Just in Time Quick Check

Standard of Learning G.RLT.3

Strand: Reasoning, Lines, and Transformations

Standard of Learning G.RLT.3

The student will solve problems, including contextual problems, involving symmetry and transformation.

Students will demonstrate the following Knowledge and Skills:

a) Locate, count, and draw lines of symmetry given a figure, including figures in context.
b) Determine whether a figure has point symmetry, line symmetry, both, or neither, including figures in context.
c) Given an image or preimage, identify the transformation or combination of transformations that has/have occurred. Transformations include:
   i) translations;
   ii) reflections over any horizontal or vertical line or the lines $y = x$ or $y = -x$;
   iii) clockwise or counterclockwise rotations of 90°, 180°, 270°, or 360° on a coordinate grid where the center of rotation is limited to the origin; and
   iv) dilations, from a fixed point on a coordinate grid.

Just in Time Quick Check

Just in Time Quick Check Teacher Notes

Supporting and Prerequisite SOL: 8.MG.3

Just in Time Quick Check G.RLT.3

1. Use the following letters to answer the questions below.

U P X N J

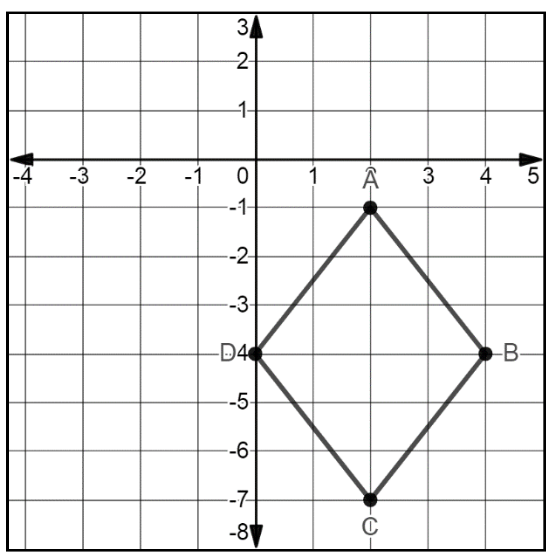
   a) Which letter(s) have both line symmetry and point symmetry?

   b) Which letter(s) have line symmetry, but not point symmetry?

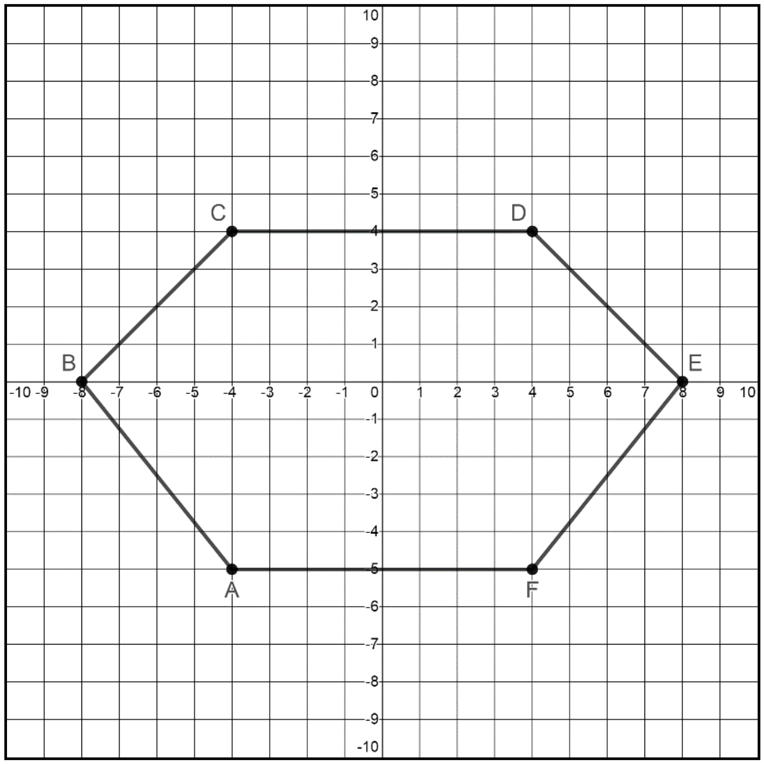
   c) Which letter(s) have point symmetry, but not line symmetry?

2. Determine if the parallelogram and rectangle have line symmetry, point symmetry, both line and point symmetry, or neither point nor line symmetry. If line symmetry is present, draw the line(s) of symmetry.

