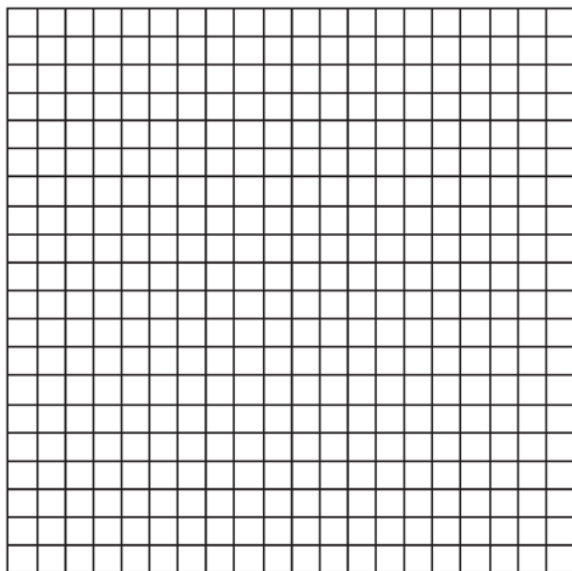
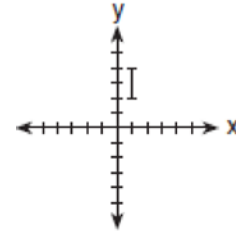


**G.CO.A.5: Compositions of Transformations 3**

- 1 What is the image of point  $A(4,2)$  after the composition of transformations defined by  $R_{90^\circ} \circ r_{y=x}$ ?
  - 1)  $(-4,2)$
  - 2)  $(4,-2)$
  - 3)  $(-4,-2)$
  - 4)  $(2,-4)$
  
- 2 What is the image of point  $(1,1)$  under  $r_{x\text{-axis}} \circ R_{0,90^\circ}$ ?
  - 1)  $(1,1)$
  - 2)  $(1,-1)$
  - 3)  $(-1,1)$
  - 4)  $(-1,-1)$
  
- 3 What are the coordinates of point  $A'$ , the image of point  $A(-4,1)$  after the composite transformation  $R_{90^\circ} \circ r_{y=x}$  where the origin is the center of rotation?
  - 1)  $(-1,-4)$
  - 2)  $(-4,-1)$
  - 3)  $(1,4)$
  - 4)  $(4,1)$
  
- 4 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.]



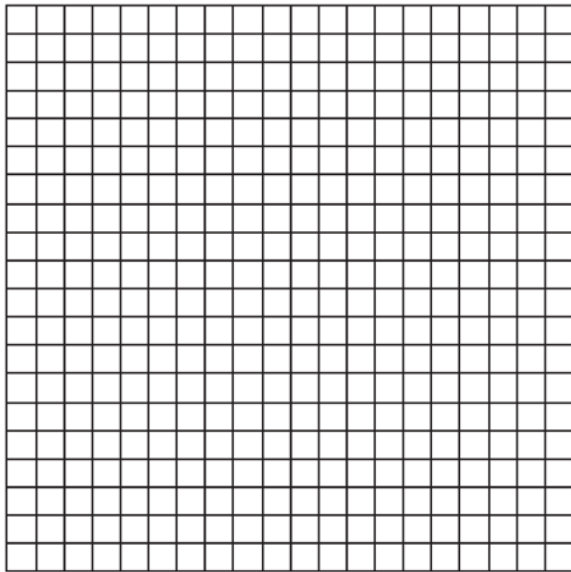
- 5 The accompanying graph represents the figure **I**.



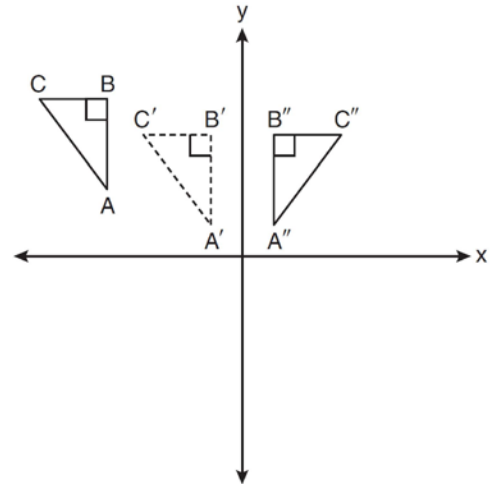
Which graph represents **I** after a transformation defined by  $r_{y=x} \circ R_{90^\circ}$ ?

