G.CO.A.5: Compositions of Transformations 4

1 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) $(-3,-2)$

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

3 Write a single translation that is equivalent to $T_{3,-1}$ followed by $T_{-5,5}$.

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

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

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

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

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

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

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

11 Given $\triangle ABC$ with points $A(4,3)$, $B(4,-2)$, and $C(2,3)$. On the grid below, sketch $\triangle ABC$. On the same set of axes, graph and state the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$ after a reflection in the line $y=x$. On the same set of axes, graph and state the coordinates of $\triangle A''B''C''$, the image of $\triangle A'B'C'$ after the translation $T_{-4,3}$.
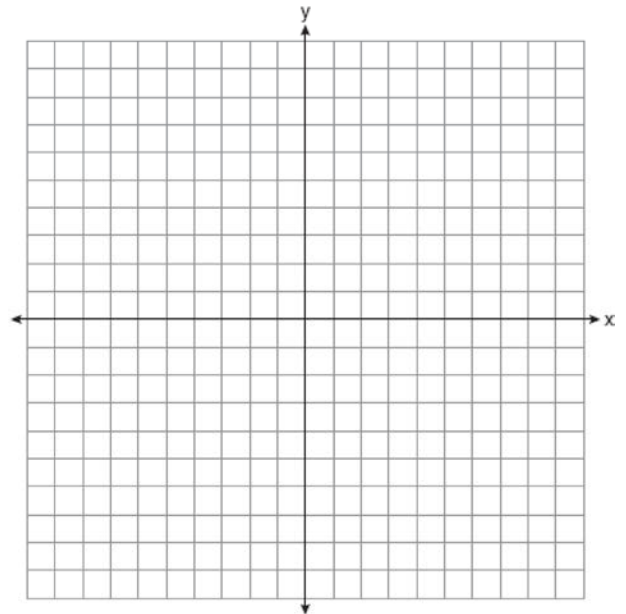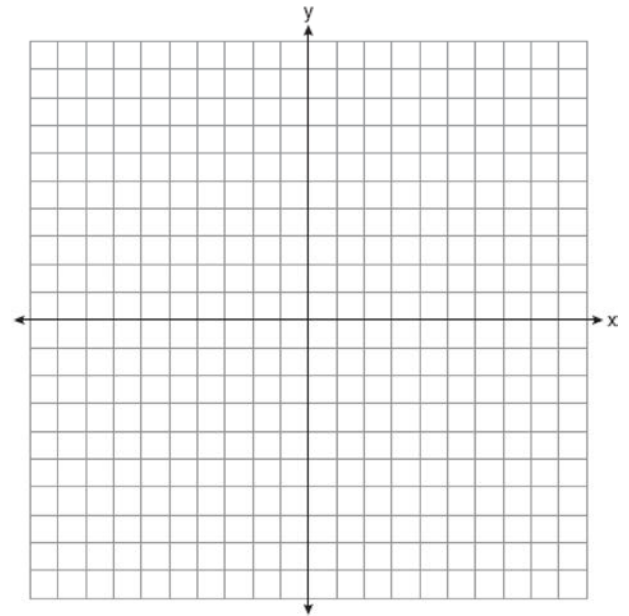
12 Triangle ABC has coordinates $A(-1,2)$, $B(6,2)$, and $C(3,4)$.
    a On the grid below, draw and label $\triangle ABC$.
    b Graph and state the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$ after the composition $R_{90°} \circ r_{x-\text{axis}}$.
   *c* Write a transformation equivalent to $R_{90°} \circ r_{x-\text{axis}}$.
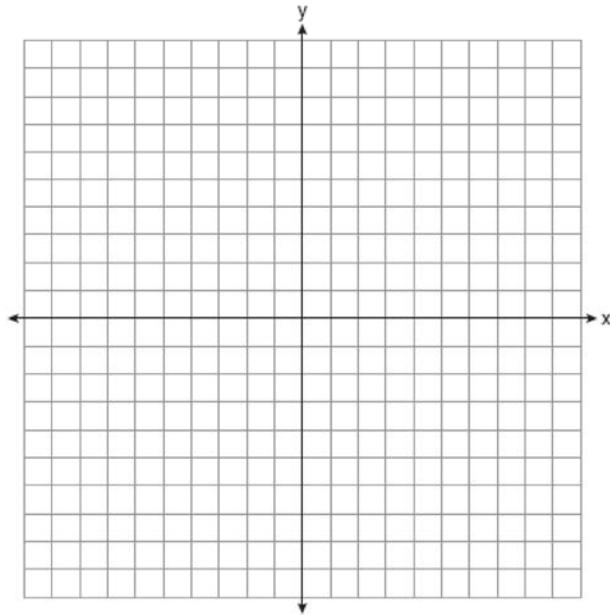
13 On the graph below, draw and label $\triangle PQR$, whose vertices are $P(3,5)$, $Q(9,5)$, and $R(7,7)$. On the same set of axes, graph and state the coordinates of
    a $\triangle P'Q'R'$, the image of $\triangle PQR$ after $R_{90°}$.
    b $\triangle P''Q''R''$, the image of $\triangle P'Q'R'$ after $r_{x-\text{axis}}$.
    c $\triangle P'''Q'''R'''$, the image of $\triangle P''Q''R''$ after $r_{y-\text{axis}}$.