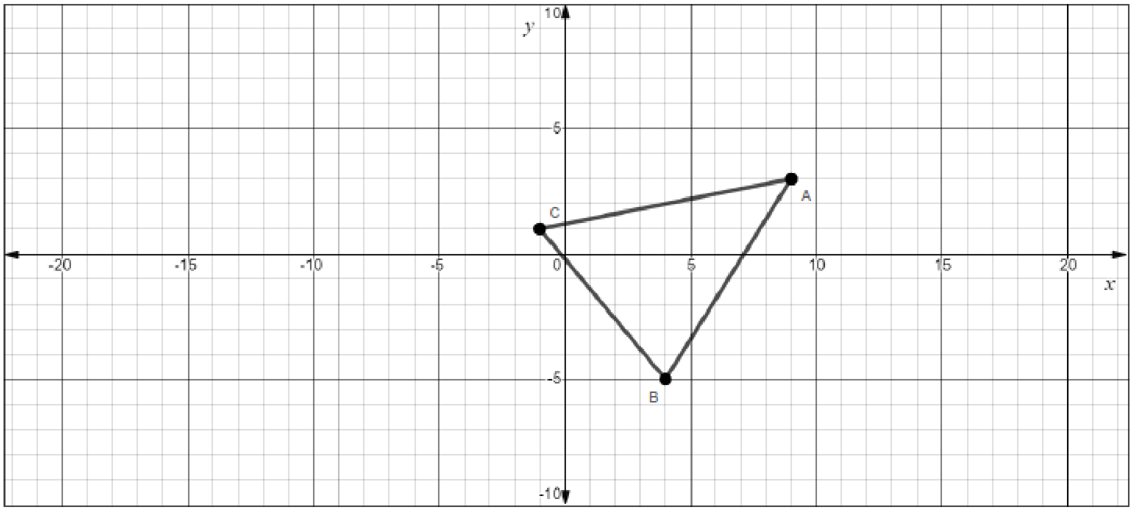
3. Quadrilateral ABCD with points A (2, -1), B (4, -4), C (2, -7), D (0, -4) is shown below. Write the equation of the line(s) of symmetry in Quadrilateral ABCD.



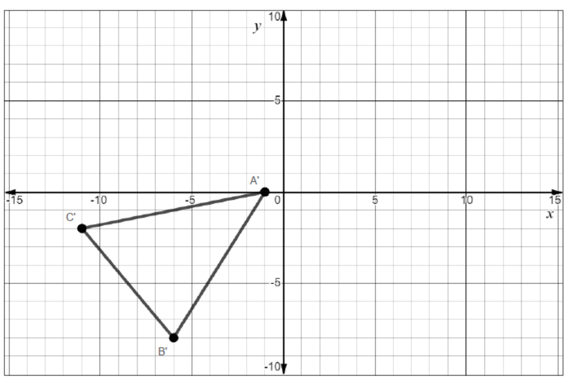
4. Given Polygon ABCDEF with points A (-4,-5), B (-8, 0), C (-4, 4), D (4, 4), E (8, 0), F (4, -5), determine if the polygon has point symmetry, line symmetry, both, or neither. If the figure has line symmetry, identify how many lines.

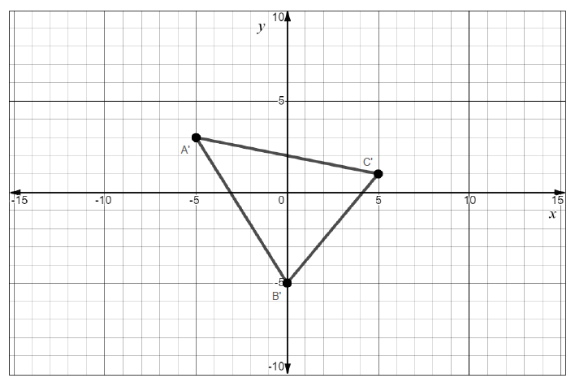


5. Given Triangle *ABC* on the coordinate plane, state the transformation that best describes each graph.

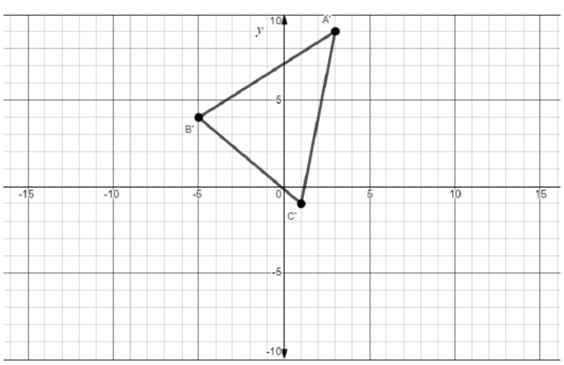


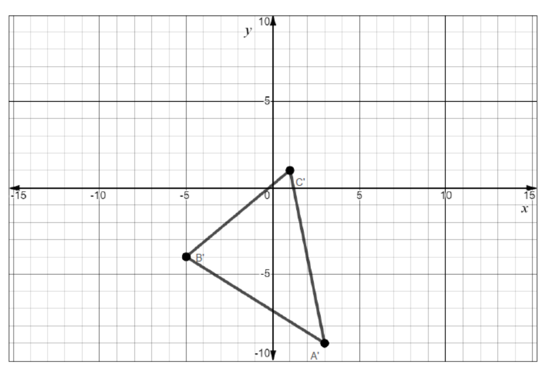
Possible Transformations	
A reflection across *x* = 2	A rotation clockwise 90°
A reflection across *y* = *x*	A translation left 10 and down 3