- 1)
- 2)
- 3)
- 4)

- 6 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  $\overline{A''B''}$ ?

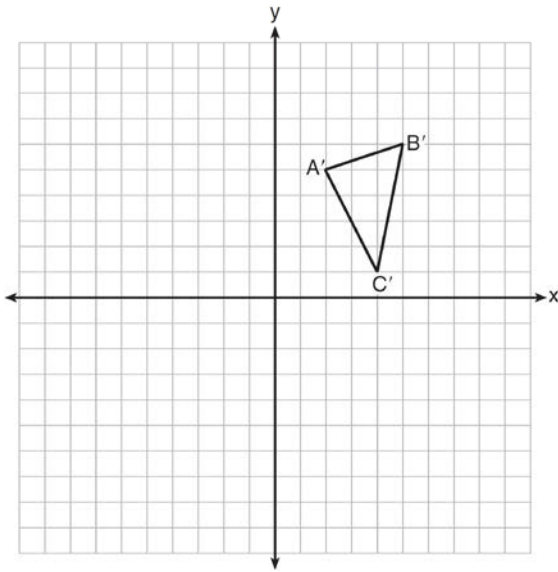


- 7 In the diagram below,  $\triangle A'B'C'$  is a transformation of  $\triangle ABC$ , and  $\triangle A''B''C''$  is a transformation of  $\triangle A'B'C'$ .

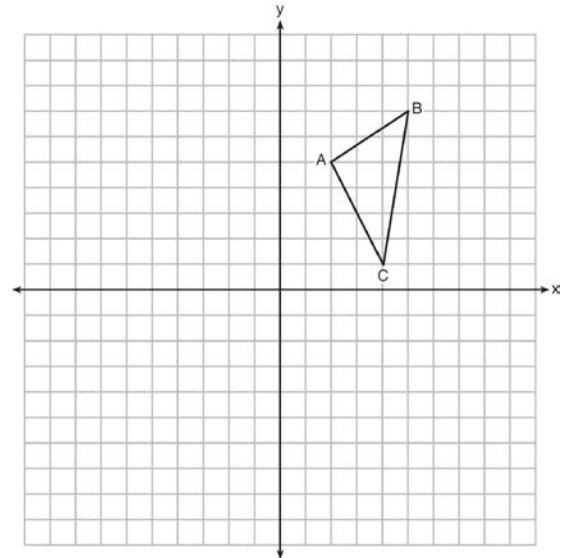


- The composite transformation of  $\triangle ABC$  to  $\triangle A''B''C''$  is an example of a
- 1) reflection followed by a rotation
  - 2) reflection followed by a translation
  - 3) translation followed by a rotation
  - 4) translation followed by a reflection
- 8 The coordinates of  $\triangle JRB$  are  $J(1,-2)$ ,  $R(-3,6)$ , and  $B(4,5)$ . What are the coordinates of the vertices of its image after the transformation  $T_{2,-1} \circ r_{y\text{-axis}}$ ?
- 1)  $(3,1), (-1,-7), (6,-6)$
  - 2)  $(3,-3), (-1,5), (6,4)$
  - 3)  $(1,-3), (5,5), (-2,4)$
  - 4)  $(-1,-2), (3,6), (-4,5)$

