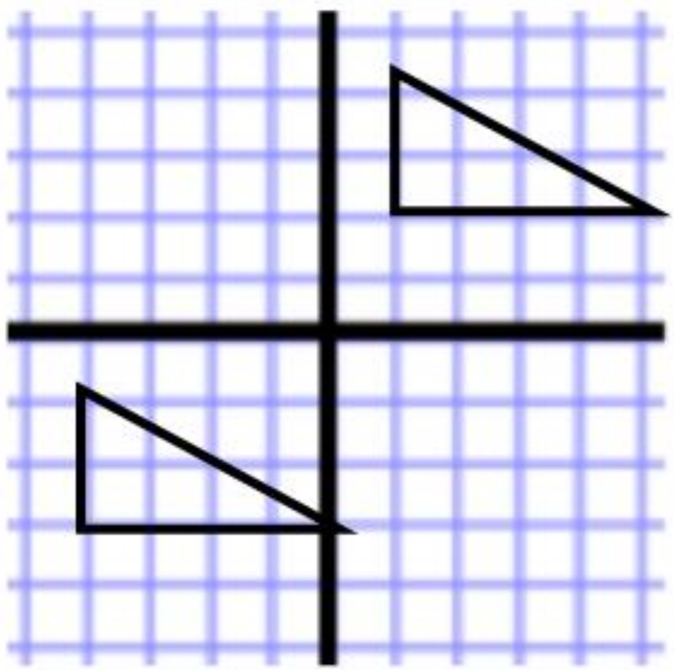
Geometry Unit 1: Transformations

Quiz/Test Review

Identify Transformations by Image

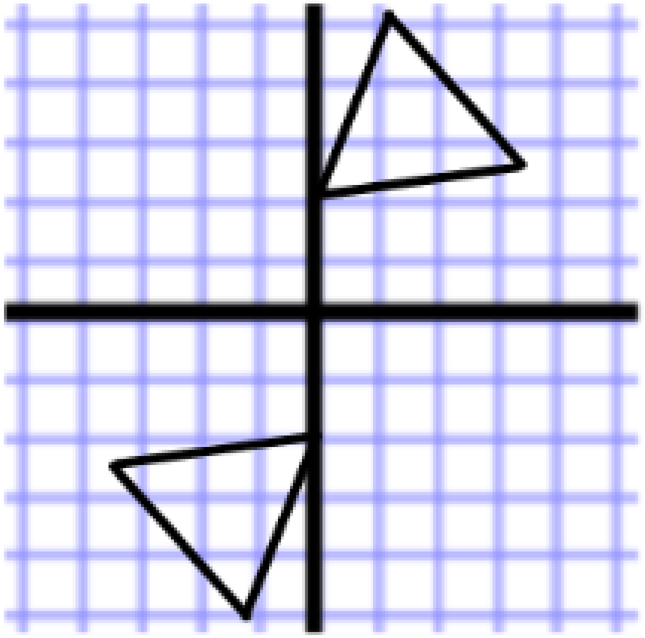
- Identify and state the Transformation being demonstrated be the following shapes



Transformation:
Translation

Identify Transformations by Image.

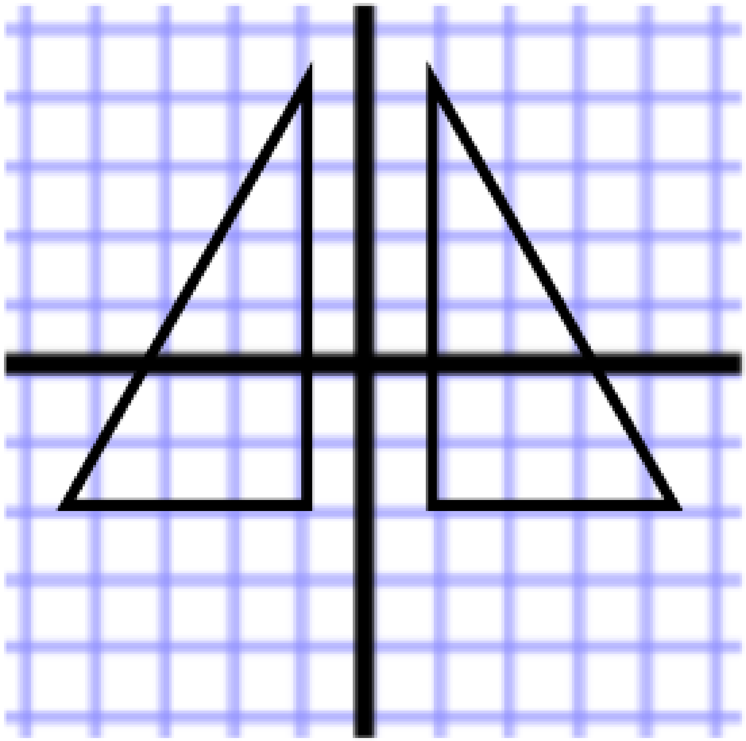
- Identify and state the Transformation being demonstrated be the following shapes.