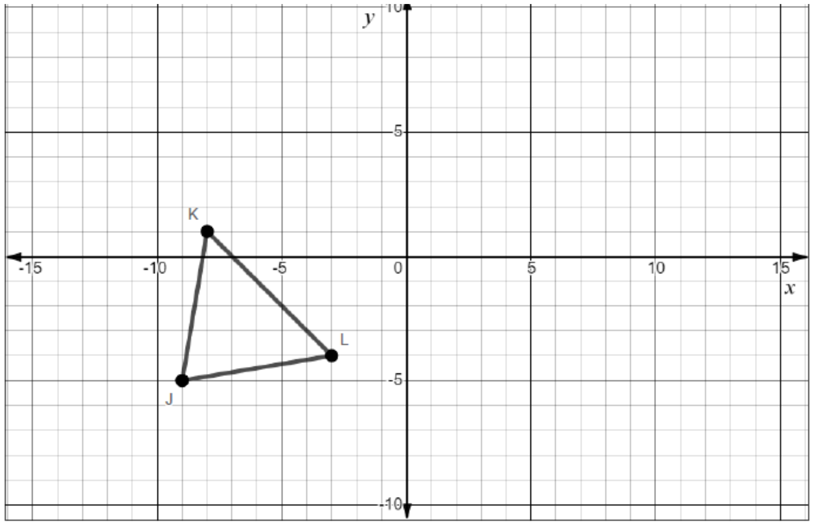
a) ____________________ b) _____________________



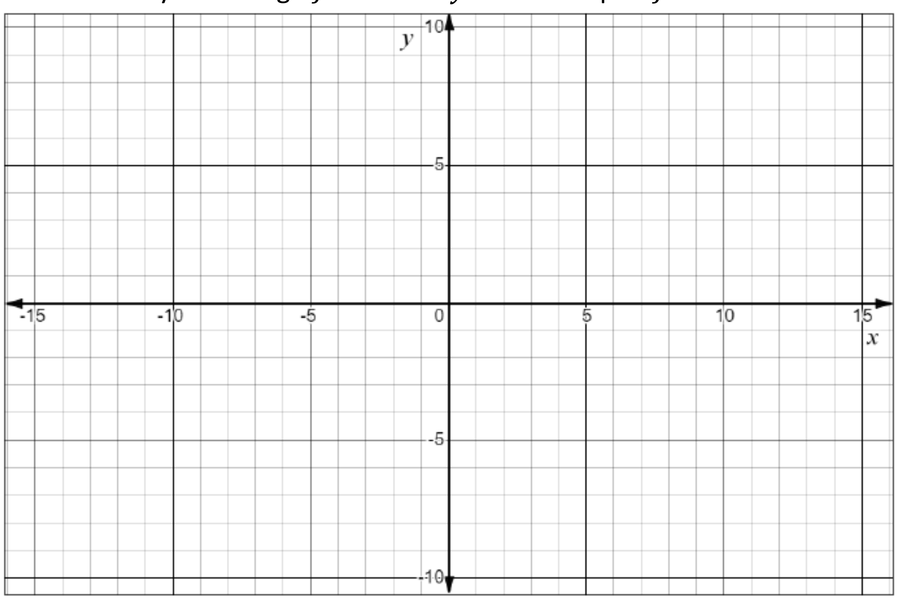


c) ____________________ d) _____________________

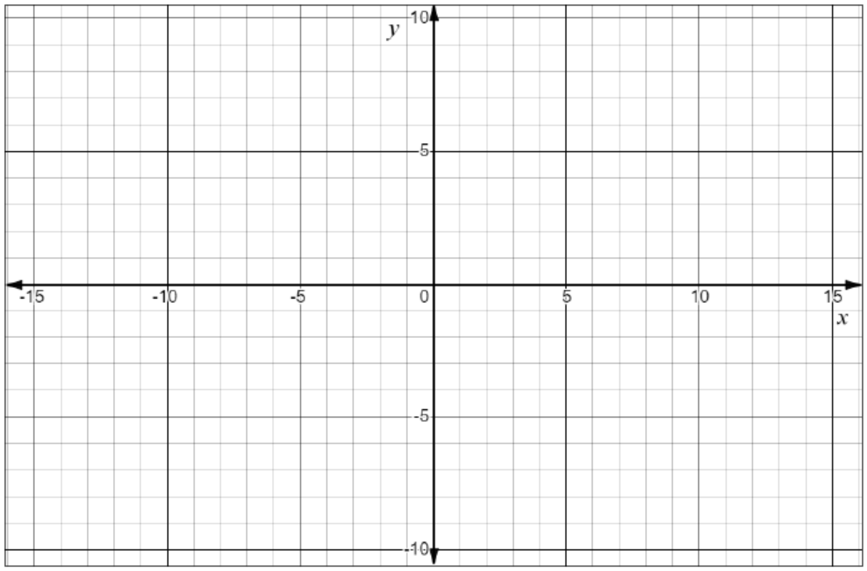
6. Given ΔJKL where *J* is (-9,-5), *K* is (-8,1), and *L* is (-3,-4), complete the following transformations.



