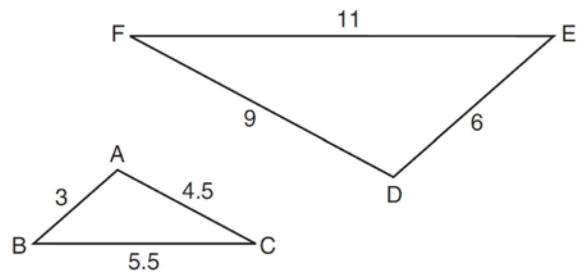
Name: ________________________

G.SRT.A.2: Compositions of Transformations 2

1 In the diagram below, $\triangle DEF$ is the image of $\triangle ABC$ after a clockwise rotation of 180° and a dilation where $AB = 3$, $BC = 5.5$, $AC = 4.5$, $DE = 6$, $FD = 9$, and $EF = 11$.



Which relationship must always be true?

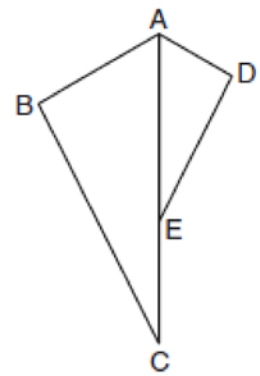
1) $\frac{m\angle A}{m\angle D} = \frac{1}{2}$

2) $\frac{m\angle C}{m\angle F} = \frac{2}{1}$

3) $\frac{m\angle A}{m\angle C} = \frac{m\angle F}{m\angle D}$

4) $\frac{m\angle B}{m\angle E} = \frac{m\angle C}{m\angle F}$

2 In the diagram below, $\triangle ADE$ is the image of $\triangle ABC$ after a reflection over the line AC followed by a dilation of scale factor $\frac{AE}{AC}$ centered at point A.



Which statement must be true?

1) $m\angle BAC \cong m\angle AED$

2) $m\angle ABC \cong m\angle ADE$

3) $m\angle DAE \cong \frac{1}{2} m\angle BAC$

4) $m\angle ACB \cong \frac{1}{2} m\angle DAB$

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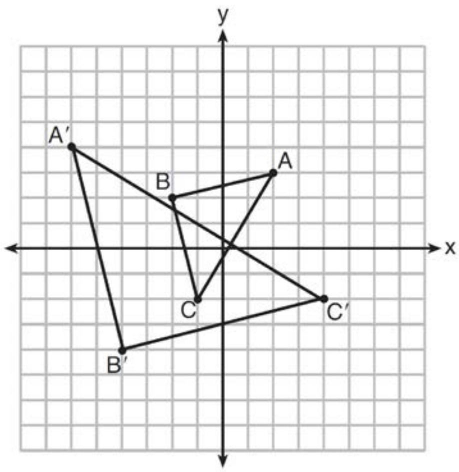
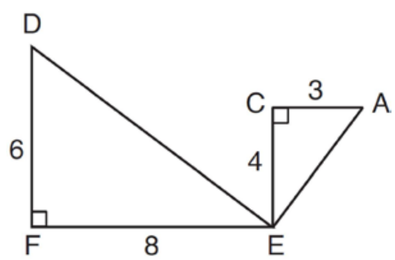
3 Which sequence of transformations will map $\triangle ABC$ onto $\triangle A'B'C'$?



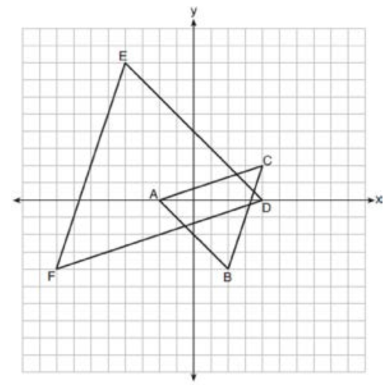
1) reflection and translation
2) rotation and reflection
3) translation and dilation
4) dilation and rotation

