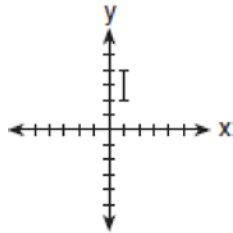


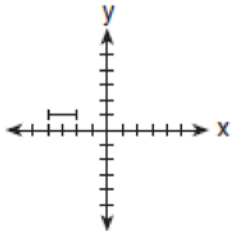
**G.CO.A.5: Compositions of Transformations 3**

1 The accompanying graph represents the figure **I**.

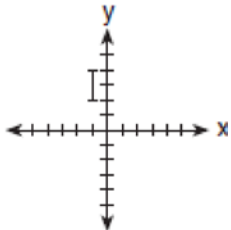


Which graph represents **I** after a transformation defined by  $r_{y=x} \circ R_{90^\circ}$ ?

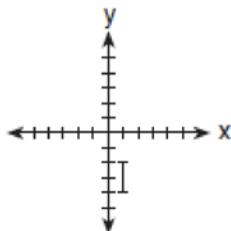
1)



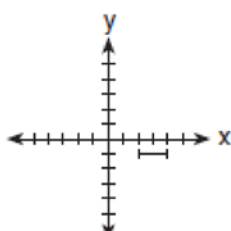
2)



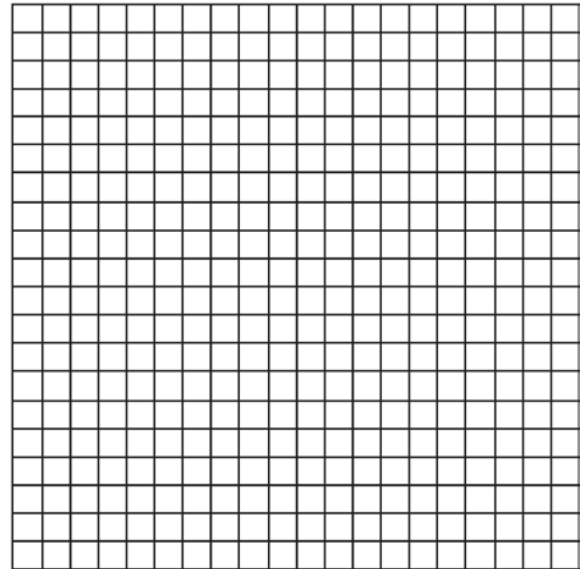
3)



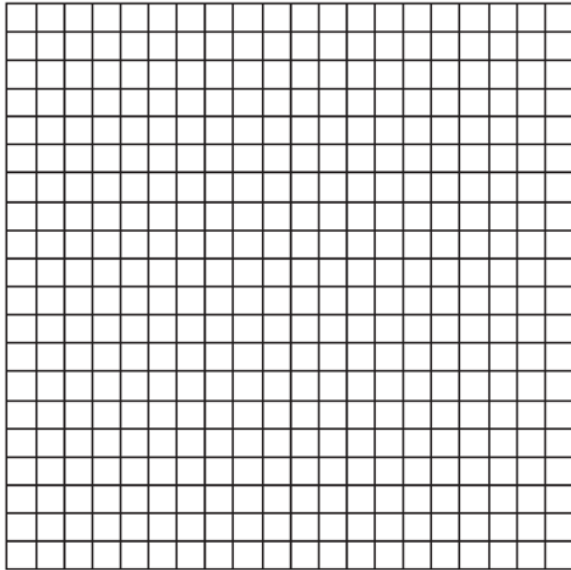
4)



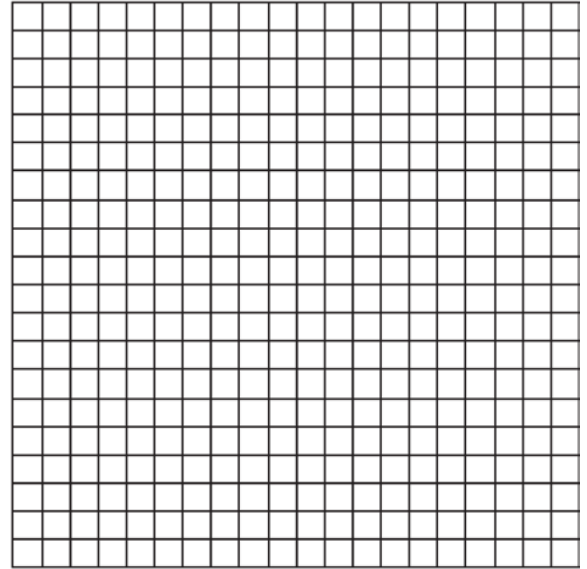
2 Given point  $A(-2,3)$ . State the coordinates of the image of  $A$  under the composition  $T_{(-3,-4)} \circ r_{x\text{-axis}}$ .  
 [The use of the accompanying grid is optional.]