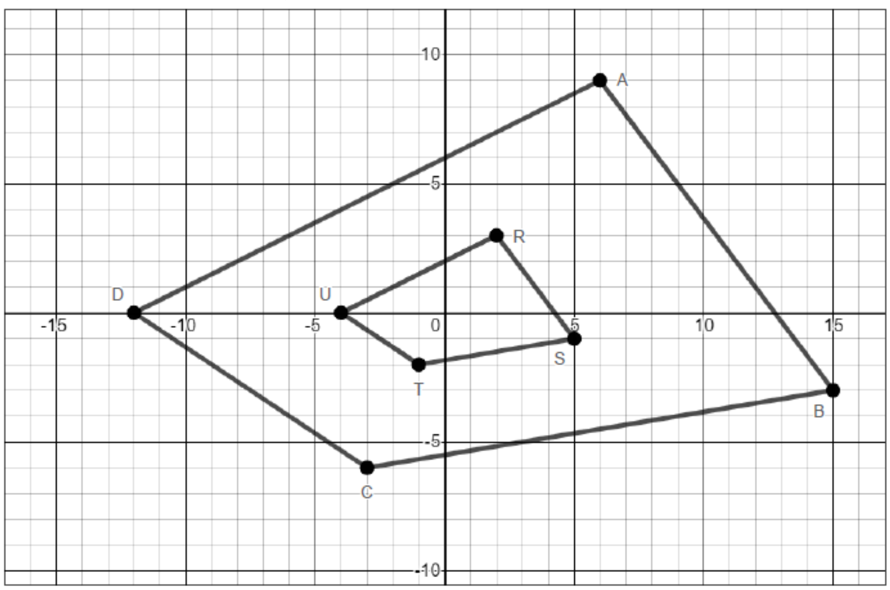
a) $\Delta J'K'L'$ is created by reflecting ΔJKL across $y = -x$. Graph $\Delta J'K'L'$.



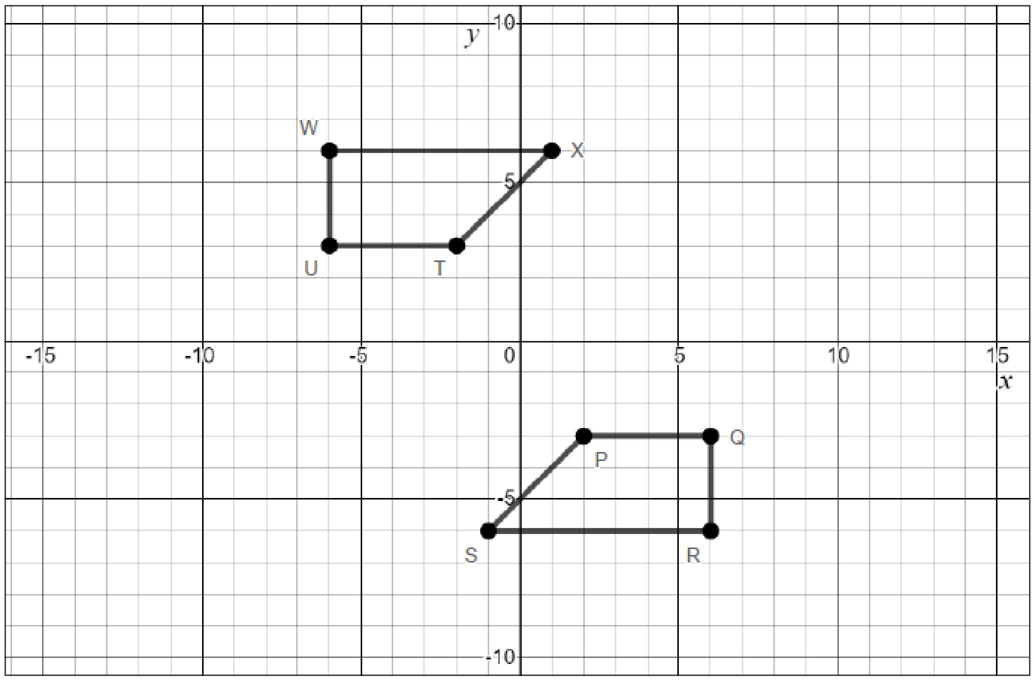
b) $\Delta J''K''L''$ is created by rotating ΔJKL counterclockwise $90°$. Graph $\Delta J''K''L''$.



7. The diagram shows two quadrilaterals graphed on a coordinate plane. Describe the transformation that maps Quadrilateral *ABCD* to Quadrilateral *RSTU*.



