Chapter 3 Review – Transformations

Name: ____________________

Review Section:

1. Given ΔABC has vertices at A(0, -4), B(2,-1), C(5,0).
   a. Find the vertices of the image of ΔABC under \( R_y = ax 
   \)
   \[ A'(0, -4) \quad B'(-2, -1) \quad C'(-5, 0) \]
   b. Find the image of the point B under \( T_{(270°,0)} \)
   \[ (x, y) \Rightarrow (y, -x) \]
   \[ (-1,-2) \]
   c. Find the coordinates of the image of ΔABC under the transformation defined by \( T_{(-3,2)} \)
   \( 3 \) left \( 2 \) up
   \[ (0,4) \quad A'(-3, -2) \quad B'(-1, 1) \quad C'(2, 2) \]
   \[ (0,-3), (-4,2) \]

2. Given ΔBAD with B(-4,1), A(3,2), and D(2,-2) use the following transformation
   \( (R_y = -1 \circ R_{y=x}) \)
   \[ (x, y) \Rightarrow (y, -x) \]
   \[ B'(-1, -3) \quad A'(2, -3) \quad D'(-2, -2) \]
   B'(-1, -3) \quad A'(2, -3) \quad D'(-2, -2)
3. Given $\triangle MBL$, $M(-5,-3)$, $L(-1,-4)$, and $B(1,3)$ ($T_{(0,2)} \circ R_{x-axis}$),

$m'(-5,5) \quad l'(-1,4) \quad b'(1,-3)

m''(-5,6) \quad l''(-1,7) \quad b''(1,0)

4. Given quadrilateral $ESP$ with $E(-4,-3)$, $S(-2,2)$, $P(3,1)$, and $N(5,-2)$, ($R_{x=1} \circ T_{(100^0, 0)}$),

$e'(4,3) \quad s'(-2,-2) \quad p'(-3,-1) \quad n'(-5,2)

e''(2,3) \quad s''(0,-2) \quad p''(5,-1) \quad n''(7,2)

5. Refer to the coordinate grid below. The scale on each axis is one.

a. Describe and write a rule for a composite transformation that will map $\triangle ABC$ onto $\triangle DEF$.

b. Which point of $\triangle ABC$ is the image of point $B$ under your composite transformation from Part b?

$E$ \quad $(-4,0)$

$(T_{(0,2)} \circ R_{x=1})(\triangle ABC)$
6. Find the coordinates of the vertices of each image.

a. \( R_{y=x}(QQRST) \) \((x,y)\rightarrow(y,x)\)
   \( Q'(-1,1) \)
   \( R'(-2,3) \)
   \( S'(-1,0) \)
   \( T'(-2,-2) \)

b. \( R_{(270^\circ,0)}(QQRST) \) \((x,y)\rightarrow(y,-x)\)
   \( Q'(-1,1) \)
   \( R'(-2,3) \)
   \( S'(-1,0) \)
   \( T'(-2,-2) \)

(c. \( T_{(-3,-1)}(QQRST) \)
   \((x,y)\rightarrow(x-3,y-1)\)
   \( Q'(-2,2) \)
   \( R'(1,5) \)
   \( S'(-3,-2) \)
   \( T'(-5,1) \)

d. \( (R_{y=x} \circ T_{(-2,-1)})(QQRST) \)
   \( Q'(-2,2) \)
   \( R'(1,5) \)
   \( S'(-3,-2) \)
   \( T'(-5,1) \)

7. A reflection over \( x = -4 \) followed by a reflection over \( x = 6 \) result in a translation in the direction of \( \text{UP LEFT RIGHT} \) a total distance \( 20 \).

8. A reflection over \( y = 6 \) followed by a reflection over \( y = -8 \) result in a translation in the direction of \( \text{UP DOWN LEFT RIGHT} \) a total distance of \( 28 \).

9. If you wanted to translate a shape to the right 20 units, you could reflect over \( x = -5 \) and then \( x = 5 \).

10. If you want to translate a shape down 18 units, you could reflect over \( y = -5 \) and then \( y = -13 \).

11. If you want to translate a shape right 24 units, you could reflect over \( x = -5 \) and then \( x = 7 \).

12. Suppose \( m \) is the line \( x = 6 \) and \( n \) is the line \( x = -2 \). Write the following composition as one translation.

\[ R_m \circ R_n = T_{\langle \vec{u},0 \rangle} \]
13. Find a translation that has the same effect as the composition of translations below.

\[ T_{(-3,6)}(x, y) \text{ followed by } T_{(-7,-4)}(x, y) \]

\[ T\left(\begin{array}{c} -3+6 \\ 6+(-4) \end{array}\right) \]

\[ T\left(\begin{array}{c} 2 \\ 4 \end{array}\right) \]

\[ T\left(\begin{array}{c} -10 \\ 2 \end{array}\right) \]

14. Point \( P(7, -4) \) is the image of point \( P(5, -8) \) under a translation. What is the image of \( (0, -6) \) under the same translation?

\[ T_{(2, 4)} \]

\[ \left(\begin{array}{c} 2 \\ -4 \end{array}\right) \]

15. The rule \( T_{(-4,0)} \) is used for point \( (2, -7) \). Which quadrant is the translated point in the coordinate system?

\[ \begin{array}{c|c|c|c}
\text{III} & \text{II} & \text{I} & \text{IV} \\
\hline
\text{II} & \text{I} & \text{IV} & \text{III} \\
\hline
\end{array} \]

\[ \left(\begin{array}{c} -2 \\ -1 \end{array}\right) \]

16. In the isosceles trapezoid below, \( AB = BC = CD = 7 \) centimeters.

a. Identify all, if any reflection symmetries. If there are reflections, draw or describe the line(s) of reflection. Describe any angle(s) of rotation for the figure.

\[ \text{Connect midpt of } \overline{BC} \text{ and } \overline{DA} \]

17. Identify any reflection or rotational symmetry. On either, draw the line(s) of symmetry and describe the angle(s) of rotation.

\[ 6 \text{ lines of symmetry} \]

\[ 60^\circ, 120^\circ, 180^\circ, 240^\circ, 300^\circ \]

18. Which words have horizontal reflection symmetry?

A) COOKBOOK  B) BOB  C) ROB  D) SEEK
19. Give the coordinates of the image of the point (-6, 3) under the given transformation.

<table>
<thead>
<tr>
<th>Transformation</th>
<th>New Coordinates</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T(90°, 0)$</td>
<td>$(-3, -6)$</td>
</tr>
<tr>
<td>$R_{y=-x}$</td>
<td>$(-6, -3)$</td>
</tr>
<tr>
<td>$R_{y=0} \circ R_{y=4}$</td>
<td>$(-3, -6)$</td>
</tr>
<tr>
<td>$T(180°, 0) \circ T(270°, 0)$</td>
<td>$(-6, -3)$</td>
</tr>
<tr>
<td>$T_{(8,-5)}$</td>
<td>$(2, -2)$</td>
</tr>
<tr>
<td>$(R_{y=x} \circ T_{(-2,4)}$</td>
<td>$(-5, 7)$</td>
</tr>
</tbody>
</table>

What single rotation could you do?

$T_{(8,-5)}$ 

$R_{y=x} \circ T_{(-2,4)}$

20. Use the diagram to describe the transformation for each of the following.

a. Pre-image: Shape I
   Image: Shape II
   $R_{(270°, o)}$

b. Pre-image: Shape III
   Image: Shape II
   $R_{y=-x}$

c. Pre-image: Shape IV
   Image: Shape II
   $R_{(270°, o)}$

d. Pre-image: Shape I
   Image: Shape IV
   $R_{(190°, o)}$

e. Preimage: Shape I
   Image: Shape III
   $R_{y=-x, -3}$

$(-5, 3) \Rightarrow (-5, -3)$

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