4 Given: $\triangle AEC$, $\triangle DEF$, and $\overline{FE} \perp \overline{CE}$



What is a correct sequence of similarity transformations that shows $\triangle AEC \sim \triangle DEF$?
1) a rotation of 180 degrees about point E followed by a horizontal translation
2) a counterclockwise rotation of 90 degrees about point E followed by a horizontal translation
3) a rotation of 180 degrees about point E followed by a dilation with a scale factor of 2 centered at point E
4) a counterclockwise rotation of 90 degrees about point E followed by a dilation with a scale factor of 2 centered at point E

5 On the set of axes below, $\triangle ABC$ has vertices at $A(-2,0)$, $B(2,-4)$, $C(4,2)$, and $\triangle DEF$ has vertices at $D(4,0)$, $E(-4,8)$, $F(-8,-4)$.



Which sequence of transformations will map $\triangle ABC$ onto $\triangle DEF$?
1) a dilation of $\triangle ABC$ by a scale factor of 2 centered at point A
2) a dilation of $\triangle ABC$ by a scale factor of $\frac{1}{2}$ centered at point A
3) a dilation of $\triangle ABC$ by a scale factor of 2 centered at the origin, followed by a rotation of 180° about the origin
4) a dilation of $\triangle ABC$ by a scale factor of $\frac{1}{2}$ centered at the origin, followed by a rotation of 180° about the origin

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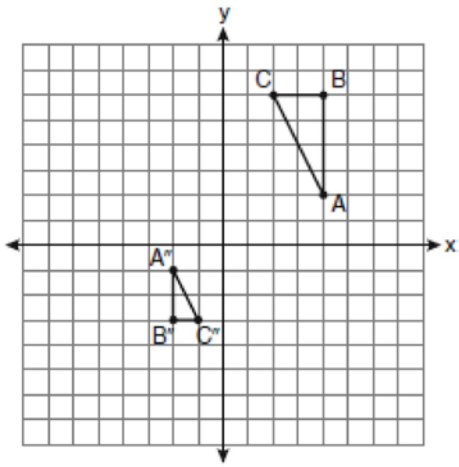
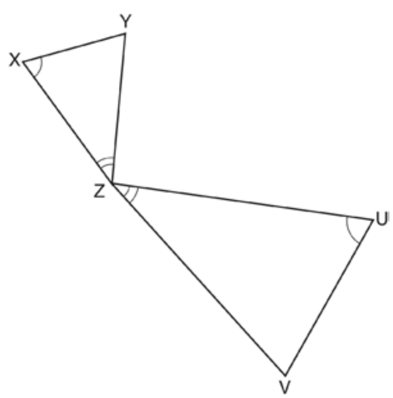
6 After a composition of transformations, the coordinates $A(4,2)$, $B(4,6)$, and $C(2,6)$ become $A''(-2,-1)$, $B''(-2,-3)$, and $C''(-1,-3)$, as shown on the set of axes below.



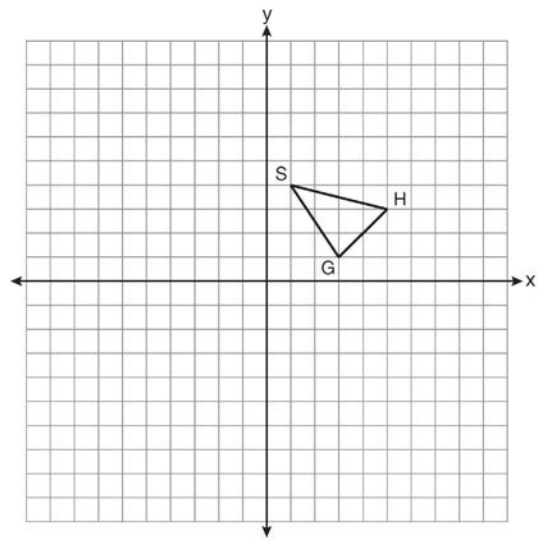
Which composition of transformations was used?
1) $R_{180^\circ} \circ D_2$
2) $R_{90^\circ} \circ D_2$
3) $D_{\frac{1}{2}} \circ R_{180^\circ}$
4) $D_{\frac{1}{2}} \circ R_{90^\circ}$

7 In the diagram below, triangles XYZ and UVZ are drawn such that $\angle X \cong \angle U$ and $\angle XZY \cong \angle UZV$.