8. Use the graph below. Miguel thinks the transformation that describes how Quadrilateral *PQRS* is mapped to Quadrilateral *TUWX* is a clockwise rotation of $180°$ about the origin. Keisha thinks the transformation that describes how Quadrilateral *PQRS* is mapped to Quadrilateral *TUWX* is a reflection across the *y*-axis followed by a reflection across the *x*-axis. Who is correct? How do you know?



G.RLT.3 Just in Time Quick Check Teacher Notes

Common Errors/Misconceptions and their Possible Indications

1. Use the following letters to answer the questions below.

U P X N J

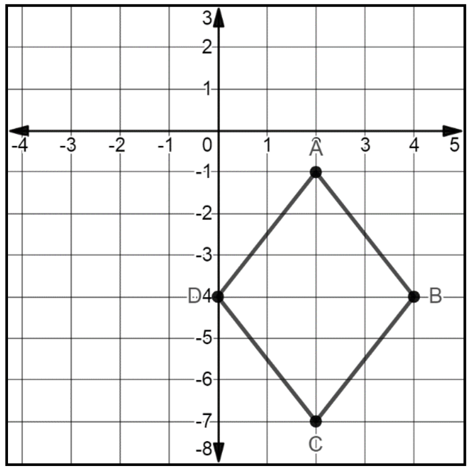
a) Which letter(s) have both line symmetry and point symmetry?
b) Which letter(s) have lines symmetry, but not point symmetry?
c) Which letter(s) have point symmetry, but not line symmetry?

Some students may assume incorrectly that N contains a line of symmetry diagonally. Additionally, some students may not readily see that N has point symmetry. Students could use techniques such as mirrors and paper folding as a strategy to help identify lines of symmetry. Another strategy may include using one half of a figure or image and having students create the other half of the figure or image that would make the figure or image symmetric. Teachers can use digital graphics to rotate electronically, or students can physically rotate a copy of an image as a strategy for identifying point symmetry.

2. Determine if the parallelogram and rectangle have line symmetry, point symmetry, both line and point symmetry, or neither point nor line symmetry. If line symmetry is present, draw the line(s) of symmetry.

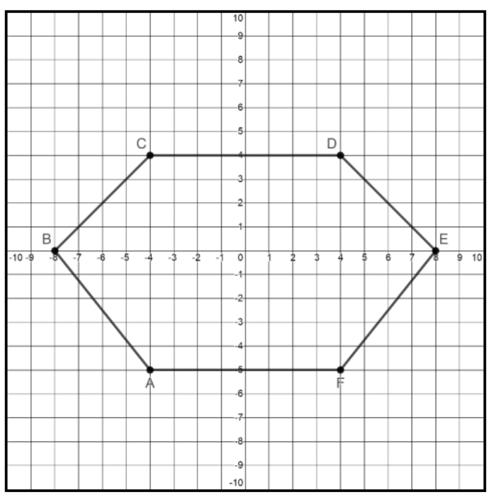
A common error some students may make is to draw lines of symmetry on the diagonals of the quadrilaterals. This may indicate that students perceive all lines that divide a figure into two congruent figures are lines of symmetry, which is not true. Techniques and strategies for helping students identify line symmetry may include using a coordinate grid and pattern blocks to provide students with a conceptual understanding of line symmetry using manipulatives. Have students create symmetrical designs and determine the line of symmetry in their design. Teachers may also wish to insert a black line on the coordinate grid in different locations (on the x-axis, y-axis, y=x, etc.) and encourage students to create a symmetrical design using the given line of symmetry. Teachers are encouraged to use a variety of examples related to symmetry to include letters, shapes, numbers, and images found in nature.

3. Quadrilateral ABCD with points A (2, -1), B (4, -4), C (2, -7), D (0, -4) is shown below. Write the equation(s) of the line(s) of symmetry in Quadrilateral ABCD.



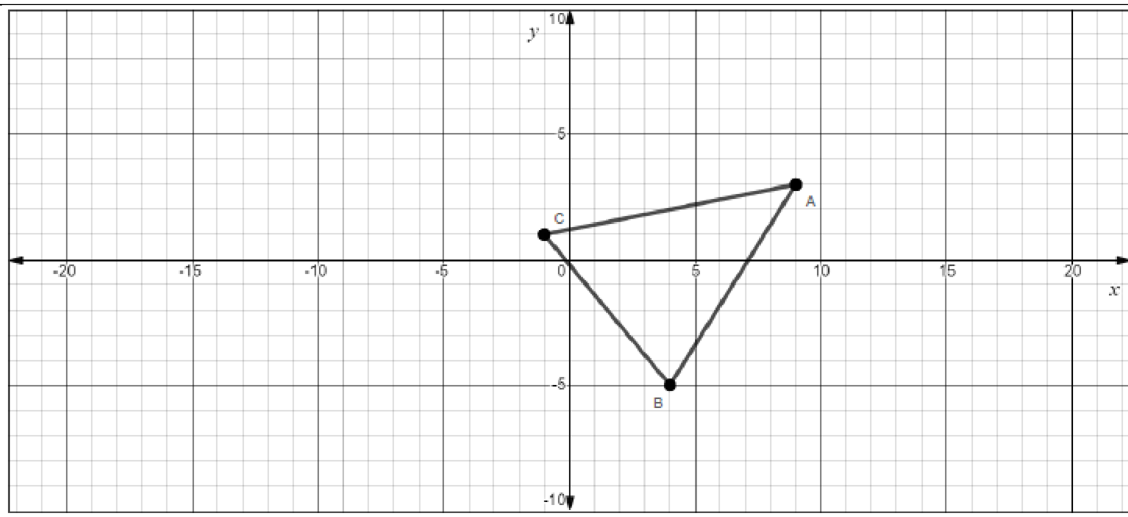
A common error students may make is to incorrectly identify the lines of symmetry as x = -4 and y = 2 in polygon ABCD. This may indicate that students are struggling with writing the equations of horizontal and vertical lines. Teachers should encourage students to graph the lines of symmetry, either by hand or using a graphing utility.