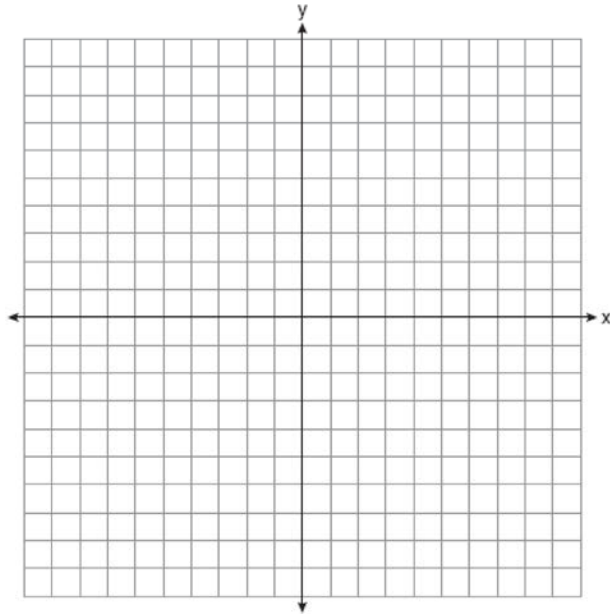
- 3 On the accompanying grid, graph and label  $\overline{AB}$ , where  $A$  is  $(0,5)$  and  $B$  is  $(2,0)$ . Under the transformation  $r_{x\text{-axis}} \circ r_{y\text{-axis}}(\overline{AB})$ ,  $A$  maps to  $A''$ , and  $B$  maps to  $B''$ . Graph and label  $\overline{A''B''}$ . What single transformation would map  $\overline{AB}$  to  $\overline{A''B''}$ ?



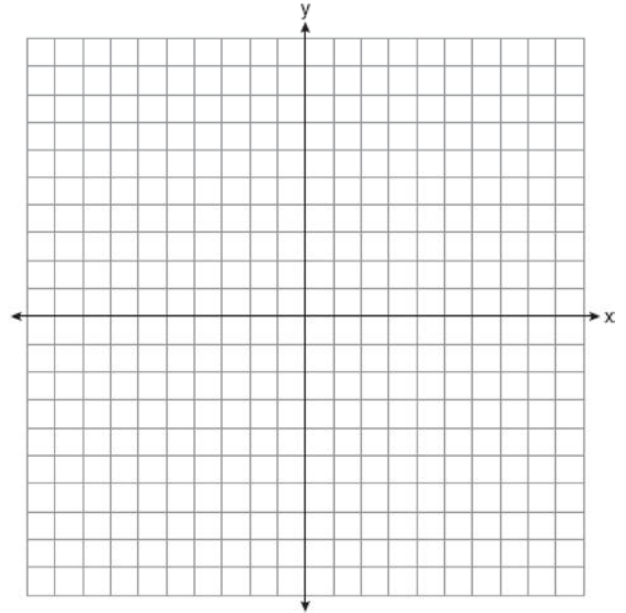
- 4 On the accompanying grid, graph and label  $\triangle ABC$  with vertices  $A(3,1)$ ,  $B(0,4)$ , and  $C(-5,3)$ . On the same grid, graph and label  $\triangle A''B''C''$ , the image of  $\triangle ABC$  after the transformation  $r_{x\text{-axis}} \circ r_{y=x}$ .