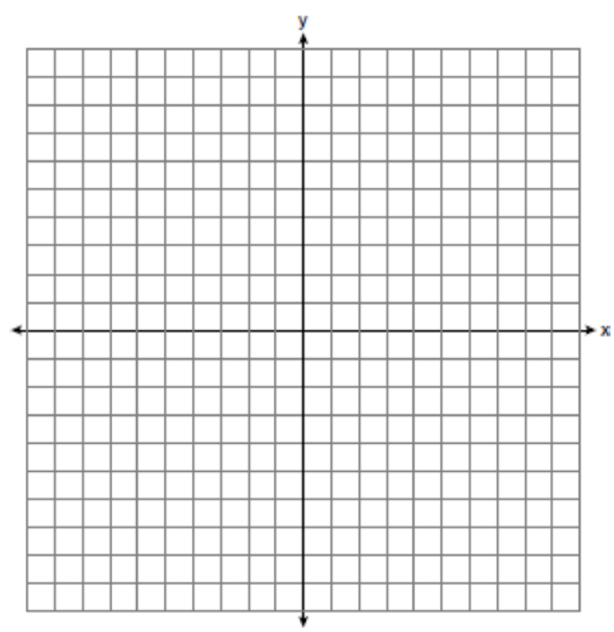


Describe a sequence of similarity transformations that shows $\triangle XYZ$ is similar to $\triangle UVZ$.

8 As shown on the set of axes below, $\triangle GHS$ has vertices $G(3,1)$, $H(5,3)$, and $S(1,4)$. Graph and state the coordinates of $\triangle G''H''S''$, the image of $\triangle GHS$ after the transformation $T_{-3,1} \circ D_2$.

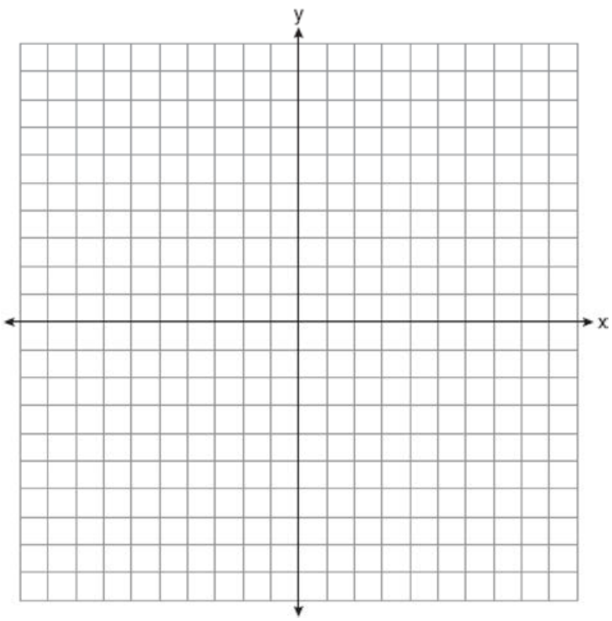


9 Triangle ABC has vertices $A(5,1)$, $B(1,4)$ and $C(1,1)$. State and label the coordinates of the vertices of $\triangle A''B''C''$, the image of $\triangle ABC$, following the composite transformation $T_{1,-1} \circ D_2$. [The use of the set of axes below is optional.]



Name: ________________________

10 The coordinates of the vertices of parallelogram *SWAN* are $S(2,-2)$, $W(-2,-4)$, $A(-4,6)$, and $N(0,8)$. State and label the coordinates of parallelogram $S''W''A''N''$, the image of *SWAN* after the transformation $T_{4,-2} \circ D_{\frac{1}{2}}$. [The use of the set of axes below is optional.]