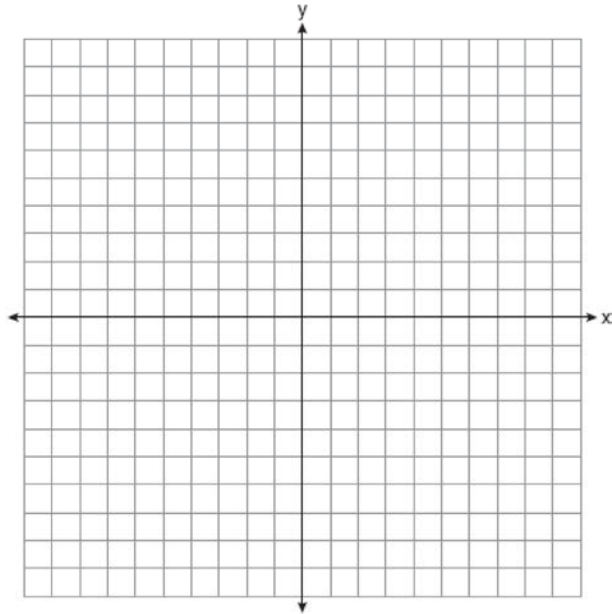
- 9 The graph below shows  $\triangle A'B'C'$ , the image of  $\triangle ABC$  after it was reflected over the  $y$ -axis. Graph and label  $\triangle ABC$ , the pre-image of  $\triangle A'B'C'$ . Graph and label  $\triangle A''B''C''$ , the image of  $\triangle A'B'C'$  after it is reflected through the origin. State a single transformation that will map  $\triangle ABC$  onto  $\triangle A''B''C''$ .



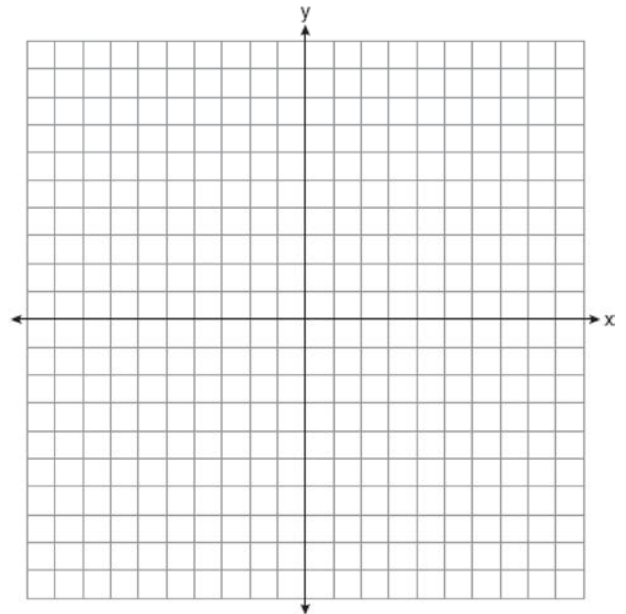
- 10 The coordinates of  $\triangle ABC$ , shown on the graph below, are  $A(2, 5)$ ,  $B(5, 7)$ , and  $C(4, 1)$ . Graph and label  $\triangle A'B'C'$ , the image of  $\triangle ABC$  after it is reflected over the  $y$ -axis. Graph and label  $\triangle A''B''C''$ , the image of  $\triangle A'B'C'$  after it is reflected over the  $x$ -axis. State a single transformation that will map  $\triangle ABC$  onto  $\triangle A''B''C''$ .



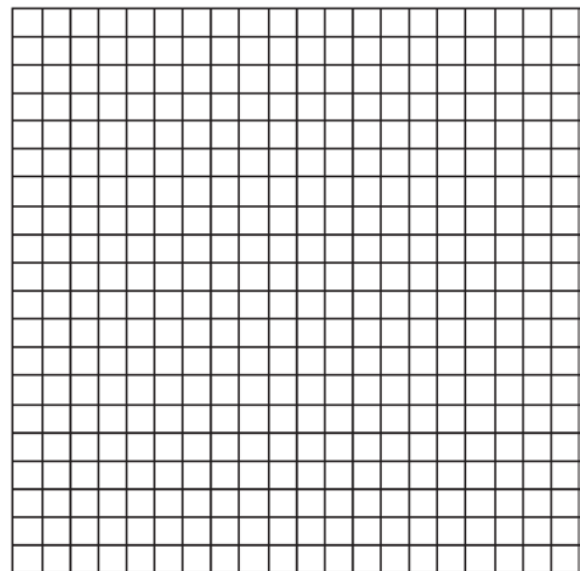
- 11 The vertices of  $\triangle RST$  are  $R(-6,5)$ ,  $S(-7,-2)$ , and  $T(1,4)$ . The image of  $\triangle RST$  after the composition  $T_{-2,3} \circ r_{y=x}$  is  $\triangle R''S''T''$ . State the coordinates of  $\triangle R''S''T''$ . [The use of the set of axes below is optional.]



