TRANSFORMATIONS CHEAT-SHEET!

REFLECTIONS:

✓ Reflections are a flip.
✓ The flip is performed over the “line of reflection.” Lines of symmetry are examples of lines of reflection.
✓ Reflections are isometric, but do not preserve orientation.

Coordinate plane rules:

Over the x-axis: \((x, y) \rightarrow (x, -y)\)
Over the y-axis: \((x, y) \rightarrow (-x, y)\)
Over the line \(y = x\): \((x, y) \rightarrow (y, x)\)
Through the origin: \((x, y) \rightarrow (-x, -y)\)

TRANSLATIONS:

✓ Translations are a slide or shift.
✓ Translations can be achieved by performing two composite reflections over parallel lines.
✓ Translations are isometric, and preserve orientation.

Coordinate plane rules:

\((x, y) \rightarrow (x \pm h, y \pm k)\) where \(h\) and \(k\) are the horizontal and vertical shifts.

Note: If movement is left, then \(h\) is negative. If movement is down, then \(k\) is negative.

DILATIONS:

✓ Dilations are an enlargement / shrinking.
✓ Dilations multiply the distance from the point of projection (point of dilation) by the scale factor.
✓ Dilations are not isometric, and preserve orientation only if the scale factor is positive.

Coordinate plane rules:

From the origin dilated by a factor of “\(c\)”: \((x, y) \rightarrow (cx, cy)\)
From non-origin by factor of “\(c\)”: count slope from point to projection point, multiply by “\(c\),” count from projection point.

ROTATIONS:

✓ Rotations are a turn.
✓ Rotations can be achieved by performing two composite reflections over intersecting lines. The resulting rotation will be double the amount of the angle formed by the intersecting lines.
✓ Rotations are isometric, and do not preserve orientation unless the rotation is 360° or exhibit rotational symmetry back onto itself.
✓ Rotations of 180° are equivalent to a reflection through the origin.

Coordinate plane rules:

<table>
<thead>
<tr>
<th>Counter-clockwise:</th>
<th>Clockwise:</th>
<th>Rule:</th>
</tr>
</thead>
<tbody>
<tr>
<td>90°</td>
<td>270°</td>
<td>((x, y) \rightarrow (-y, x))</td>
</tr>
<tr>
<td>180°</td>
<td>180°</td>
<td>((x, y) \rightarrow (-x, -y))</td>
</tr>
<tr>
<td>270°</td>
<td>90°</td>
<td>((x, y) \rightarrow (y, -x))</td>
</tr>
</tbody>
</table>