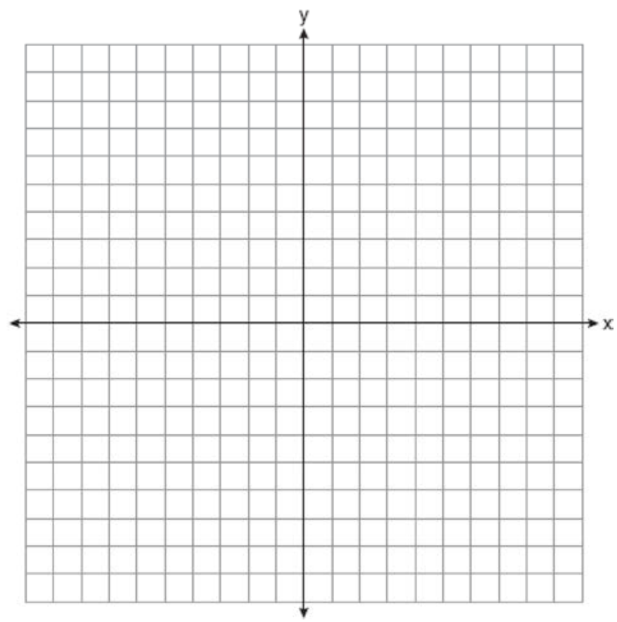
11 Triangle *ABC* has coordinates $A(3,-2)$, $B(8,2)$, and $C(5,10)$.

a On the grid below, graph and label $\triangle ABC$.

b Graph and state the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$ after a half-turn $\left(R_{180^\circ}\right)$.

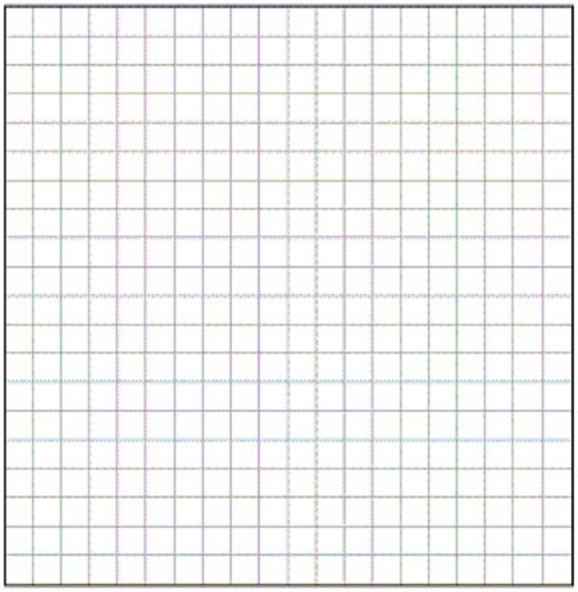
c Graph and state the coordinates of $\triangle A''B''C''$, the image of $\triangle ABC$ after $\left(D_2 \circ T_{-5,-2}\right)$.

d What is the ratio of the area of $\triangle ABC$ to the area of $\triangle A''B''C''$?

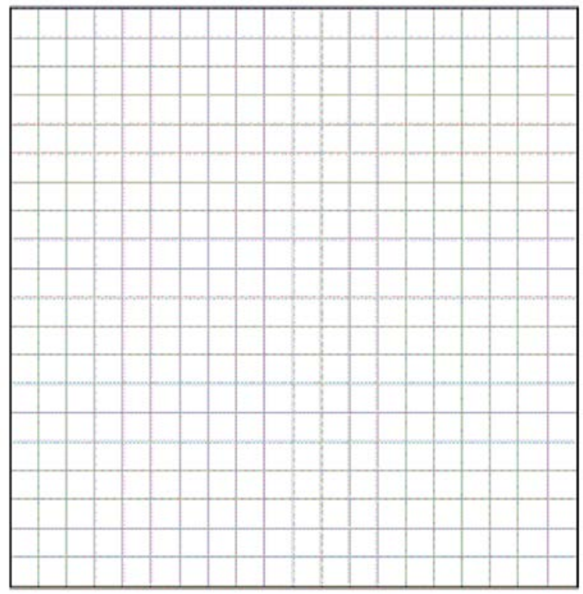


Name: ________________________

12 The coordinates of the vertices of $\triangle ABC$ $A(1,3)$, $B(-2,2)$ and $C(0,-2)$. On the grid below, graph and label $\triangle A''B''C''$, the result of the composite transformation $D_2 \circ T_{3,-2}$. State the coordinates of A'', B'', and C''.

