Geometry: Unit 1: Transformations

Dilations – changing the size of shapes.

Warm-up

- Watch the following video:
- http://www.pbslearningmedia.org/resource/muen-math-g-understandingdilations/understanding-dilations/

Dilations

- **Objective**: Students will be able to do the following, regarding geometric transformations.
  - Write Transformations Symbolically and justify their choice.
  - Explain the movement of points for a given transformation.
  - Draw an image under each transformation.

Non-Isometry: A reminder

- A Non-Isometric Transformation has the following properties are preserved:
  - Angle measure (All angles stay the same)
  - Parallelism (All lines that are parallel stay parallel)
  - Collinearity (All points on a line remain on a line)

- In short, the transformed figure (**Image**) is the same shape as the original figure **(Pre-Image)**, but not the same size.

Dilations

- A dilation is a transformation that affects the size of a point, either making it bigger (expansion) or smaller (contraction).
- If $|k| > 1$, the dilation is called an expansion.
- If $|k| < 1$, the dilation is called a contraction.

Dilations Continued

- Under the notation $D_{O,k}$, a dilation maps any point P to P' about a center O under a nonzero scale factor of k in the following ways:

  1) The Center O is its own image.

  2) If $k > 0$, then P' lies on the ray $\overrightarrow{OP}$ and $OP' = k \cdot OP$.

  3) If $k < 0$, then P' lies on the ray opposite $\overrightarrow{OP}$ and $OP' = |k| \cdot OP$.

Dilations Example

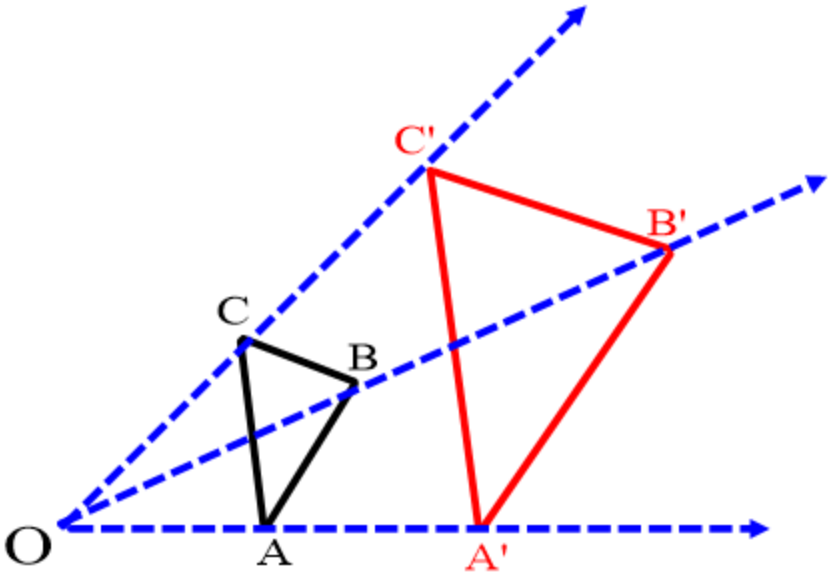
- Find the image of ΔABC under the expansion $D_{O,2}$

