Essential Question: How do we find an image under a composition of transformations?

Starter:
Describe how triangle PQR got all the way over there to triangle XYZ.

Find each of the following using the line segment with endpoints A(3,1), B(5,4):

a) Rotation of 90 degrees about the origin.
b) Reflection about the origin.
c) Reflection about the line y=x.
d) Translation by (-3, 5).

NOTATION ALERT!!!

A point reflection in the origin can be noted in several ways:

\[ r_{\text{origin}} \quad r_{(0,0)} \]

\[ r_{x=180^\circ} \quad r_{R_{180^\circ}} \]

All of these result in the following mapping:

\[ (x, y) \rightarrow (-x, -y) \]
Compositions

- **Composition**: When two or more transformations are combined to produce a single transformation.

- The **composition** of two or more isometries is an **isometry**.

- The order **DOES** matter!!!
Perform the following transformations on point \( A(4,-2) \)

Choose any 2 Compositions and find the image

<table>
<thead>
<tr>
<th>1. ( r_{x-axis} \circ r_{y-axis} )</th>
<th>2. ( r_{y-axis} \circ r_{x-axis} )</th>
</tr>
</thead>
<tbody>
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<td>3. ( R_{90^\circ} \circ R_{O} )</td>
<td>4. ( T_{-1,4} \circ r_{y=x} )</td>
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Make note of which ones you are doing.

Perform the following transformations on point \( A(4,-2) \)

Write a composition statement of the ones you did. Swap papers. Now you follow your friend’s composition & check their work. Did their point land where it was supposed to land according to the composition?

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Now, create a problem of your own!

Now, share your problem & see if someone can follow it. Give the coordinates of the triangle & the composition to your friend, then check their work.
Independent Practice

1. Graph \( \triangle ABC \) with vertices \( A(1, 1), B(1, 3) \) and \( C(2, 2) \) and \( \triangle A'B'C' \) its image under \( T_{0, 2} \) followed by \( r_{y-axis} \).

2. Graph point \( Q(2, 3) \) and its image under a rotation of 90 degrees about the point \((0, 2)\) followed by reflection in the x-axis.

3. Given \( \triangle MAP \) with vertices \( M(2, 2), A(3, 3) \) and \( P(4, 2) \), find its image under \( r_{x-axis} \) followed by \( r_{y-axis} \).

4. \( A'(-2, -1) \) is the image of \( A(2, 1) \). List four different transformations or composition of transformations that could map \( A \) to \( A' \).

Exit Ticket

On LHS, pg _____ respond to the following:

- Describe 3 things you've learned in the Transformations Unit.
- List 2 things you have a question about.
- Tell 1 thing you want me to know about...you, the unit, or our class.