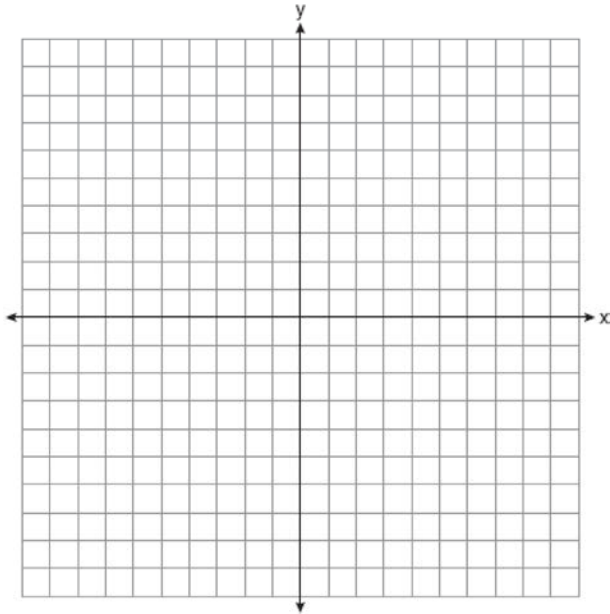
- 12 The coordinates of the vertices of  $\triangle ABC$  are  $A(-6,5)$ ,  $B(-4,8)$ , and  $C(1,6)$ . State and label the coordinates of the vertices of  $\triangle A''B''C''$ , the image of  $\triangle ABC$  after the composition of transformations  $T_{(4,-5)} \circ r_{y\text{-axis}}$ . [The use of the set of axes below is optional.]



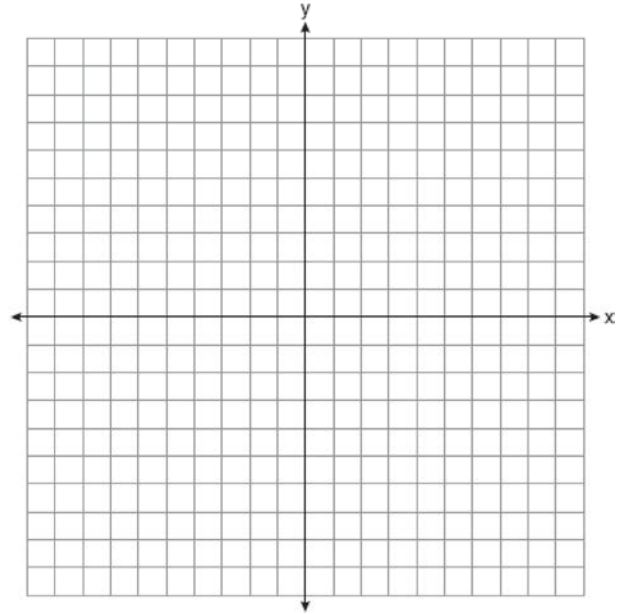
- 13 On the accompanying grid, graph and label  $\triangle ABC$  with vertices  $A(3,1)$ ,  $B(0,4)$ , and  $C(-5,3)$ . On the same grid, graph and label  $\triangle A''B''C''$ , the image of  $\triangle ABC$  after the transformation  $r_{x\text{-axis}} \circ r_{y=x}$ .