4. Given Polygon ABCDEF with points A (-4,-5), B (-8, 0), C (-4, 4), D (4, 4), E (8, 0), F (4, -5), determine if the polygon has point symmetry, line symmetry, both, or none. If the figure has line symmetry, identify how many lines.



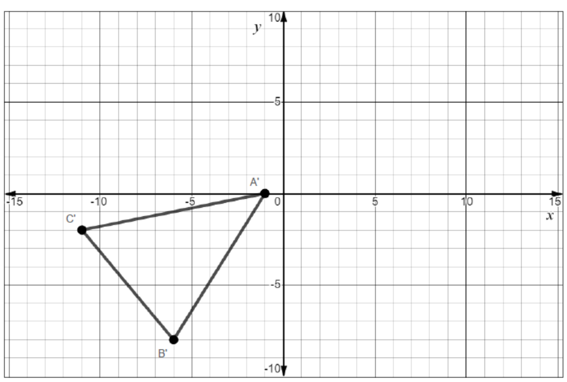
A common error students may make is to identify that the figure has both line symmetry and point symmetry. Students may use the image as a means of determining symmetry because they assume it is a regular hexagon rather than verifying algebraically. Teachers should encourage students to verify that corresponding sides are congruent using the distance formula before they assume that the figure is a regular hexagon. When side lengths are verified, it will be determined that $\overline{CB}$ and $\overline{DE}$ are not congruent to $\overline{AB}$ and $\overline{FE}$.

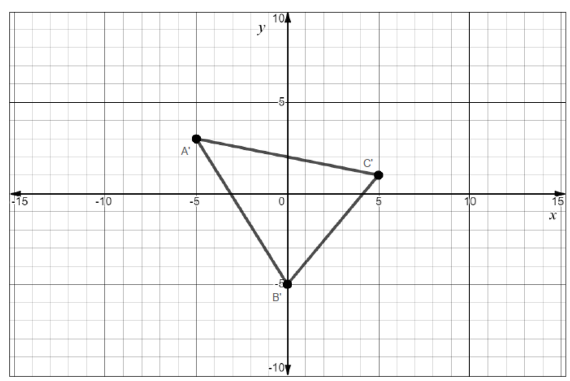
5. Given Triangle *ABC* on the coordinate plane, state the transformation that best describes each graph.



Possible Transformations

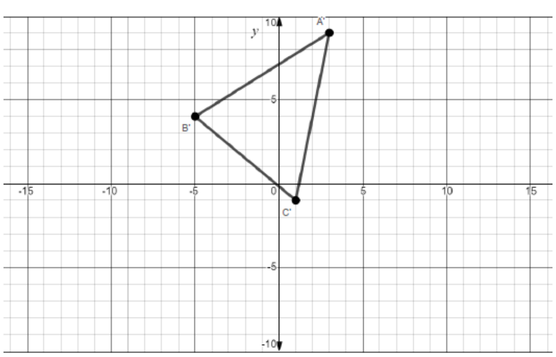
A reflection across $x = 2$	A rotation clockwise 90°
A reflection across $y = x$	A translation left 10 and down 3