Transformation:
Rotation

Identify Transformations by Image.

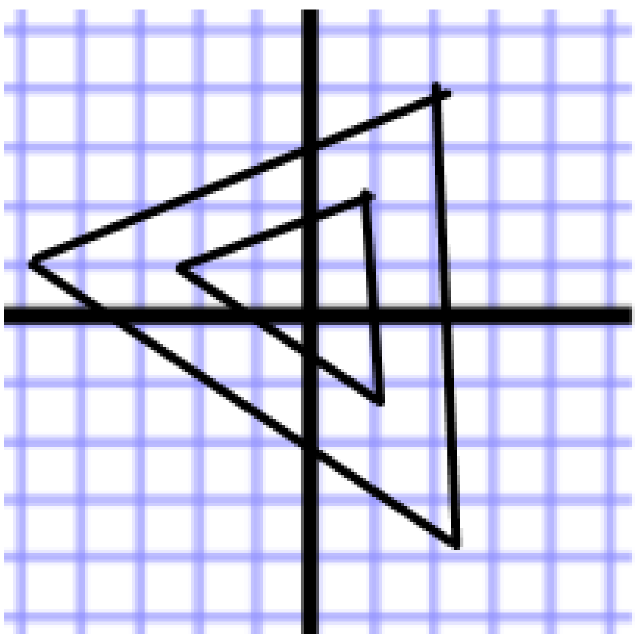
- Identify and state the Transformation being demonstrated be the following shapes.



Transformation:
Reflection

Identify Transformations by Image…and write in notation

- Identify and state the Transformation being demonstrated be the following shapes.



Transformation:
Dilation

Explain Transformations in Words

- For each Transformation, describe how each point should move.

1. T:(x, y) → (x + a, y + b):

   Every point moves a units (left if a is negative/right if a is positive) and b units (down if b is negative and up if b is positive.

2. R_m:

   Every point maps to its image, forming a line that is **perpendicular** to the line "m" (you would put the specific line for your problem in place of "m"), with both image and pre-image being **equidistant** (same distance) from the line "m".

Explain Transformations in Words

- For each Transformation, describe how each point should move.

3. $R_{O,90°}$:

Every point moves 90° clockwise about the origin.

4. H_O:

Every point moves 180° about the origin (in either direction).

Explain Transformations in Words

- For each Transformation, describe how each point should move.

5. $D_{O,k}$:

Every point moves to a point "k" times the distance from the center O.

Translation:
From Pre-Image to Image, and Vice versa

- You are Given a translation that moves the point $(1, -5)$ to the point $(4, -7)$
- Complete the translation that describes the movement above.

$T: (x, y) \rightarrow (x\_\_\_\_\_\_, y\_\_\_\_\_\_\_)$, $(x + 3, y - 2)$

- Use the above translation you found to answer the next problem:
- Find the image of (-4,-4)

Since you are finding the image, you simply apply the above notation to the point (-4,-4): $T: (-4, -4) \rightarrow (-4 + 3, -4 - 2)$

Image: (-1,-6)

Translation:
From Pre-Image to Image, and Vice versa

- Use the same translation $[T: (x, y) \rightarrow (x + 3, y - 2)]$ to solve the next problem:
- Find the Pre-Image of (6,0)

To find the Pre-Image, you do the opposite on each point from what is in the notation (You are going in reverse). On way to do this is to set the parts on the end of the notation equal to their respective parts from the given image (in this case, the point (6,0)):

$$x + 3 = 6 \qquad\qquad y - 2 = 0$$

$$x = -3 \qquad\qquad y = 2$$

Pre-Image: (-3,2)

Rules For the Transformations

- Reflections:
  - Reflect across y-axis: change the sign on the x-coordinate. $[R_y: (x, y) \rightarrow (-x, y)]$
  - Reflect across the x-axis: change the sign on the y-coordinate. $[R_x: (x, y) \rightarrow (x, -y)]$
  - Reflect across the line $y = x$: switch the x and y values. $[R_{y=x}: (x, y) \rightarrow (y, x)]$

- For other Reflections: It is best to use a graph to visualize the change.