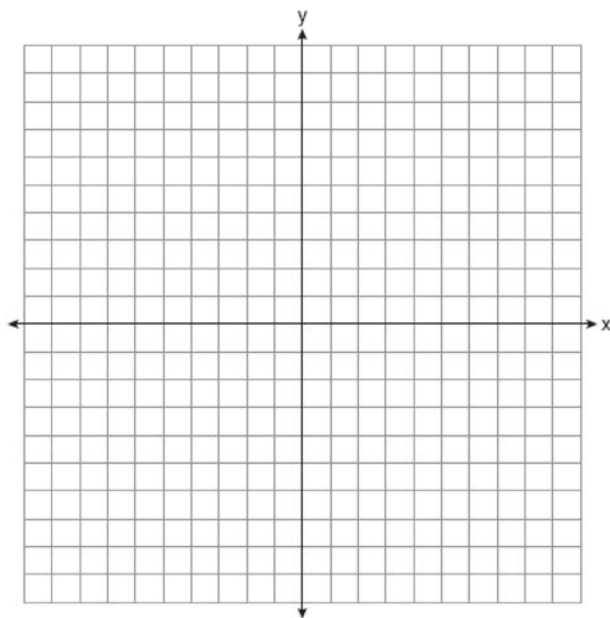
- 5 Given  $\triangle ABC$  with points  $A(4,3)$ ,  $B(4,-2)$ , and  $C(2,3)$ . On the grid below, sketch  $\triangle ABC$ . On the same set of axes, graph and state the coordinates of  $\triangle A'B'C'$ , the image of  $\triangle ABC$  after a reflection in the line  $y = x$ . On the same set of axes, graph and state the coordinates of  $\triangle A''B''C''$ , the image of  $\triangle A'B'C'$  after the translation  $T_{-4,3}$ .



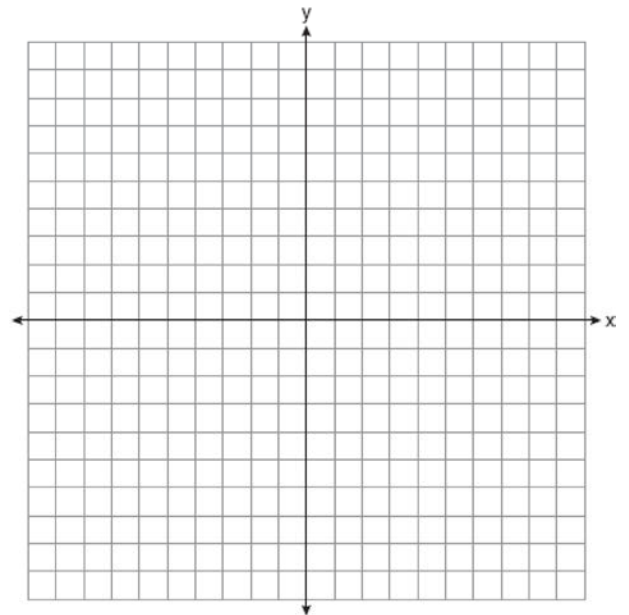
- 6 Triangle  $ABC$  has coordinates  $A(-1,2)$ ,  $B(6,2)$ , and  $C(3,4)$ .
- On the grid below, draw and label  $\triangle ABC$ .
  - Graph and state the coordinates of  $\triangle A'B'C'$ , the image of  $\triangle ABC$  after the composition  $R_{90^\circ} \circ r_{x\text{-axis}}$ .
  - Write a transformation equivalent to  $R_{90^\circ} \circ r_{x\text{-axis}}$ .



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



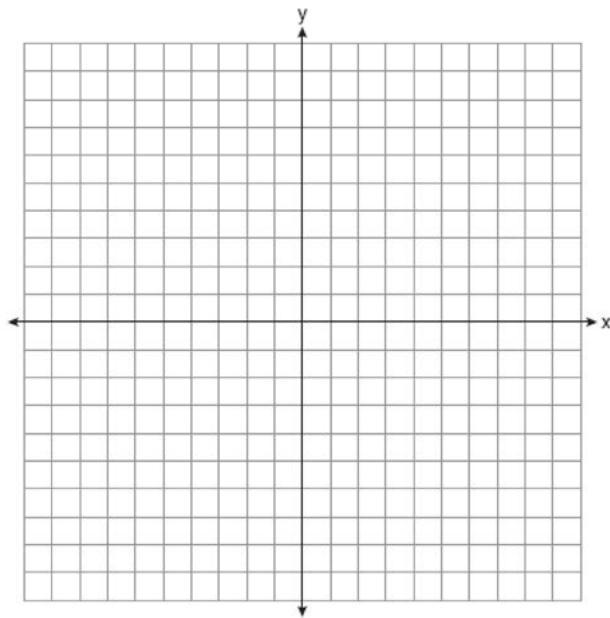
- 8 Triangle  $ABC$  has coordinates  $A(-1,3)$ ,  $B(3,7)$ , and  $C(0,6)$ .
- On the graph below, draw and label  $\triangle ABC$ .
  - Graph and state the coordinates of  $\triangle A'B'C'$ , the image of  $\triangle ABC$  after a reflection in the line  $y = x$ .
  - Graph and state the coordinates of  $\triangle A''B''C''$ , the image of  $\triangle A'B'C'$  following  $r_{y\text{-axis}}(\triangle A'B'C')$ .
  - 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  $P(0,-5)$ .