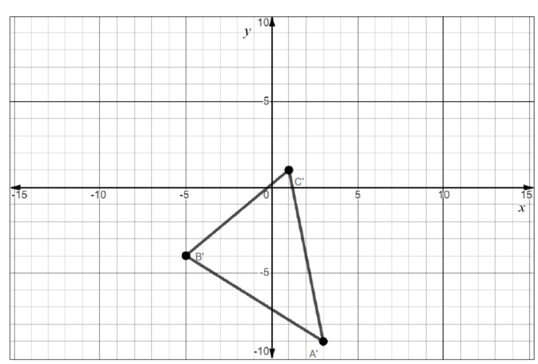




a) ____________________

b) _____________________





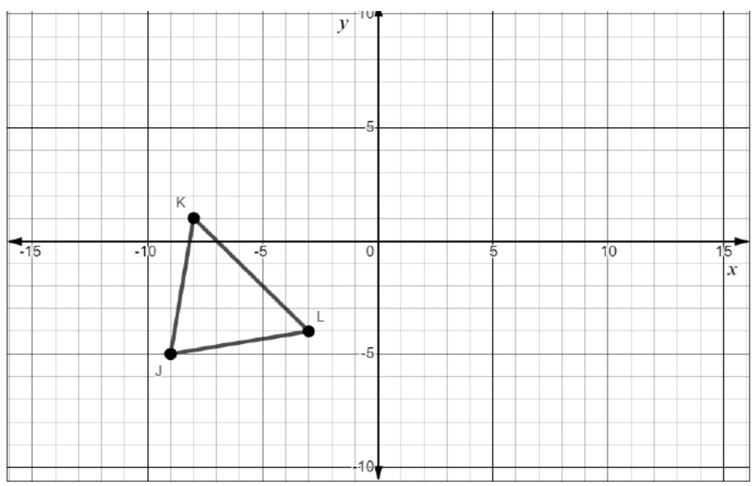
c) ____________________

d) _____________________

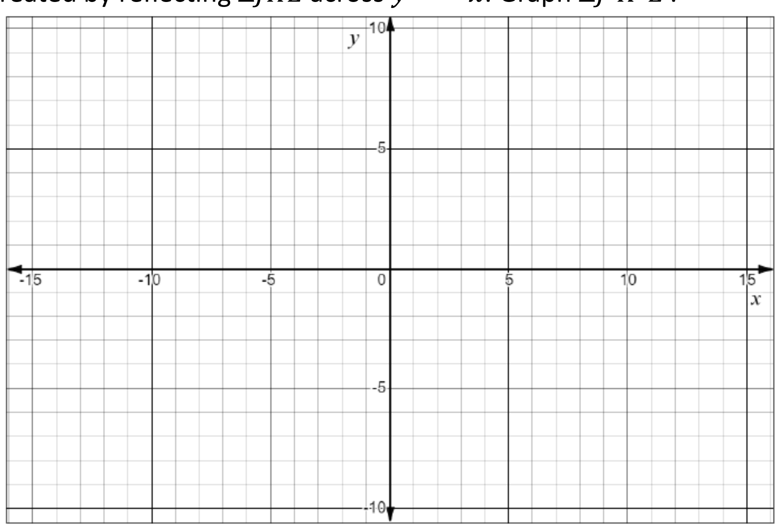
Parts a) and c): A common error students may make is to confuse the reflection across y = x with the translation left 10 and down 3 or the reflection across x = 2. This may indicate that students are not graphing the line y = x correctly or are struggling with reflecting across non-vertical or non-horizontal lines. Teachers are encouraged to have students identify patterns in the relationship with the rule and the actual transformation.

Parts b) and d): Another common error some students may make is to confuse the rotation clockwise 90° with the reflection across x = 2. This may indicate that students are mistaking a counterclockwise rotation for a clockwise rotation. Teachers are encouraged to use patty paper with students to have them physically rotate the figure or simply practice turning a figure on a piece of graph paper a full 90 degrees to illustrate 90 degree rotations.

6. Given ΔJKL where *J* is (-9,-5), *K* is (-8,1), and *L* is (-3,-4), complete the following transformations.

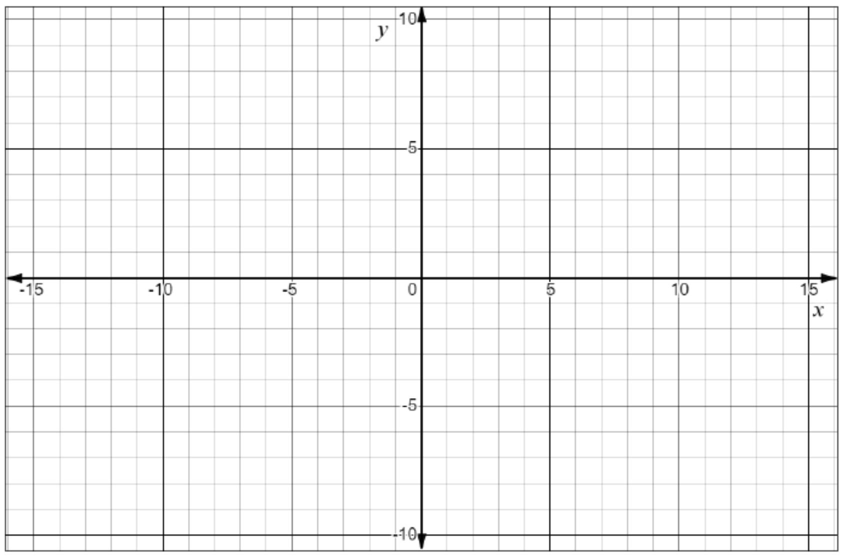


a) $\Delta J'K'L'$ is created by reflecting ΔJKL across $y = -x$. Graph $\Delta J'K'L'$.