Rules For the Transformations

- For Translations: Just go off of the notation, and apply the changes to each point.
- Rotations:
  - $R_{(O,90°)} = R_{(O,-270°)}: (x, y) \rightarrow (-y, x)$
  - $R_{(O,180°)}: (x, y) = H_O: (x, y) \rightarrow (-x, -y)$
  - $R_{(O,270°)} = R_{(O,-90°)}: (x, y) \rightarrow (y, -x)$
  - $R_{(O,360°)}: (x, y) \rightarrow (x, y)$
- Half-Turn: It is a rotation of 180° about the center (for this class, the center will be the origin). $[H_O = R_{O,180°}]$.

Practice Using the Rules

- Perform the identified transformation for the point (-2,3).

1. Reflect across $y = x$: (3,-2)
2. Half-Turn: (2,-3)
3. $T: (x, y) \rightarrow (x + 6, y - 2)$: (4,1)
4. $90°$ rotation: (-3,-2)

Practice Using the Rules

- Perform the identified transformation for the point (-2,3).

5. Dilation through the point (0,0) with a scale factor of 3: (-6,9)

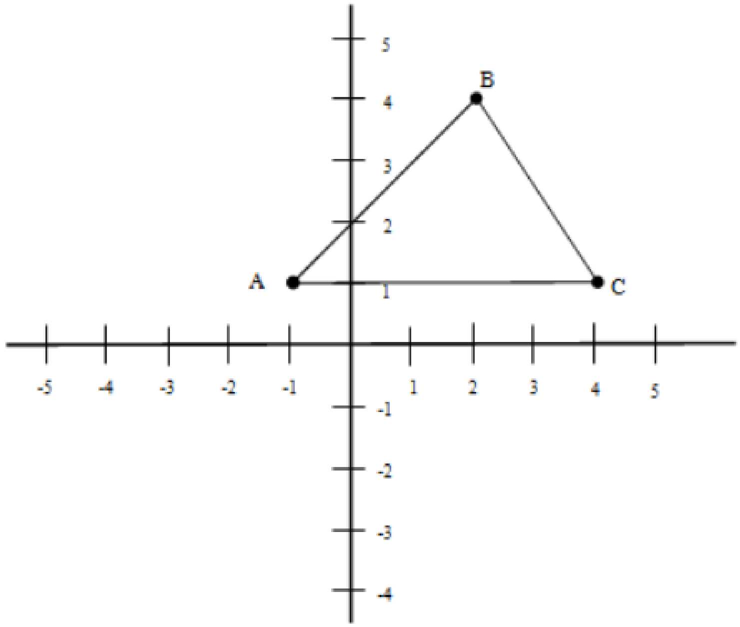
6. Dilation through the point (0,0) with a scale factor of -2: (4,-6)

7. Dilation through the point (0,0) with a scale factor of $\frac{1}{6}$: $\left(\frac{-1}{3}, \frac{1}{2}\right)$

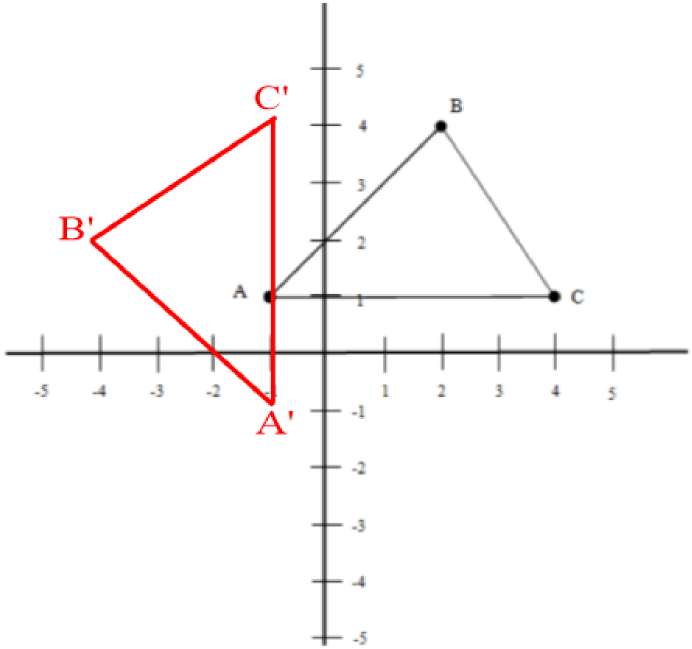
Using a given shape, graph its image under the given transformation.