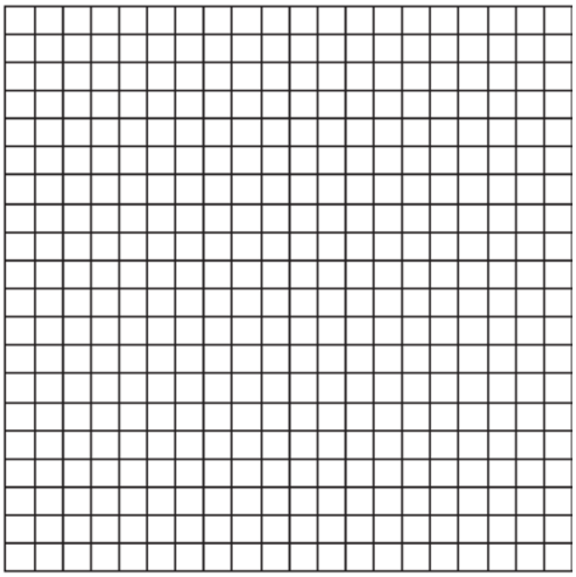


13 The coordinates of the endpoints of $\overline{AB}$ are $A(2,6)$ and $B(4,2)$. Is the image $\overline{A''B''}$ the same if it is reflected in the x-axis, then dilated by $\frac{1}{2}$ as the image is if it is dilated by $\frac{1}{2}$, then reflected in the x-axis? Justify your answer. (The use of the accompanying grid is optional.)

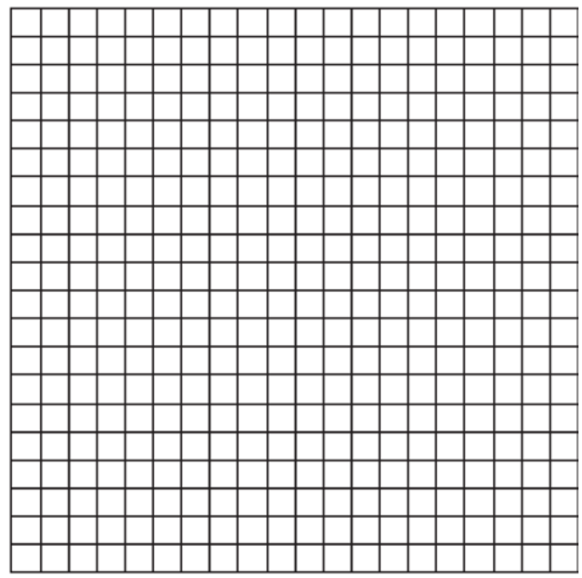


Name: ________________________

14 Triangle ABC has vertices $A(1,0)$, $B(6,3)$, and $C(4,5)$. On the accompanying grid, draw and label $\triangle ABC$. Graph and state the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$ after the composition $D_2 \circ r_{(0,0)}$.



15 Farmington, New York, has plans for a new triangular park. If plotted on a coordinate grid, the vertices would be $A(3,3)$, $B(5,-2)$, and $C(-3,-1)$. However, a tract of land has become available that would enable the planners to increase the size of the park, which is based on the following transformation of the original triangular park, $R_{270^\circ} \circ D_2$. On the grid below, graph and label both the original park $\triangle ABC$ and its image, the new park $\triangle A''B''C''$, following the transformation.



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16 *a* Triangle *ABC* has coordinates $A(0,9)$, $B(-3,0)$, and $C(-6,9)$. On the graph below, draw and label triangle *ABC*.

