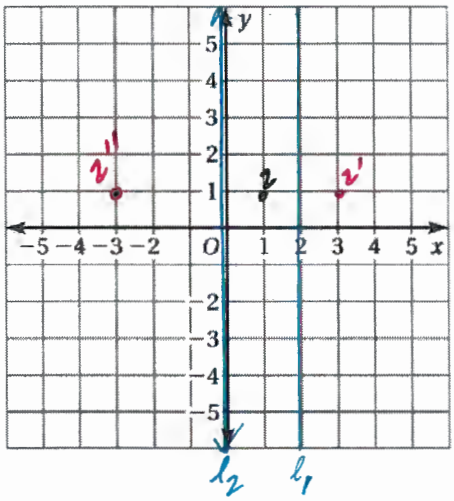
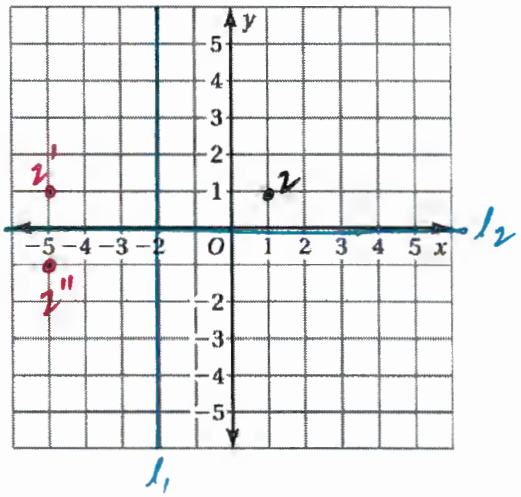
# 9.5 – Composition of Transformations - Answers

Find the image of Z(1, 1) after two reflections, first across line $\ell_1$, and then across line $\ell_2$.