- $R_{O,90°}$

Pre-Image



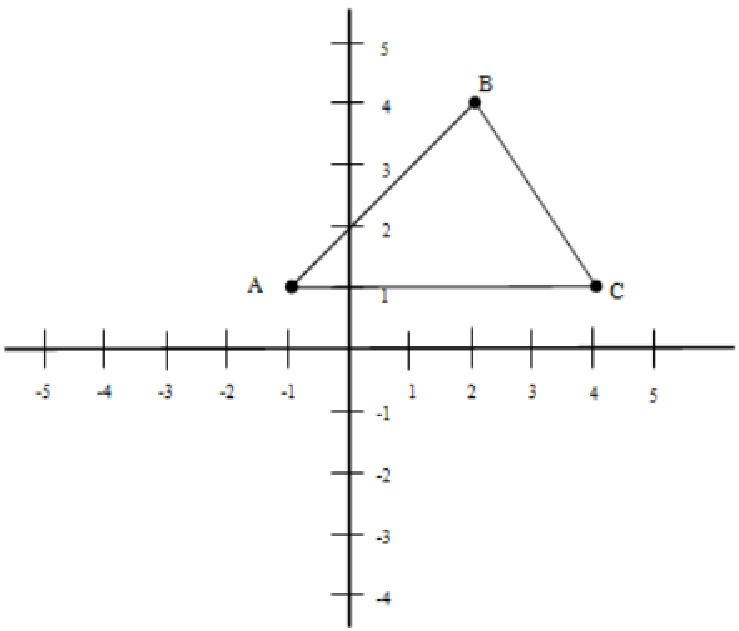
Image



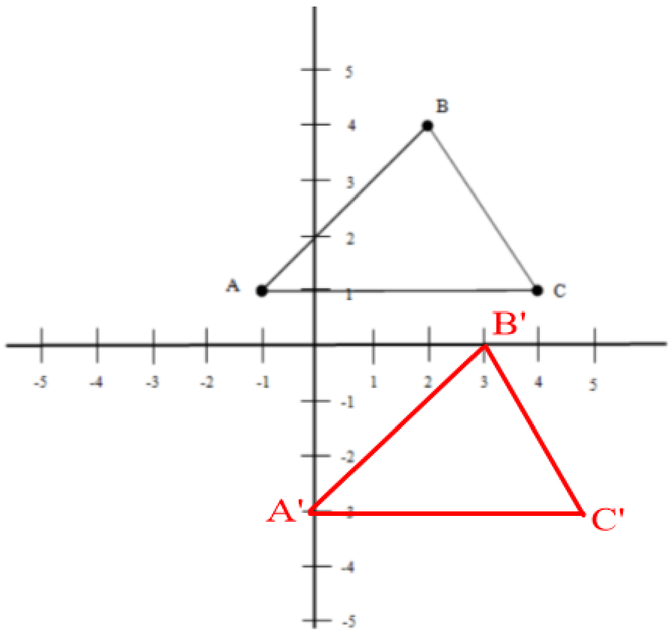
Using a given shape, graph its image under the given transformation.