Solution: $D_{O,2}$: $\Delta ABC \rightarrow \Delta A'B'C'$

$OA' = 2 \cdot OA$

$OB' = 2 \cdot OB$

$OC' = 2 \cdot OC$



Dilations Example

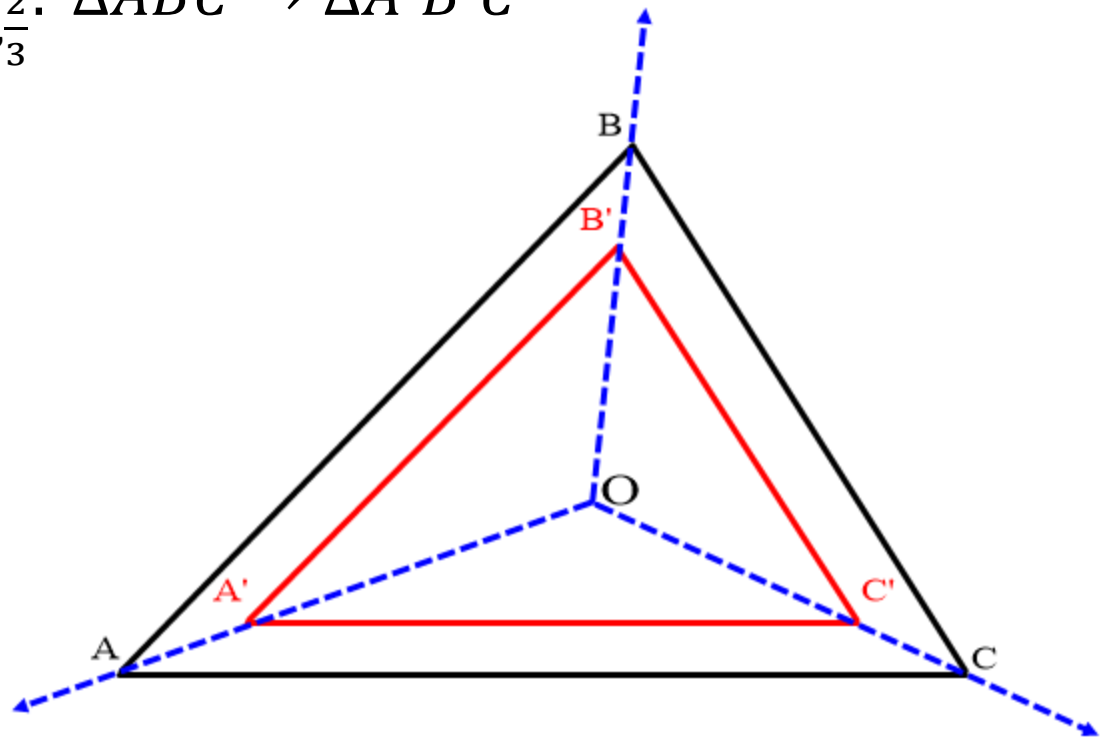
- Find the image of ΔABC under the expansion $D_{O,\frac{2}{3}}$

Solution: $D_{O,\frac{2}{3}}$: $\Delta ABC \rightarrow \Delta A'B'C'$

$$OA' = \frac{2}{3} \cdot OA$$

$$OB' = \frac{2}{3} \cdot OB$$

$$OC' = \frac{2}{3} \cdot OC$$



Dilations Example

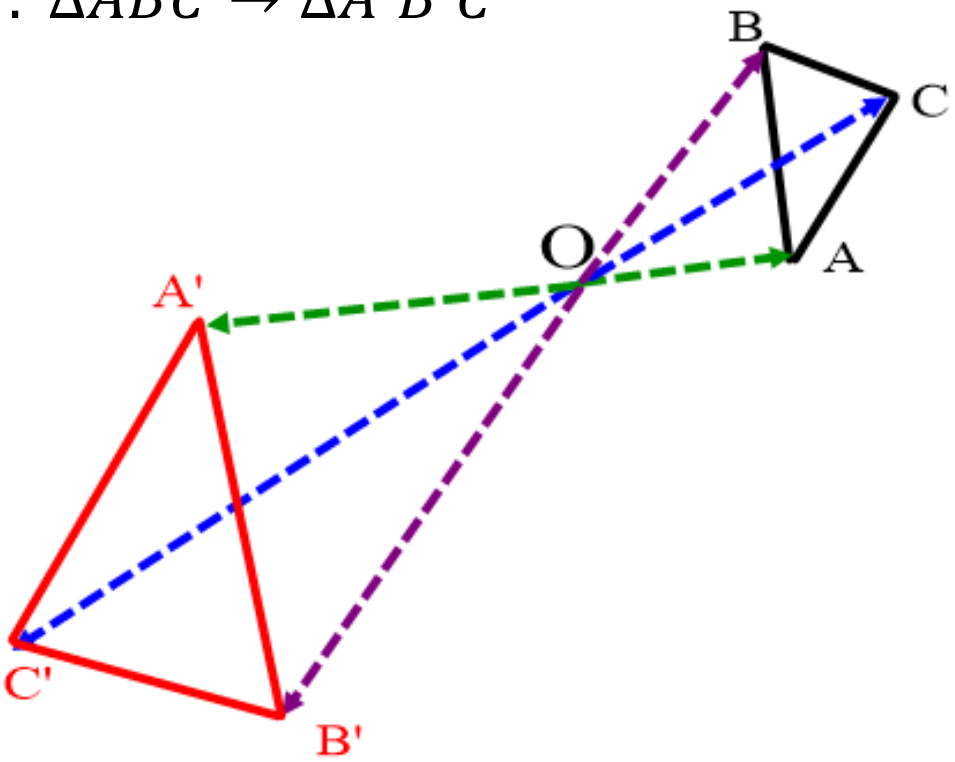
- Find the image of ΔABC under the expansion $D_{O,-2}$