Based upon these graphs, write a single transformation that shows the composition $r_{y-\text{axis}} \circ r_{x-\text{axis}} \circ R_{90°}$.

14 Given triangle ABC with coordinates $A(-1,-2)$, $B(0,-4)$, and $C(3,-1)$.
  a On the graph below, draw and label $\triangle ABC$.
  b Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after translation $T_{4,-3}$.
  c Graph and label $\triangle A''B''C''$, the image of $\triangle A'B'C'$ after a reflection in the origin.
  d Graph and label $\triangle A'''B'''C'''$, the image of $\triangle A''B''C''$ after a reflection in the line $y = -x$.
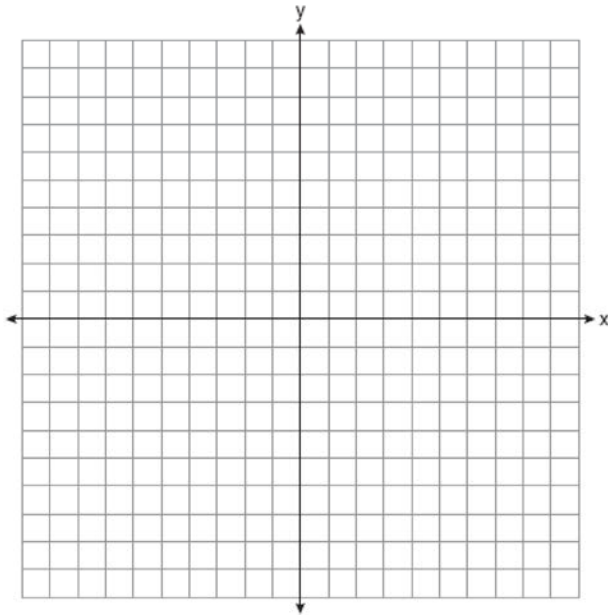
15 Given: $\triangle ABC$ with coordinates $A(1,2)$, $B(0,5)$, and $C(5,4)$.
  a On the graph below, draw and label $\triangle ABC$.
  b Graph and state the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$ after the translation $T_{-6,3}$.
  c Graph and state the coordinates of $\triangle A''B''C''$, the image of $\triangle A'B'C'$ after a reflection in the x-axis.
  d Graph and state the coordinates of $\triangle A'''B'''C'''$, the image of $\triangle A''B''C''$ after a reflection in the origin.