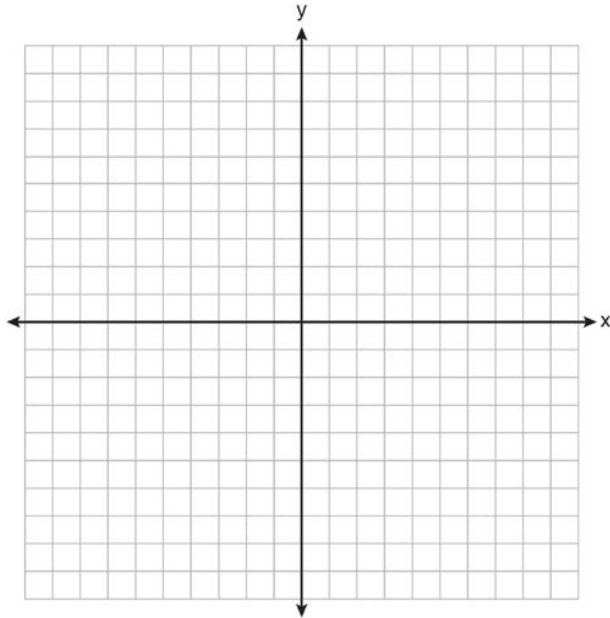
- 14 Quadrilateral *MATH* has coordinates  $M(-6,-3)$ ,  $A(-1,-3)$ ,  $T(-2,-1)$ , and  $H(-4,-1)$ . The image of quadrilateral *MATH* after the composition  $r_{x\text{-axis}} \circ T_{7,5}$  is quadrilateral  $M''A''T''H''$ . State and label the coordinates of  $M''A''T''H''$ . [The use of the set of axes below is optional.]



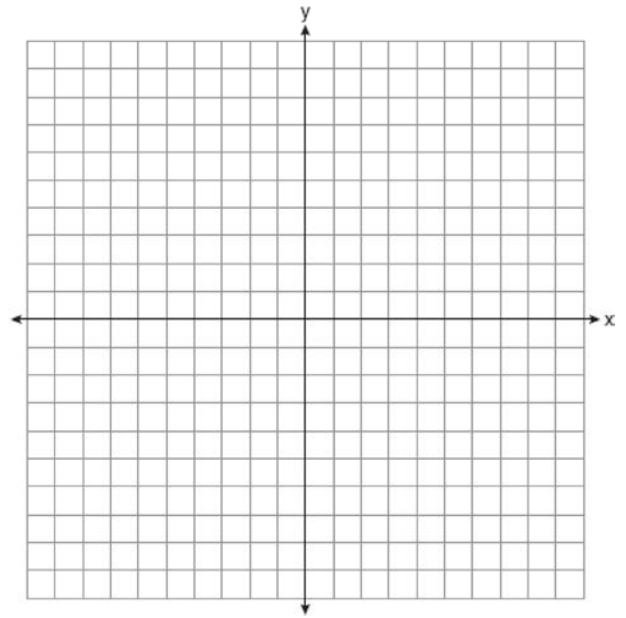
- 15 Quadrilateral *HYPE* has vertices  $H(2,3)$ ,  $Y(1,7)$ ,  $P(-2,7)$ , and  $E(-2,4)$ . State and label the coordinates of the vertices of  $H''Y''P''E''$  after the composition of transformations  $r_{x\text{-axis}} \circ T_{5,-3}$ . [The use of the set of axes below is optional.]



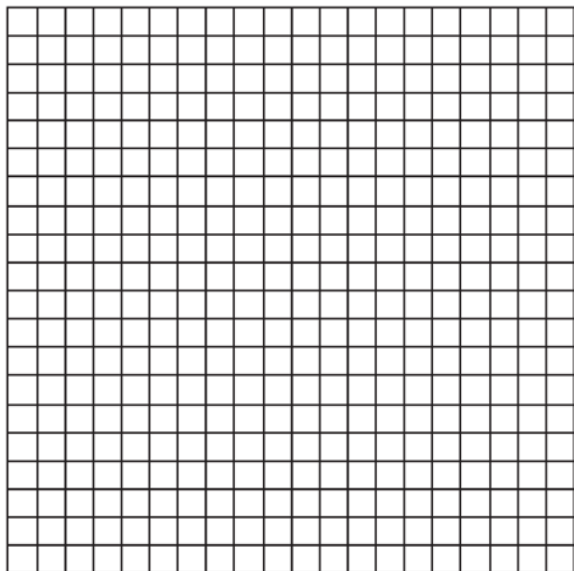
- 16 The coordinates of the vertices of parallelogram  $ABCD$  are  $A(-2,2)$ ,  $B(3,5)$ ,  $C(4,2)$ , and  $D(-1,-1)$ . State the coordinates of the vertices of parallelogram  $A''B''C''D''$  that result from the transformation  $r_{y\text{-axis}} \circ T_{2,-3}$ . [The use of the set of axes below is optional.]