Solution: $D_{O,-2}$: $\Delta ABC \rightarrow \Delta A'B'C'$

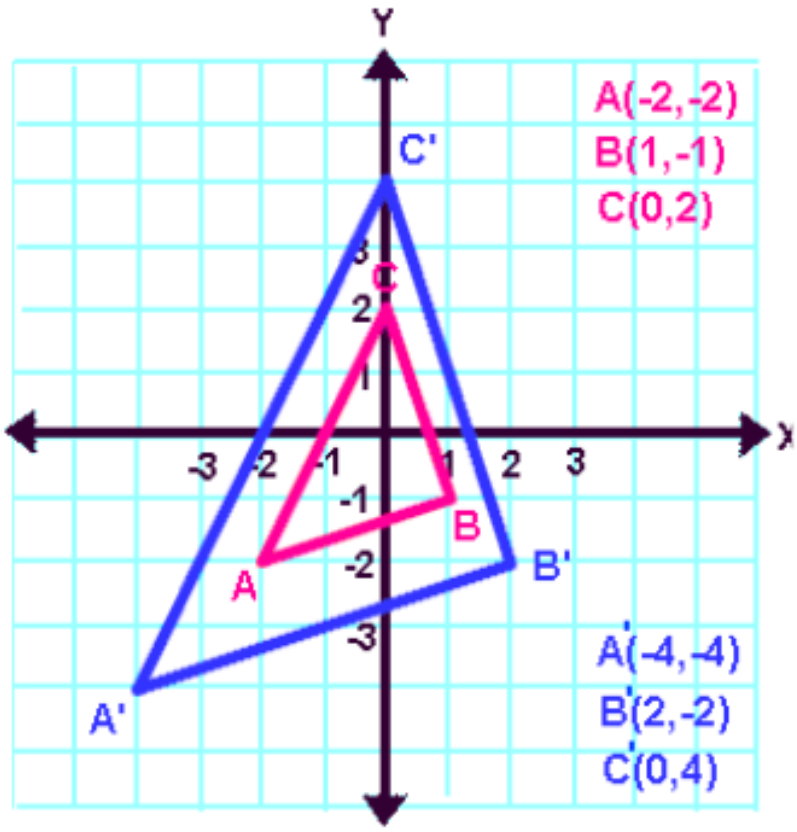
$OA' = 2 \cdot OA$

$OB' = 2 \cdot OB$

$OC' = 2 \cdot OC$

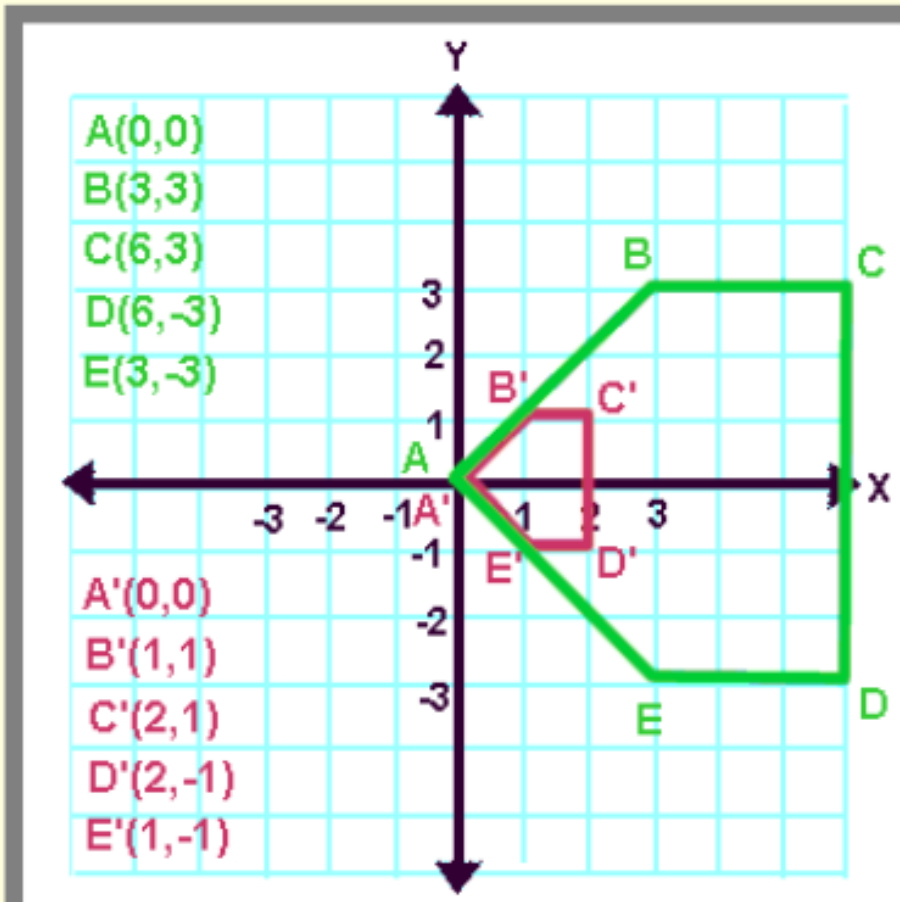


Identify the Scale Factor and Center from the picture



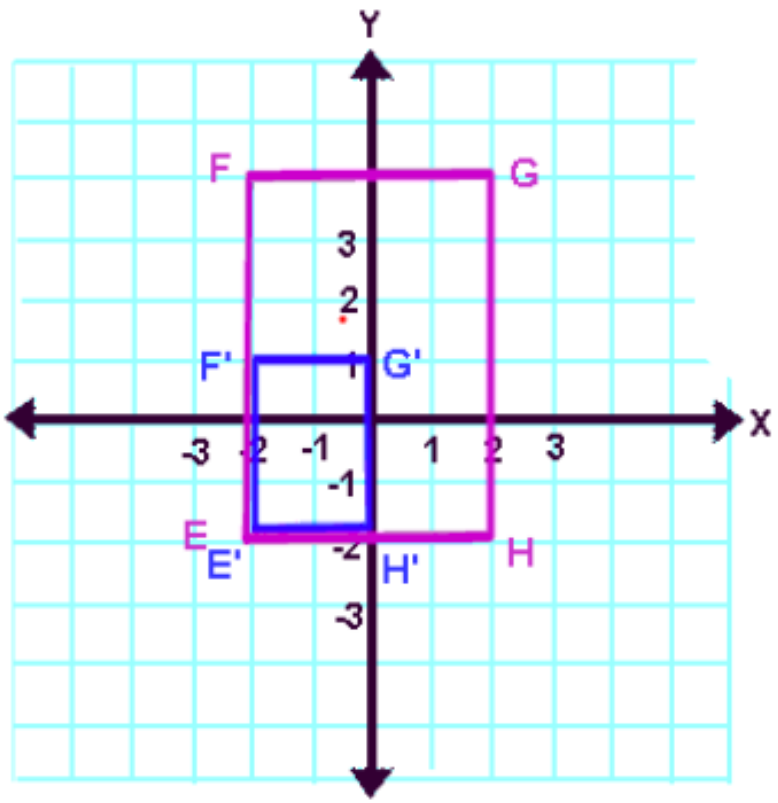
What do you observe is happening with the coordinates of the new image? Explain.

Identify the Scale Factor and Center from the picture



What do you observe is happening with the coordinates of the new image? Explain.

Identify the Scale Factor and Center from the picture



How is changing the center of the dilation change the way we calculate the coordinates of the new image from the previous examples?Explain.

Exit Ticket

- In words, describe how these transformations (given in their notations) would move each point.

1. $D_{O,2}$ Every Point…

2. $D_{O,-1}$ Every Point…

3. $D_{\frac{3}{4}}$ Every Point…