- $T: (x, y) \rightarrow (x + 1, y - 4)$

Pre-Image



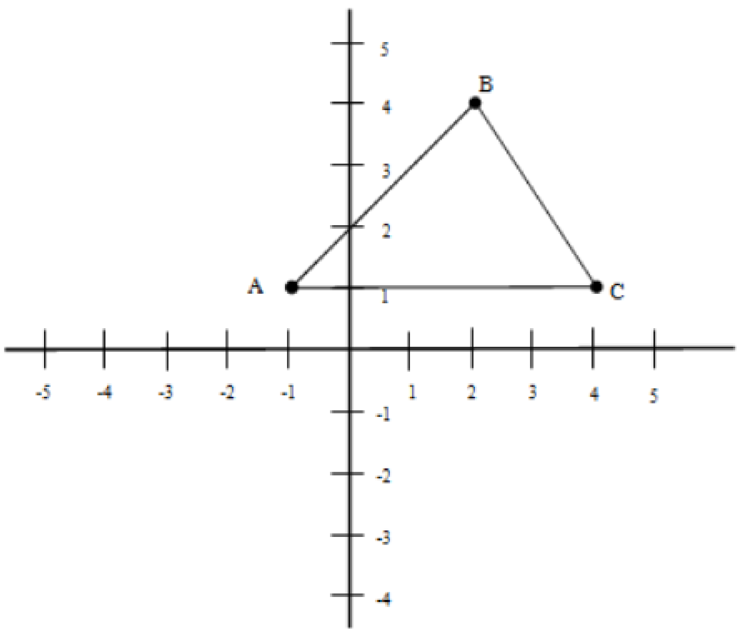
Image



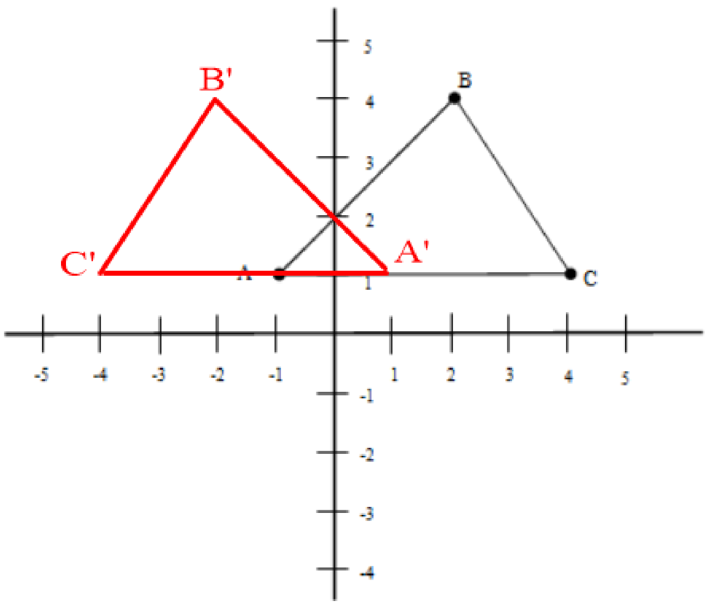
Using a given shape, graph its image under the given transformation.

- R_{y-axis}

Pre-Image



Image

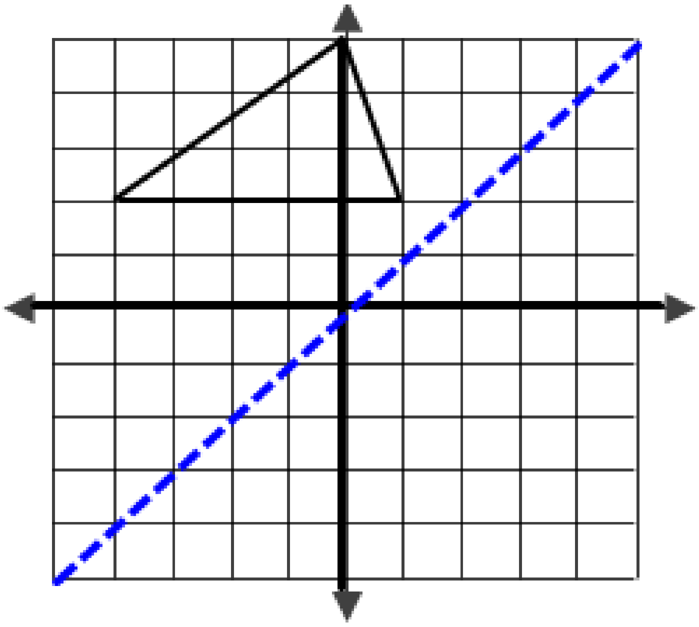


Using a given shape, graph its image under the given transformation.