- 17 The coordinates of trapezoid  $ABCD$  are  $A(-4,5)$ ,  $B(1,5)$ ,  $C(1,2)$ , and  $D(-6,2)$ . Trapezoid  $A''B''C''D''$  is the image after the composition  $r_{x\text{-axis}} \circ r_{y=x}$  is performed on trapezoid  $ABCD$ . State the coordinates of trapezoid  $A''B''C''D''$ . [The use of the set of axes below is optional.]



- 18 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: 1  
 $A'(2,4)$

REF: 011026ge

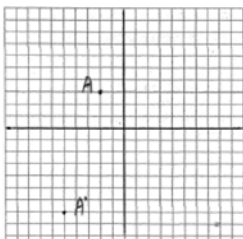
- 2 ANS: 4  
After the rotation, the coordinates are  $(-1,1)$ . After the reflection, the coordinates are  $(-1,-1)$ .

REF: 080413b

- 3 ANS: 4  
After the reflection, the coordinates of point  $A$  are  $(1,-4)$ . After the rotation, the coordinates of point  $A'$  are  $(4,1)$ .

REF: 010618b

- 4 ANS:

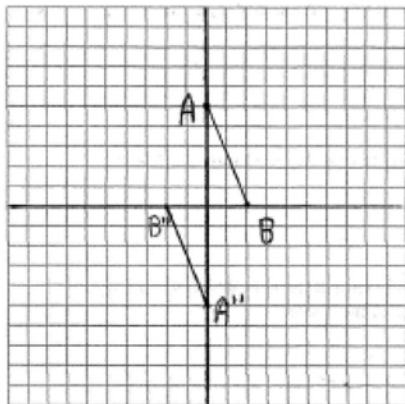


$(-5,-7)$ . The coordinates of the image of A after the reflection are  $(-2,-3)$ . After the translation, the coordinates of the image of A are  $(-5,-7)$ .

REF: 080626b

- 5 ANS: 3 REF: 080219b

- 6 ANS:



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

REF: 080327b

- 7 ANS: 4 REF: 061103ge



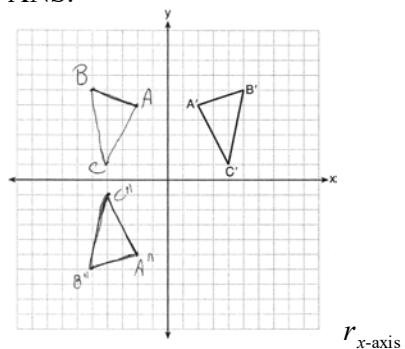
8 ANS: 3

After the reflection, the coordinates are  $J'(-1,-2)$ ,  $R'(3,6)$  and  $B'(-4,5)$ .

After the translation, the coordinates are  $J''(1,-3)$ ,  $R''(5,5)$  and  $B''(-2,4)$ .

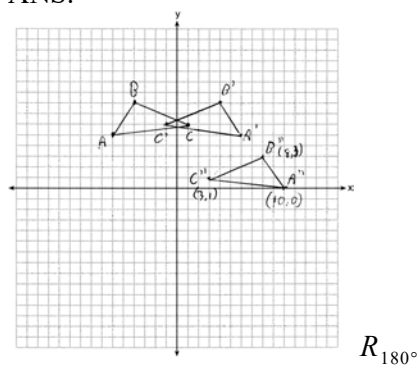
REF: 080715b

9 ANS:



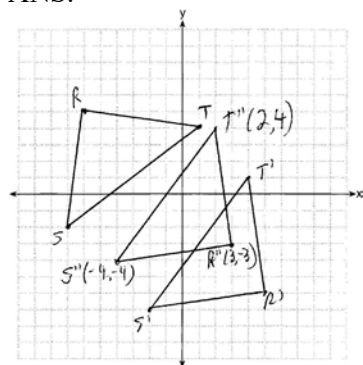
REF: 061435ge

10 ANS:



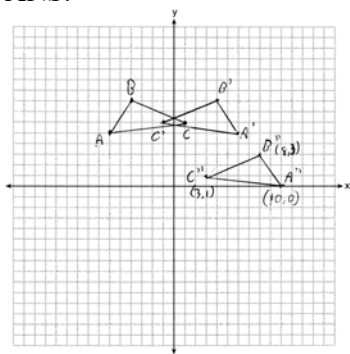
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11 ANS:



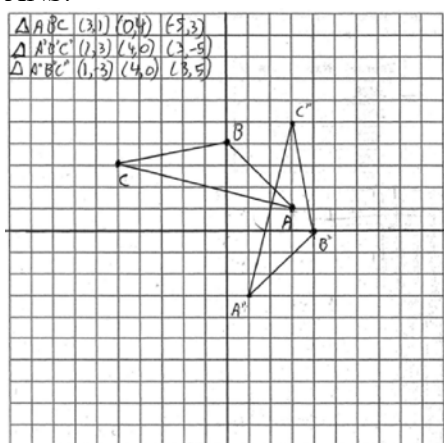
REF: 081236ge

12 ANS:



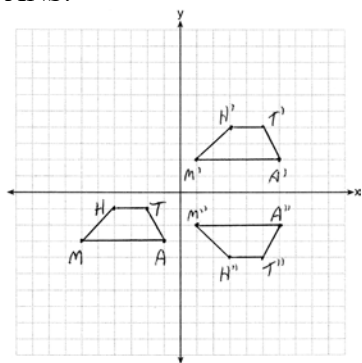
REF: 011436ge

13 ANS:



REF: 060928b

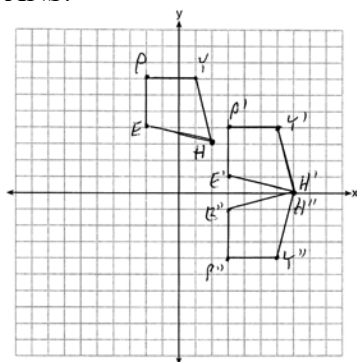
14 ANS:



$M''(1,-2), A''(6,-2), T''(5,-4), H''(3,-4)$

REF: 081336ge

15 ANS:

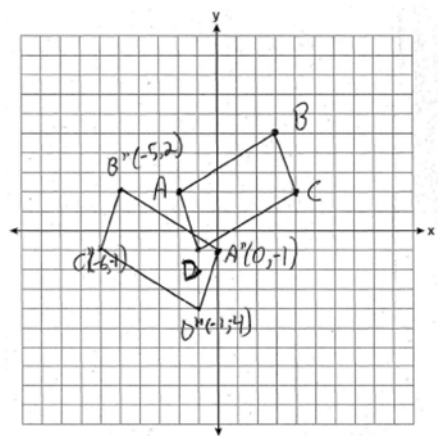


$H'(7, 0), V'(6, 4), P'(3, 4), E'(3, 1)$

$H''(7, 0), V''(6, -4), P''(3, -4), E''(3, -1)$

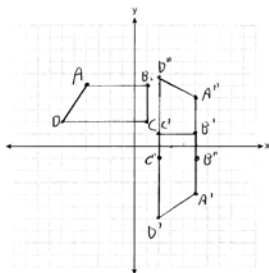
REF: 011535ge

16 ANS:



REF: 060937ge

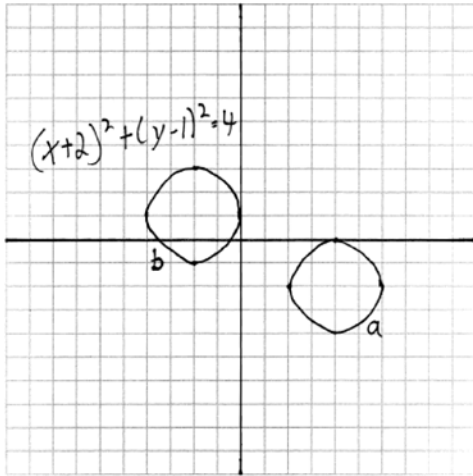
17 ANS:



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

REF: 061236ge

18 ANS:



REF: 061029b