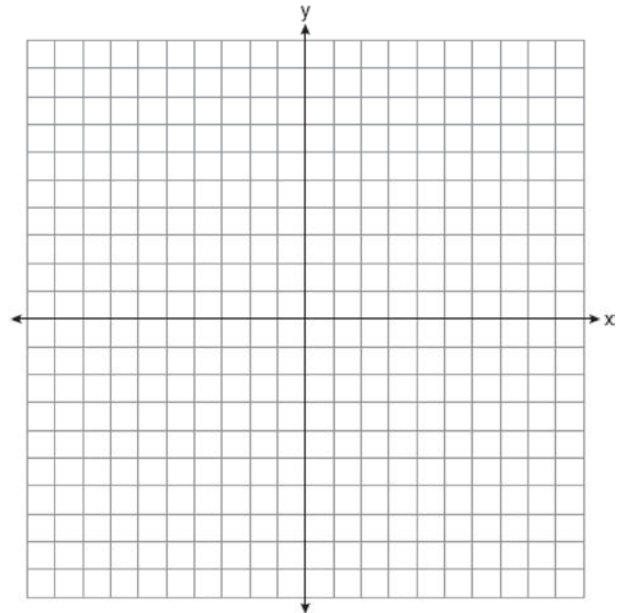
- 9 On the graph below, draw and label  $\triangle PQR$ , whose vertices are  $P(3,5)$ ,  $Q(9,5)$ , and  $R(7,7)$ . On the same set of axes, graph and state the coordinates of
- $\triangle P'Q'R'$ , the image of  $\triangle PQR$  after  $R_{90^\circ}$ .
  - $\triangle P''Q''R''$ , the image of  $\triangle P'Q'R'$  after  $r_{x-axis}$ .
  - $\triangle P'''Q'''R'''$ , the image of  $\triangle P''Q''R''$  after  $r_{y-axis}$ .

Based upon these graphs, write a single transformation that shows the composition

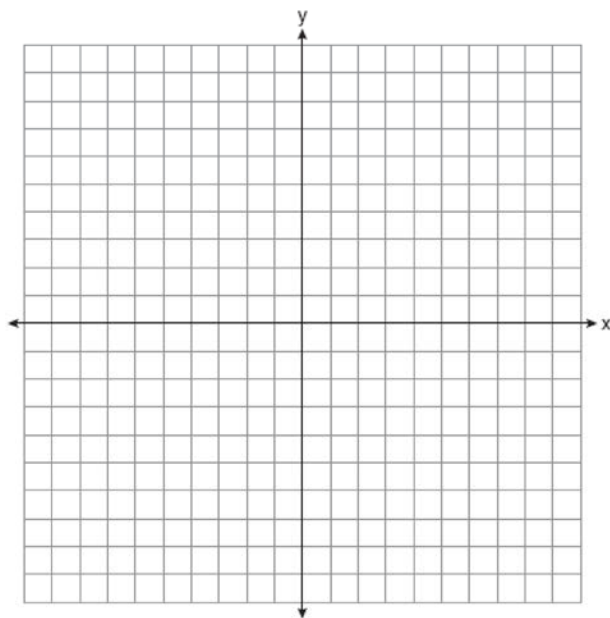
$$r_{y-axis} \circ r_{x-axis} \circ R_{90^\circ}$$



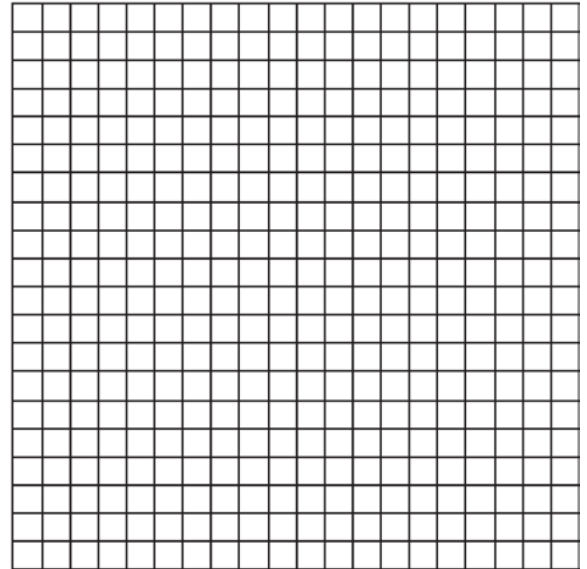
- 10 Given triangle  $ABC$  with coordinates  $A(-1,-2)$ ,  $B(0,-4)$ , and  $C(3,-1)$ .
- On the graph below, draw and label  $\triangle ABC$ .
  - Graph and label  $\triangle A'B'C'$ , the image of  $\triangle ABC$  after translation  $T_{4,-3}$ .
  - Graph and label  $\triangle A''B''C''$ , the image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