- $R_{y=x}$

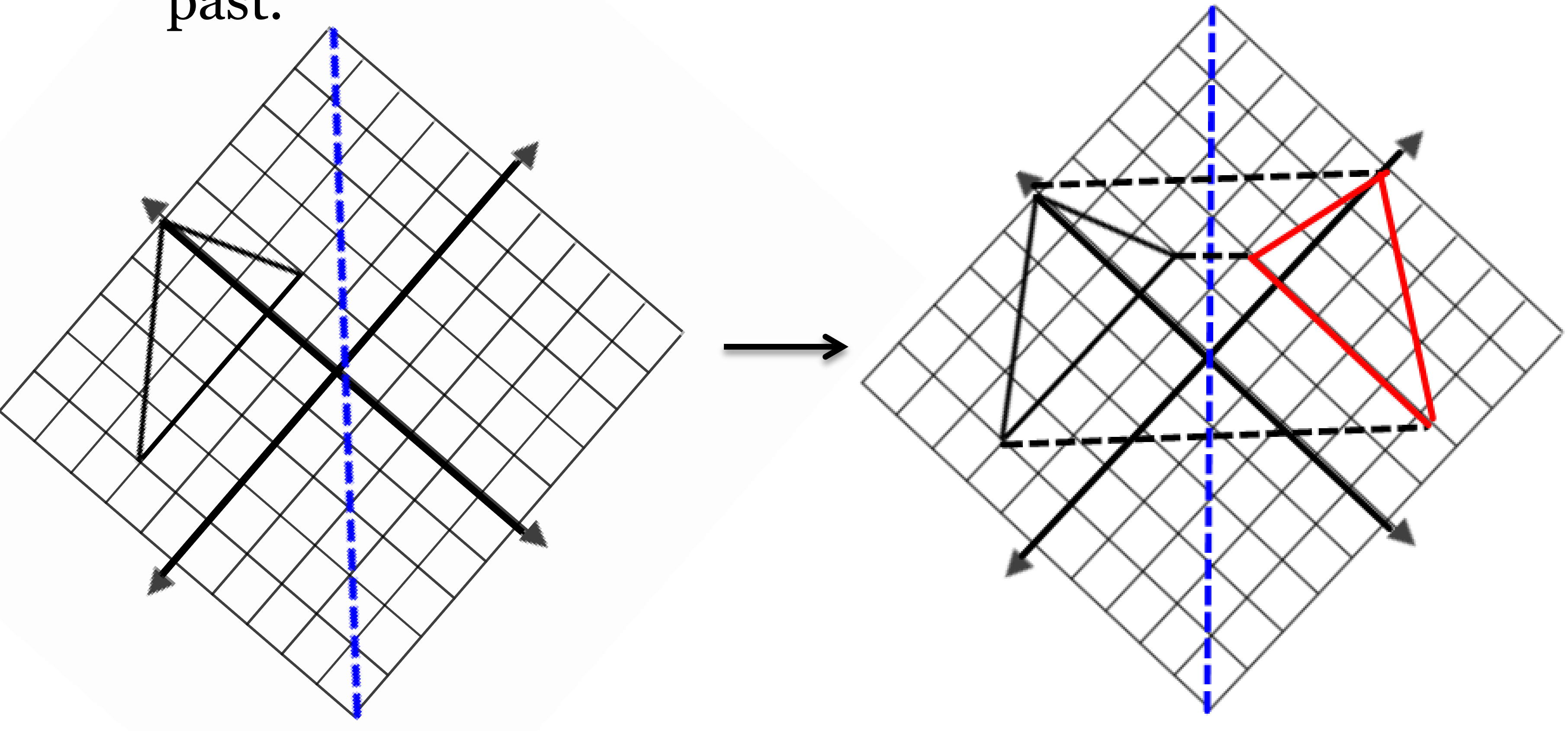
To start here is the pre-image, along with the line you are reflecting across ($y = x$)