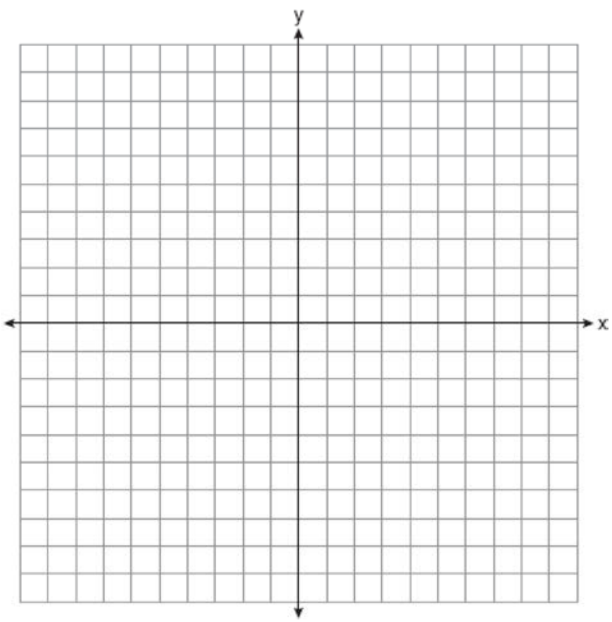
b Reflect the graph drawn in part *a* in the origin. State the coordinates of *A′*, *B′*, and *C′*, the images of *A*, *B*, and C.

c Dilate the graph drawn in part *b* using $D_{\frac{1}{3}}$.

State the coordinates of *A″*, *B″*, *C″*, the images of *A′*, *B′*, and *C′*.

d Translate the graph drawn in part *c* using $T_{(5,4)}$.

State the coordinates of *A‴*, *B‴*, and *C‴*, the images of *A″*, *B″*, and *C″*.



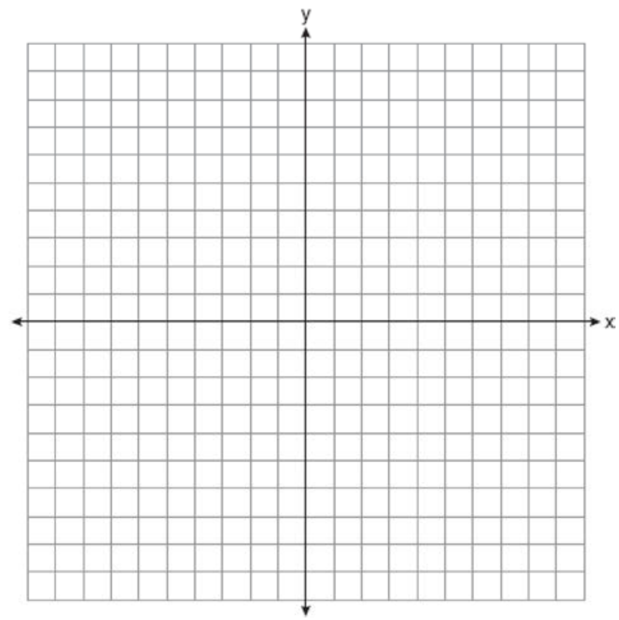
17 On the graph below, sketch the triangle formed by points $A(3,-3)$, $B(-1,-5)$, and $C(5,-4)$. On the same set of axes, graph and state the coordinates of

a $\triangle A'B'C'$, the image of $\triangle ABC$ after the rotation R_{90°.

b $\triangle A''B''C''$, the image of $\triangle A'B'C'$ after the translation $T_{-4,-1}$.

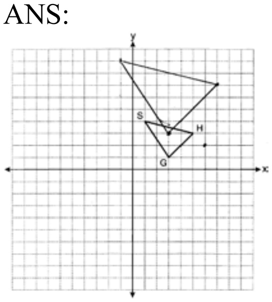
c $\triangle A'''B'''C'''$, the image of $\triangle A''B''C''$ after the dilation D_3.

Is the composite transformation $\triangle ABC \rightarrow \triangle A'''B'''C'''$ an isometry? Explain your answer.

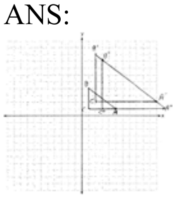


G.SRT.A.2: Compositions of Transformations 2
Answer Section

1 ANS: 4 REF: 081514geo
2 ANS: 2 REF: 011702geo
3 ANS: 4 REF: 061608geo
4 ANS: 4 REF: 081609geo
5 ANS: 3 REF: 011903geo
6 ANS: 3 REF: 060908ge
7 ANS:
Triangle $X'Y'Z'$ is the image of $\triangle XYZ$ after a rotation about point Z such that $\overline{ZX}$ coincides with $\overline{ZU}$. Since rotations preserve angle measure, $\overline{ZY}$ coincides with $\overline{ZV}$, and corresponding angles X and Y, after the rotation, remain congruent, so $\overline{XY} \parallel \overline{UV}$. Then, dilate $\triangle X'Y'Z'$ by a scale factor of $\frac{ZU}{ZX}$ with its center at point Z. Since dilations preserve parallelism, $\overline{XY}$ maps onto $\overline{UV}$. Therefore, $\triangle XYZ \sim \triangle UVZ$.