3
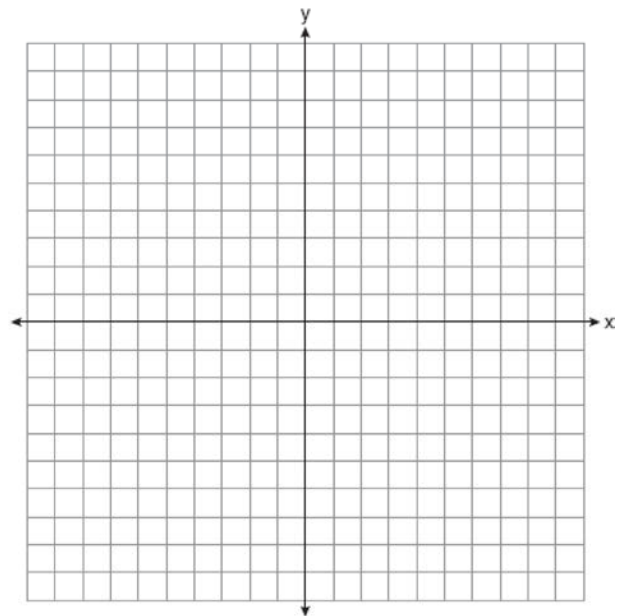
16 Triangle ABC has coordinates $A(-3,-7)$, $B(-3,-3)$, and $C(0,-3)$.
   a On the graph below, graph and label $\triangle ABC$.
   b Graph and state the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$ after a point reflection in the origin.
   c Graph and state the coordinates of $\triangle A''B''C''$, the image of $\triangle A'B'C'$ reflected in the line $y = 2$.
   d Graph and state the coordinates of $\triangle A'''B'''C'''$, the image of $\triangle A''B''C''$ after translation $T_{(-8,2)}$.
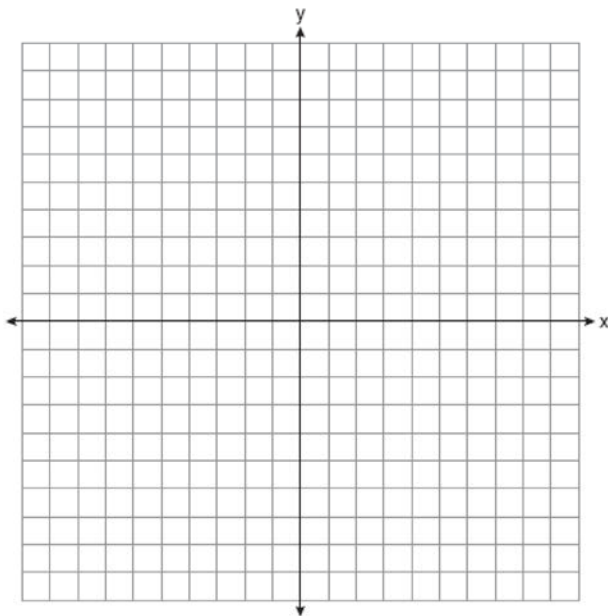
17 Triangle ABC has coordinates $A(-1,3)$, $B(3,7)$, and $C(0,6)$.
   a On the graph below, draw and label $\triangle ABC$.
   b Graph and state the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$ after a reflection in the line $y = x$.
   c Graph and state the coordinates of $\triangle A''B''C''$, the image of $\triangle A'B'C'$ following $r_{y-\text{axis}}(\triangle A'B'C')$.
   d Graph and state the coordinates of $\triangle A'''B'''C'''$, the image of $\triangle A''B''C''$ after a translation that maps $P(0,0)$ onto $P(0,-5)$.
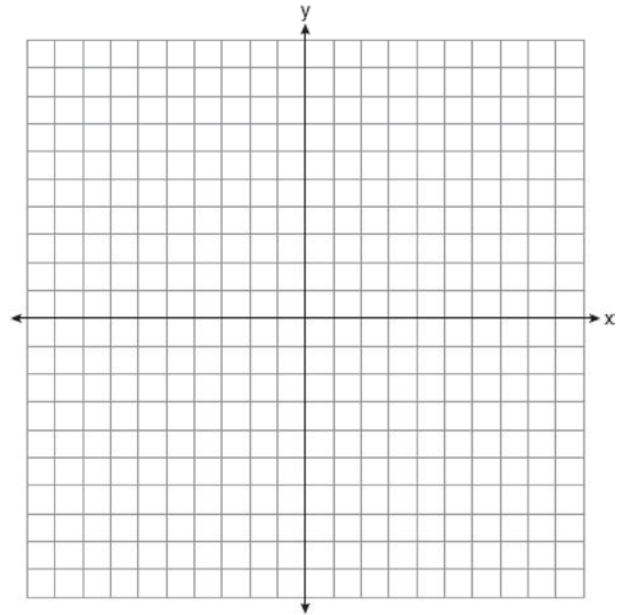
G.CO.A.5: Compositions of Transformations 4
Answer Section

1 ANS: 4   REF: 010028siii
2 ANS: 1   REF: 018634siii
3 ANS:
   $T_{-2,4}$

   REF: 019816siii
4 ANS:
   $(-1,6)$

   REF: 088611siii
5 ANS:
   $(-5,-1)$

   REF: 089340siii
6 ANS:
   $(0,3)$

   REF: 069514siii
7 ANS:
   $(3,-1)$

   REF: 019613siii
8 ANS:
   $(3,-2)$

   REF: 089714siii
9 ANS:
   $(-5,1)$

   REF: 010112siii
10 ANS:
   $(-1,-5)$

   REF: 060307siii
11 ANS:
   $A'(3,4), B'(-2,4), C'(3,2)$; $A''(-1,7), B''(-6,7), C''(-1,5)$

   REF: 080141siii
12 ANS:
   $A'(2,-1), B'(2,6), C'(4,3)$; $r_{y=x}$

   REF: 019541siii

13 ANS:
$P'(-5,3), Q'(-5,9), R'(-7,7)$; $P''(-5,-3), Q''(-5,-9), R''(-7,-7)$; $P'''(5,-3), Q'''(5,-9), R'''(7,-7)$; R_{270}

REF: 089938siii

14 ANS:
$A'(3,-5), B'(4,-7), C'(7,-4)$; $A''(1,2), B''(0,4), C''(-3,1)$; $A'''(2,1), B'''(4,0), C'''(1,-3)$

REF: 018541siii

15 ANS:
$A'(-5,5), B'(-6,8), C'(-1,7)$; $A''(-5,-5), B''(-6,-8), C''(-1,-7)$; $A'''(5,5), B'''(6,8), C'''(1,7)$

REF: 018739siii

16 ANS:
$A'(3,7), B'(3,3), C'(0,3)$; $A''(3,-3), B''(3,1), C''(0,1)$; $A'''(-5,-1), B'''(-5,3), C'''(-8,3)$

REF: 088741siii

17 ANS:
$A'(3,-1), B'(7,3), C'(6,0)$; $A''(-3,-1), B''(-7,3), C''(-6,0)$; $A'''(-3,-6), B'''(-7,-2), C'''(-6,-5)$

REF: 018936siii