Pre-Image



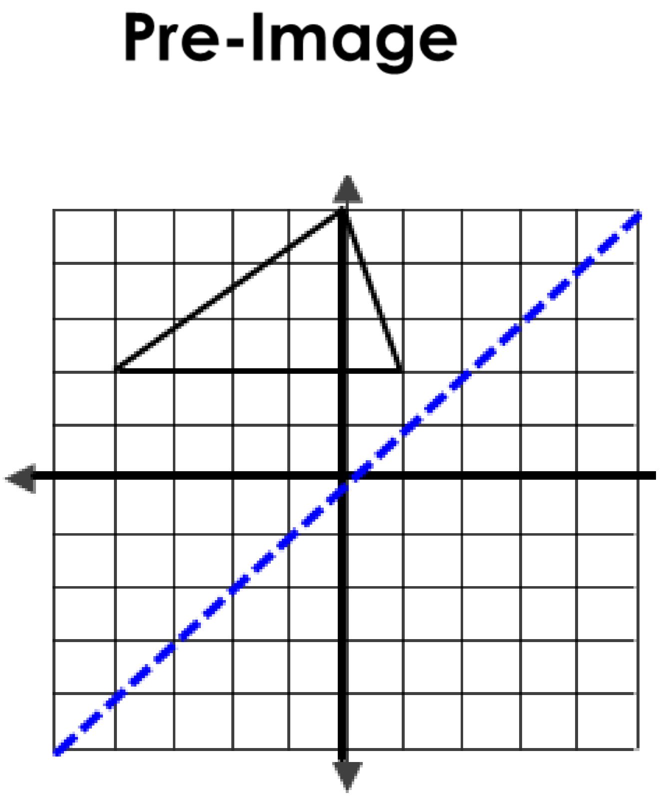
Reflecting Across $y = x$ continued

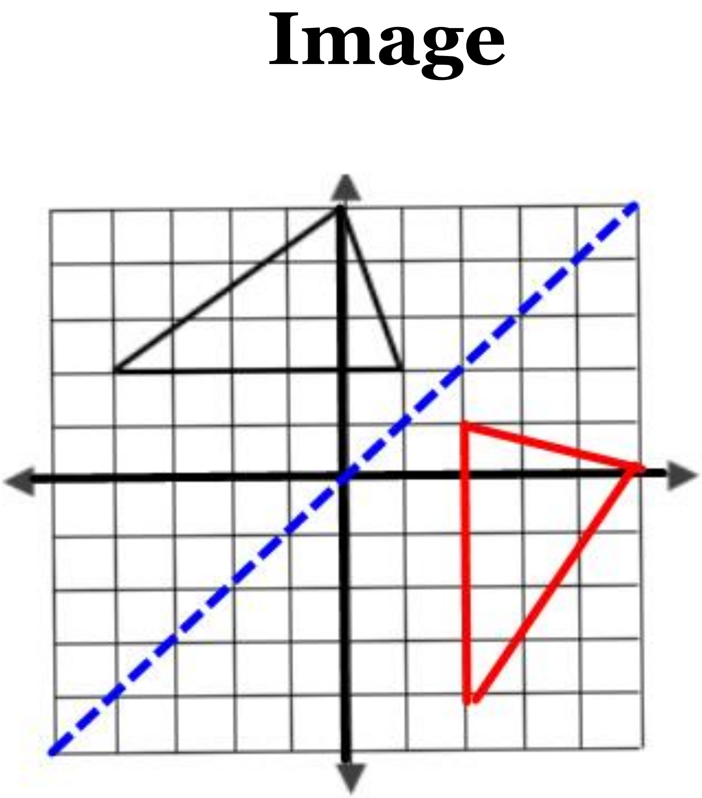
- Now, in order to accurately measure across $y = x$, I suggest you rotate the graph (i.e. the paper) as shown below, then to and across the line, as we have done in the past.



Reflecting Across $y = x$ continued

- Thus, without the dashes lines, our image looks like this (in red).

