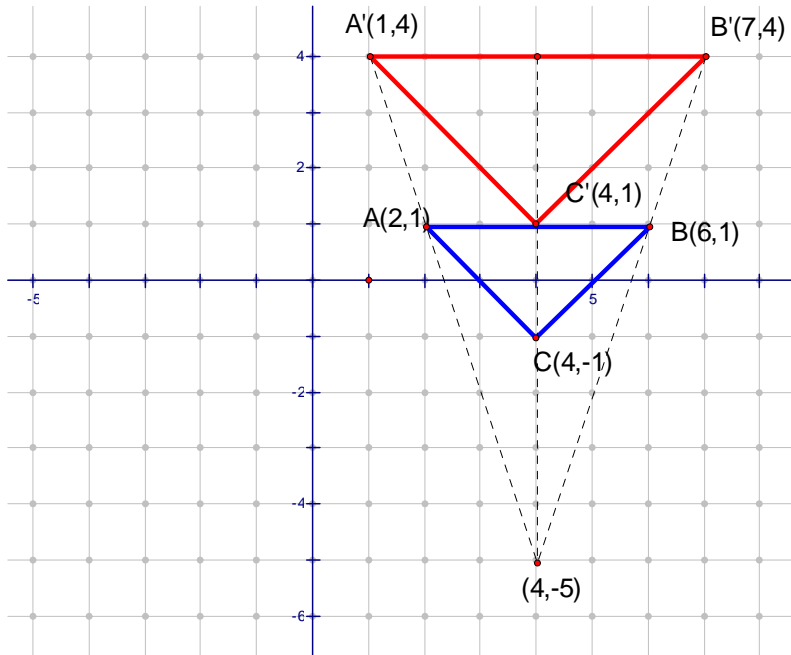


Example 5

Determine if $\Delta A'B'C'$ is a size transformation image of ΔABC for $A'(1,4)$, $B'(7,4)$, $C'(4,1)$, $A(2,1)$, $B(6,1)$, and $C(4,-1)$. If yes, find the center of rotation and the scale factor. If no, explain why not.



Find the center of rotation by extending lines through $A'A$, $B'B$, and $C'C$. The point of intersection of these points will be the center.



The scale factor would be:

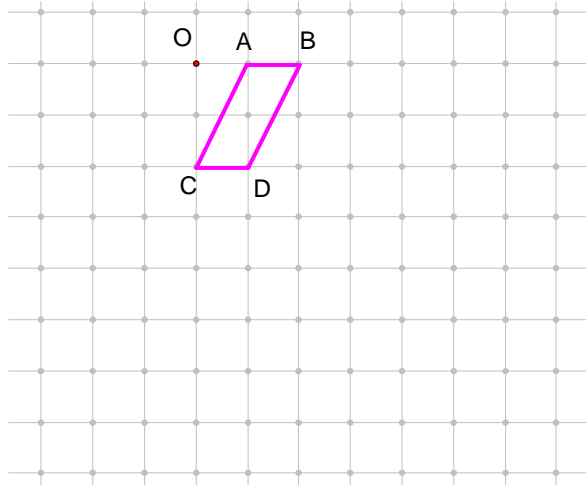
$$K = \frac{A'B'}{AB} = \frac{B'C'}{BC} = \frac{A'C'}{AC} = \frac{3}{2}$$

Properties of Size Transformations

- 1) Size Transformations take lines to lines, rays to rays, and line segments to line segments.
 - 2) Size transformations preserve orientation.
 - 3) Size transformations preserve ratios of distance.
 - 4) Size transformations preserve angle measure.
 - 5) Size transformations preserve perpendicularity
 - 6) Size transformations take lines to parallel lines.
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Example 6

Find the image of parallelogram $ABCD$ under the size transformation with center O and a scale factor of $k = 3$



Solution:

