G.G.54: Compositions of Transformations 1: Define, investigate, justify, and apply isometries in the plane (rotations, reflections, translations, glide reflections)

1 The point (3, –2) is rotated 90° about the origin and then dilated by a scale factor of 4. What are the coordinates of the resulting image?
   1) (–12, 8)
   2) (12, –8)
   3) (8, 12)
   4) (–8, –12)

2 What is the image of point A(4, 2) after the composition of transformations defined by \( R_{90°} \circ r_{y=x} \)?
   1) (–4, 2)
   2) (4, –2)
   3) (–4, –2)
   4) (2, –4)

3 What is the image of point (1, 1) under \( r_{x-axis} \circ R_{90°} \)?
   1) (1, 1)
   2) (1, –1)
   3) (–1, 1)
   4) (–1, –1)

4 What are the coordinates of point \( A' \), the image of point \( A(-4, 1) \) after the composite transformation \( R_{90°} \circ r_{y=x} \) where the origin is the center of rotation?
   1) (–1, –4)
   2) (–4, –1)
   3) (1, 4)
   4) (4, 1)

5 The coordinates of \( \Delta JRB \) are \( J(1, –2) \), \( R(–3, 6) \), and \( B(4, 5) \). What are the coordinates of the vertices of its image after the transformation \( T_{2,1} \circ r_{y-axis} \)?
   1) (3, 1), (–1, –7), (6, –6)
   2) (3, –3), (–1, 5), (6, 4)
   3) (1, –3), (5, 5), (–2, 4)
   4) (–1, –2), (3, 6), (–4, 5)

6 If the coordinates of point \( P \) are (2, –3), then \( (R_{90°} \circ R_{180°})(P) \) is
   1) (–2, 3)
   2) (–2, –3)
   3) (3, –2)
   4) (–3, –2)

7 Find the coordinates of \( r_{y-axis} \circ r_{y=x}(A) \) if the coordinates of \( A \) are (6, 1).

8 Find the coordinates of the image of (2, 4) under the transformation \( r_{y-axis} \circ T_{3, 5} \).

9 What is the image that results from this composition of transformations?
   \( r_{x-axis} \circ R_{90°}(–3, 0) \)

10 Find the coordinates of point \( N(–1, 3) \) under the composite \( r_{y-axis} \circ R_{90°} \).

11 If the coordinates of \( A \) are (2, –3), what are the coordinates of \( A' \), the image of \( A \) after \( R_{90°} \circ r_{y-axis}(A) \)?

12 If the coordinates of \( B \) are (1, –5), what are the coordinates of \( B' \), the image of \( B \) after \( R_{90°} \circ r_{x-axis} \)?

13 Find the image of point \( A(3, –2) \) under the composition of translations \( T_{2,1} \circ T_{6,4} \).

14 Which transformation is equivalent to the composite line reflections \( r_{y-axis} \circ r_{y=x}(AB) \)?
   1) a rotation
   2) a dilation
   3) a translation
   4) a glide reflection

15 Write a single translation that is equivalent to \( T_{3, 1} \) followed by \( T_{5, 5} \).
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Answer Section

1 ANS: 3
   \((3, -2) \rightarrow (2, 3) \rightarrow (8, 12)\)
   REF: 011126ge

2 ANS: 1
   REF: 011023ge

3 ANS: 4
   REF: 080413b

4 ANS: 4
   REF: 010618b

5 ANS: 3
   REF: 080715b

6 ANS: 4
   REF: 010028siii

7 ANS:
   \((-1, 6)\)
   REF: 088611siii

8 ANS:
   \((-5, -1)\)
   REF: 089340siii

9 ANS:
   \((0, 3)\)
   REF: 069514siii

10 ANS:
   \((3, -1)\)
   REF: 019613siii

11 ANS:
   \((3, -2)\)
   REF: 089714siii

12 ANS:
   \((-5, 1)\)
   REF: 010112siii

13 ANS:
   \((-1, -5)\)
   REF: 060307siii

14 ANS: 1
   REF: 018634siii

15 ANS:
   \(T_{-2, 4}\)
   REF: 019816siii