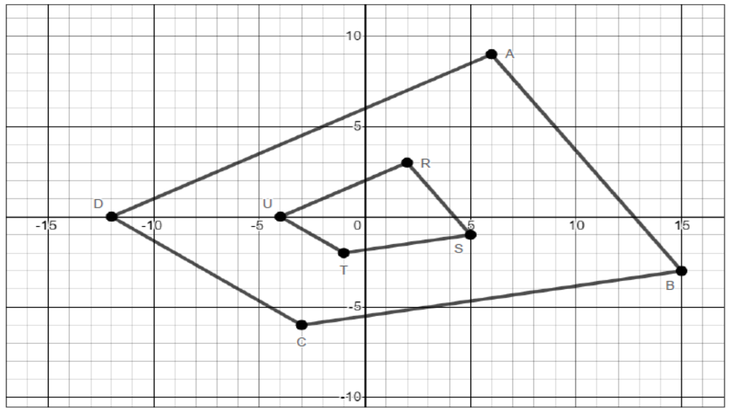
A common error students may make is to forget to take the opposite sign of the ordered pairs when using the rule to reflect ΔJKL across $y = -x$. For instance, students may plot the points (-5, -9), (1, -8) and (-4, -3) which is a reflection across $y = x$. This may indicate that students have incorrectly memorized the rule for reflecting across $y = -x$. If students choose to find the transformation graphically and draw the line correctly but do not have the correct triangle drawn, this may indicate that students are trying to reflect the triangle across $y = -x$ in the same manner as they would a vertical or horizontal line. In other words, students may attempt to move the triangle horizontally or vertically rather than using the line for reflection. Teachers are encouraged to use Desmos or another dynamic graphing software to help illustrate transformations. In addition, some students may benefit from using patty paper to create transformations.

b) $\Delta J''K''L''$ is created by rotating ΔJKL counterclockwise $90°$. Graph $\Delta J''K''L''$.



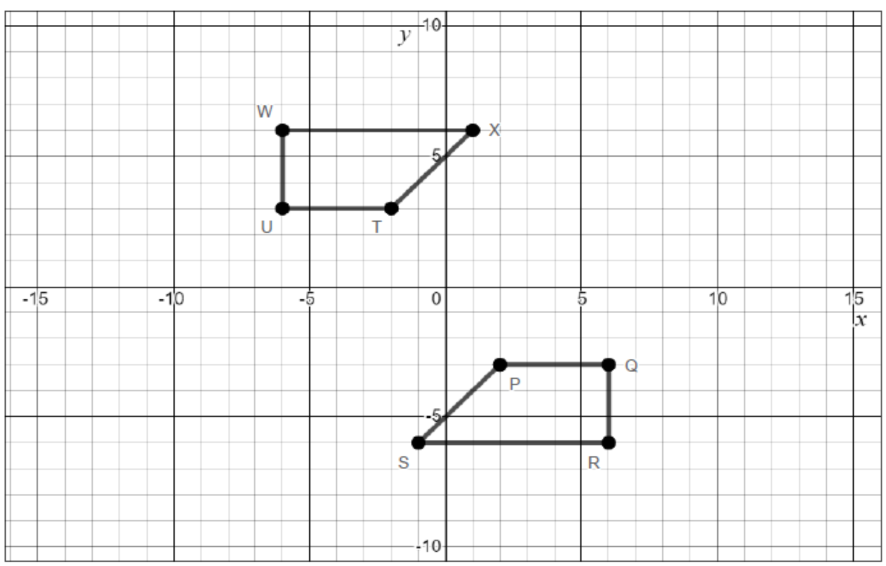
A common error students may make is to rotate the figure clockwise instead of counterclockwise. This may indicate that students are confused about the vocabulary associated with clockwise and counterclockwise. Teachers may wish to use the visual of an analog clock to help students determine the correct direction or do a comparison between clockwise/counterclockwise to see how they are alike and different.

7. The diagram shows two quadrilaterals graphed on a coordinate plane. Describe the transformation that maps Quadrilateral *ABCD* to Quadrilateral *RSTU*.



A common error students may make is to state the transformation is a dilation by a scale factor of 3 centered at the origin. This may indicate that students have started with the wrong quadrilateral or have incorrectly concluded that dilations only enlarge a figure. Additionally, teachers are encouraged to use real life examples of dilations, such as one's eyes when dilated, and architecture to illustrate that dilations can be enlargements or reductions of a figure.

8. Use the graph below. Miguel thinks the transformation that describes how Quadrilateral *PQRS* is mapped to Quadrilateral *TUWX* is a clockwise rotation of $180°$ about the origin. Keisha thinks the transformation that describes how Quadrilateral *PQRS* is mapped to Quadrilateral *TUWX* is a reflection across the *y*-axis followed by a reflection across the *x*-axis. Who is correct? How do you know?



A common misconception students may have is that only Miguel or Keisha is correct instead of both individuals. This may indicate that students think only one transformation or sequence of transformations can map one figure onto another. Teachers are encouraged to use examples where students can see that there is more than one combination of transformations that can map one figure onto another.