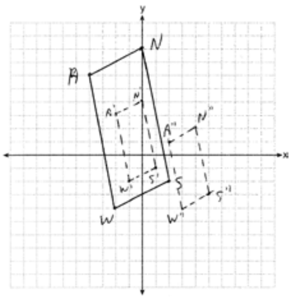
REF: spr1406geo
8 ANS:


$G''(3,3), H''(7,7), S''(-1,9)$

REF: 081136ge
9 ANS:

$A''(11,1),\ B''(3,7),\ C''(3,1)$

REF: 011336ge

10 ANS:



$S''(5,-3)$, $W''(3,-4)$, $A''(2,1)$, and $N''(4,2)$

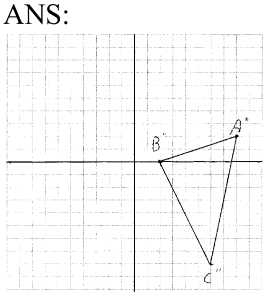
REF: 061335ge

11 ANS:

$A'(-3,-2), B'(-8,-2), C'(-5,-10)$; $A''(-4,0), B''(6,0), C''(0,16)$; $1:4$

REF: 089437siii

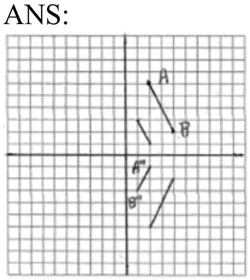
12 ANS:



$A''(8,2)$, $B''(2,0)$, $C''(6,-8)$

REF: 081036ge

13 ANS:



If $\overline{AB}$ is reflected first, the coordinates of the endpoints of $\overline{A'B'}$ are $A'(2,-6)$ and $B'(4,-2)$. When the reflection is dilated, the coordinates of the endpoints of $\overline{A''B''}$ are $A''(1,-3)$ and $B''(2,-1)$. If $\overline{AB}$ is dilated first, the coordinates of the endpoints of $\overline{A'B'}$ are $A'(1,3)$ and $B'(2,1)$. When the dilation is reflected, the coordinates of the endpoints of $\overline{A''B''}$ are $A''(1,-3)$ and $B''(2,-1)$. The images are the same.

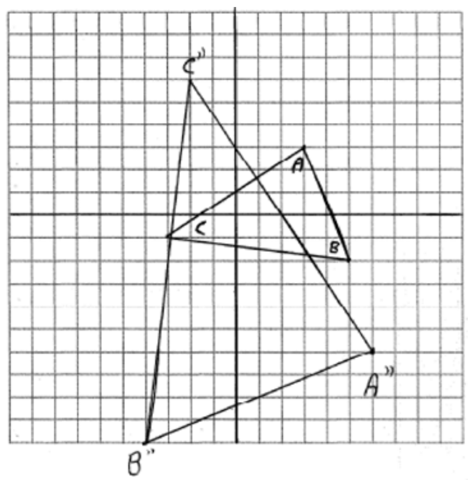
REF: 080028a

14 ANS:

$A'(-2,0), B'(-12,-6), C'(-8,-10)$

REF: 068941siii

15 ANS:



REF: 010930b

16 ANS:

$A'(0,-9), B'(3,0), C'(6,-9)$; $A''(0,-3), B''(1,0), C''(2,-3)$; $A'''(5,1), B'''(6,4), C'''(7,1)$

REF: 069038siii

17 ANS:

$A'(3,3), B'(5,-1), C'(4,5)$; $A''(-1,2), B''(1,-2), C''(0,4)$; $A'''(-3,6), B'''(3,-6), C'''(0,12)$; No, length is not preserved.

REF: 069938siii