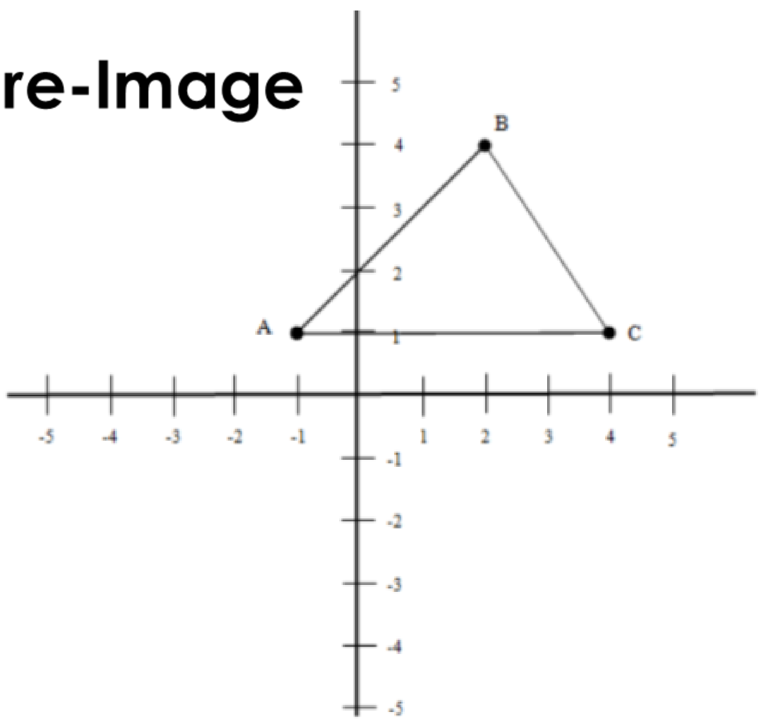




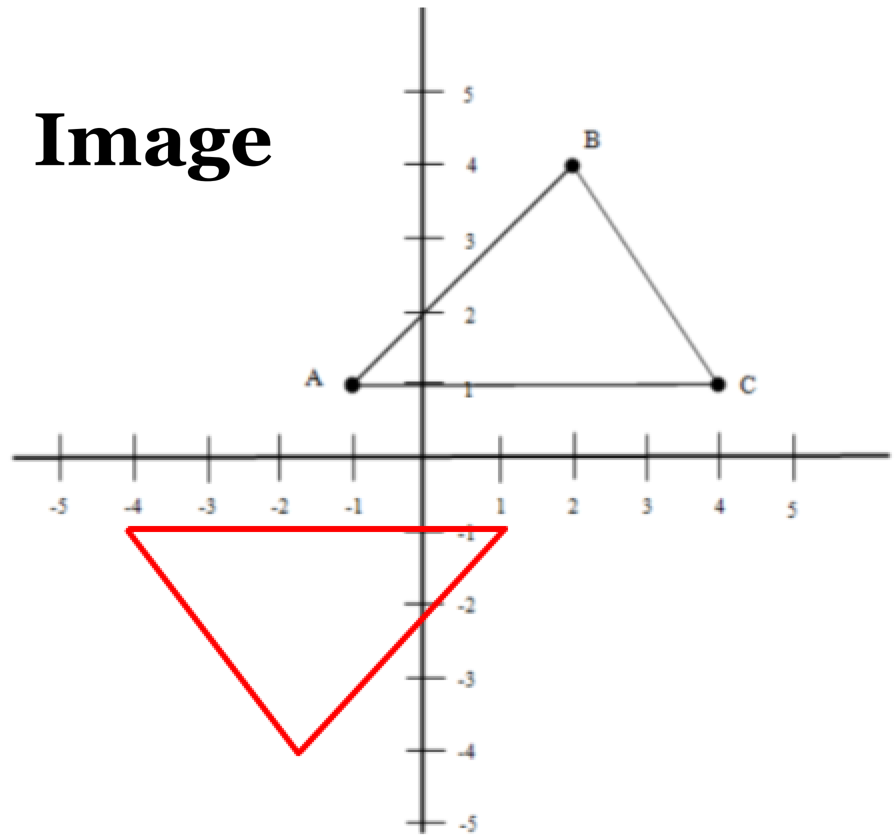
Using a given shape, graph its image under the given transformation.

- $D_{O,-1}$ When the center is the origin, you can easily find the image by multiplying the points on the pre-image by the scale factor.

Pre-Image



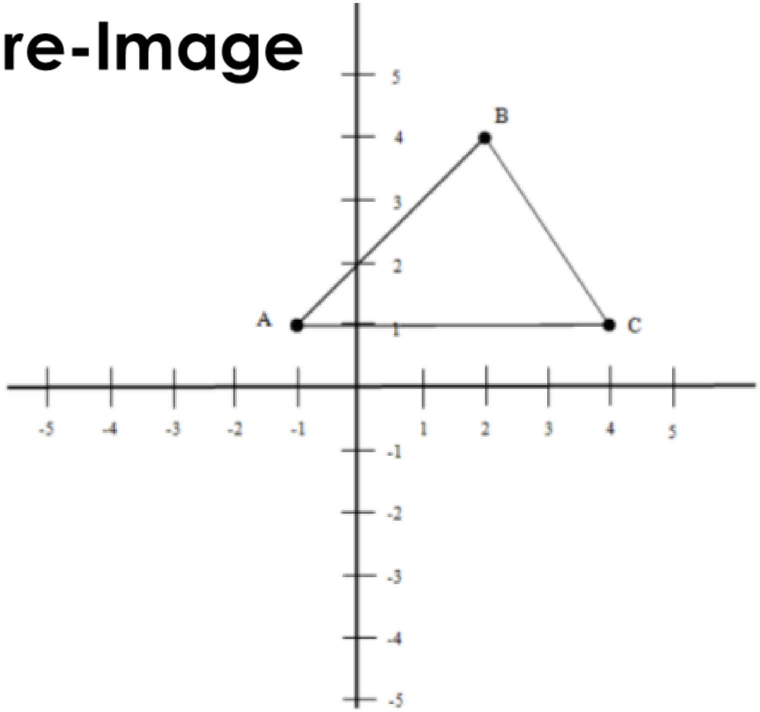
Image



Using a given shape, graph its image under the given transformation.

- $D_{A,\frac{1}{2}}$ When the center is not the origin, you must measure distances and multiply them by the scale factor to find the correct image (Remember that the center is its own image.)

Pre-Image



Image