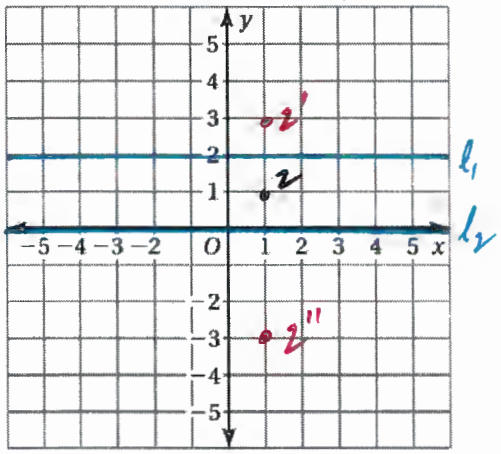
1) $\ell_1 : x = 2$, $\ell_2 : y$-axis



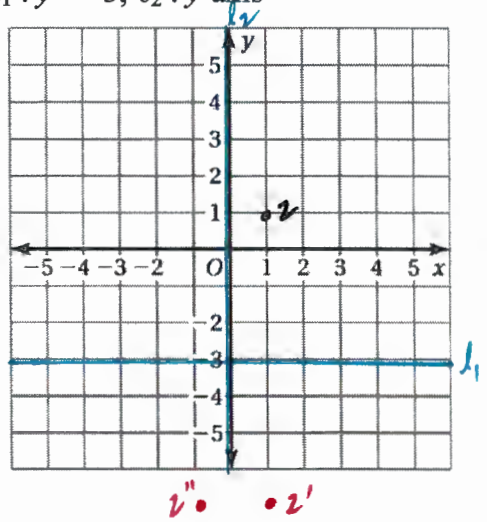

2) $\ell_1 : x = -2$, $\ell_2 : x$-axis



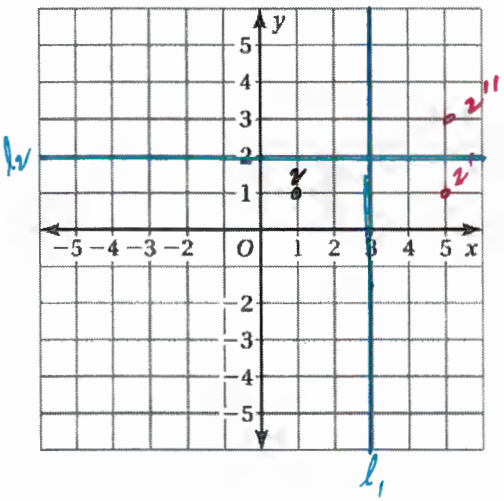

3) $\ell_1 : y = 2$, $\ell_2 : x$-axis



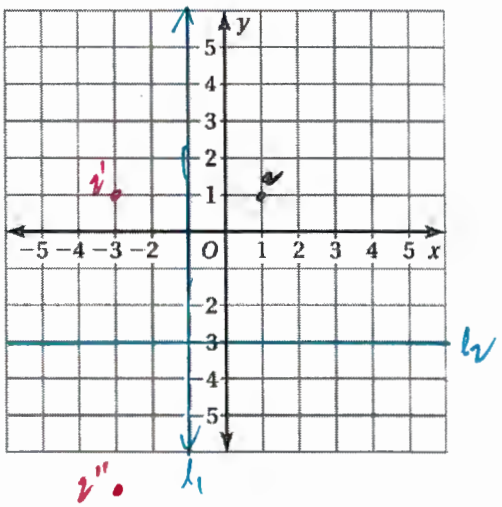

4) $\ell_1 : y = -3$, $\ell_2 : y$-axis




5) $\ell_1 : x = 3$, $\ell_2 : y = 2$

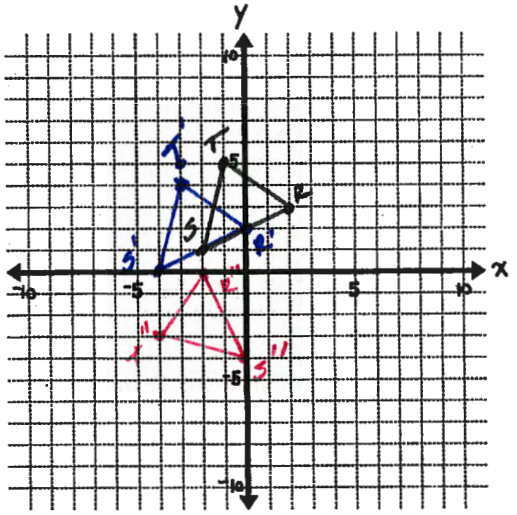



6) $\ell_1 : x = -1$, $\ell_2 : y = -3$

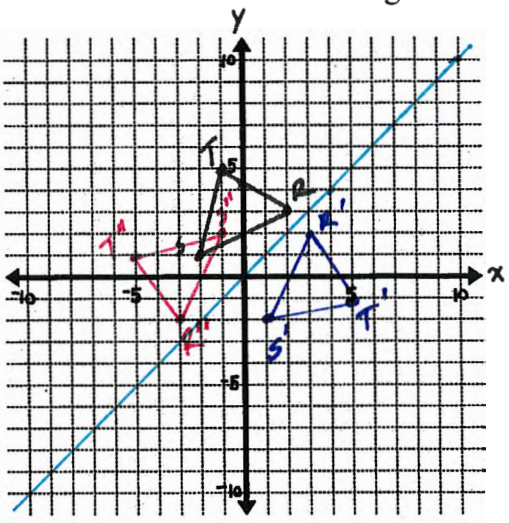


In the following, graph $\Delta RST$ with vertices R(2,3), S(-2,1) and T(-1,5) and its image after the composition. (Do each one of these on a separate coordinated plane.)

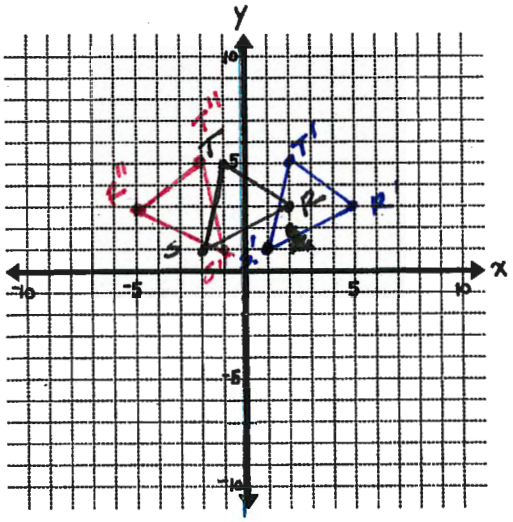
7) Translation: $(x, y) \rightarrow (x-2, y-1)$
Rotation: 90° counter-clockwise about the origin



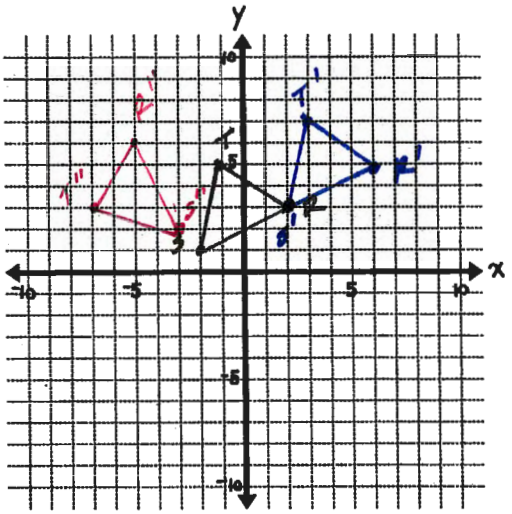
8) Reflection: Across the line $y = x$
Rotation: 180° about the origin



9) Translation: $(x, y) \rightarrow (x+3, y)$
Reflection: Across the line $x = 0$



10) Translation: $(x, y) \rightarrow (x+4, y+2)$
Rotation: 270° clockwise about the origin



11) In your own words, what is a composition of transformations?

A combination of two or more transformations

12) What is a glide reflection?

A combination of a reflection and a translation.

13) State the "Reflections over Parallel Lines Theorem":

If you compose two reflections over parallel lines that are x unit apart, it is the same as a single translation of 2x.

14) State the "Reflection over the Axes Theorem":

If you compose two reflections over each axis, then the final image is a 180° of the original.

15) Is it possible to have an object that does not have ~~of~~ rotational symmetry? Explain your reasoning.

Yes. If an object doesn't look exactly the same (shape and orientation) before a 360° rotation, then it doesn't have rotational symmetry.

16) What kind of polygon has an angle of rotation of 72°?

Example: Regular Pentagon.

17) A triangle is reflected across line $\ell$ and then across line $m$. If this composition of reflections is a translation, what is true about $m$ and $\ell$?

They are parallel