- 11 Triangle  $ABC$  has coordinates  $A(-3,-7)$ ,  $B(-3,-3)$ , and  $C(0,-3)$ .
- On the graph below, graph and label  $\triangle ABC$ .
  - Graph and state the coordinates of  $\triangle A'B'C'$ , the image of  $\triangle ABC$  after a point reflection in the origin.
  - Graph and state the coordinates of  $\triangle A''B''C''$ , the image of  $\triangle A'B'C'$  reflected in the line  $y = 2$ .
  - Graph and state the coordinates of  $\triangle A'''B'''C'''$ , the image of  $\triangle A''B''C''$  after translation  $T_{(-8,2)}$ .



- 12 A shape to be used in a computer game is placed on a Cartesian coordinate plane. The equation of the shape is  $(x - 4)^2 + (y + 2)^2 = 4$ . On the accompanying grid, graph the shape and label it  $a$ . In the game, the shape is moved under the composition  $T_{2,3} \circ r_{y\text{-axis}}$ . Draw this image, label it  $b$ , and state its equation.

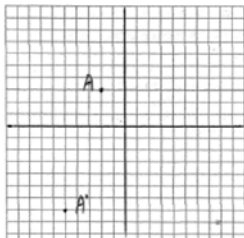


### G.CO.A.5: Compositions of Transformations 3 Answer Section

1 ANS: 3

REF: 080219b

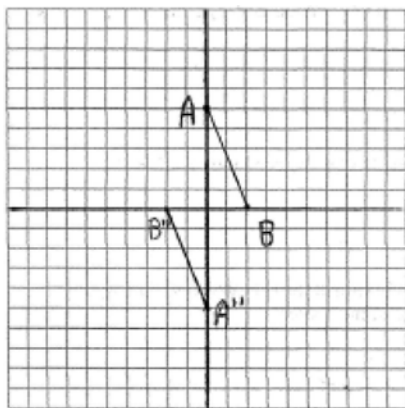
2 ANS:



$(-5, -7)$ . The coordinates of the image of A after the reflection are  $(-2, -3)$ . After the translation, the coordinates of the image of A are  $(-5, -7)$ .

REF: 080626b

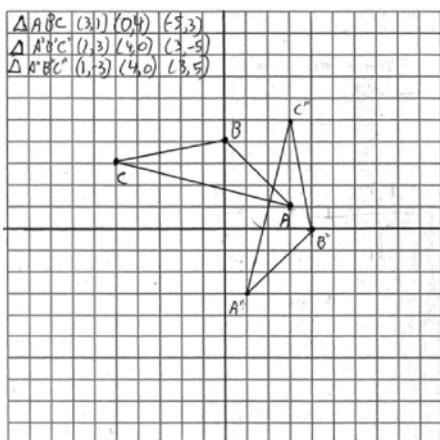
3 ANS:



Single transformations include  $R_{180^\circ}$ ,  $R_{-180^\circ}$ , and  $r_{(0,0)}$ .

REF: 080327b

4 ANS:



REF: 060928b

5 ANS:

$$A'(3,4), B'(-2,4), C'(3,2); A''(-1,7), B''(-6,7), C''(-1,5)$$

REF: 080141siii

6 ANS:

$$A'(2,-1), B'(2,6), C'(4,3); r_{y=x}$$

REF: 019541siii

7 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

8 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

9 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

10 ANS:

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

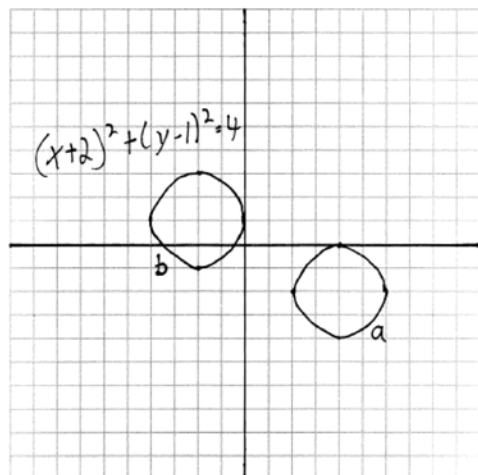
REF: 018541siii

11 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

12 ANS:



REF: 061029b