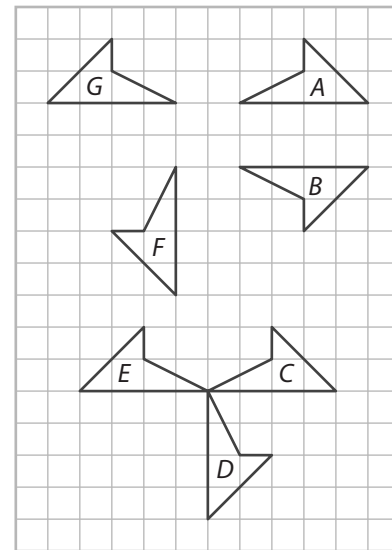


In Exercises 9–12, use the diagram. Fill in the blank with the letter of the correct image described.

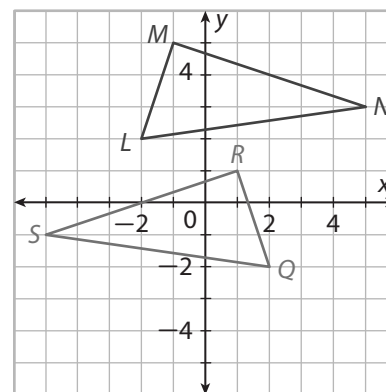
9. ____ is the result of the sequence: G reflected over a vertical line and then a horizontal line.
10. ____ is the result of the sequence: D rotated 90° clockwise around one of its vertices and then reflected over a horizontal line.
11. ____ is the result of the sequence: E translated and then rotated 90° counterclockwise.
12. ____ is the result of the sequence: D rotated 90° counterclockwise and then translated.



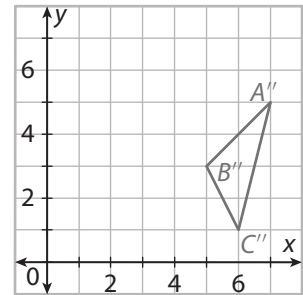
Choose the correct word to complete a true statement.

13. A combination of two rigid transformations on a preimage will always/sometimes/never produce the same image when taken in a different order.
14. A double rotation can always/sometimes/never be written as a single rotation.
15. A sequence of a translation and a reflection always/sometimes/never has a point that does not change position.
16. A sequence of a reflection across the x -axis and then a reflection across the y -axis always/sometimes/never results in a 180° rotation of the preimage.
17. A sequence of rigid transformations will always/sometimes/never result in an image that is the same size and orientation as the preimage.
18. A sequence of a rotation and a dilation will always/sometimes/never result in an image that is the same size and orientation as the preimage.
19. $\triangle QRS$ is the image of $\triangle LMN$ under a sequence of transformations. Can each of the following sequences be used to create the image, $\triangle QRS$, from the preimage, $\triangle LMN$? Select yes or no.

- a. Reflect across the y -axis and then translate along the vector $\langle 0, -4 \rangle$. Yes No
- b. Translate along the vector $\langle 0, -4 \rangle$ and then reflect across the y -axis. Yes No
- c. Rotate 90° clockwise about the origin, reflect across the x -axis, and then rotate 90° counterclockwise about the origin. Yes No
- d. Rotate 180° about the origin, reflect across the x -axis, and then translate along the vector $\langle 0, -4 \rangle$. Yes No

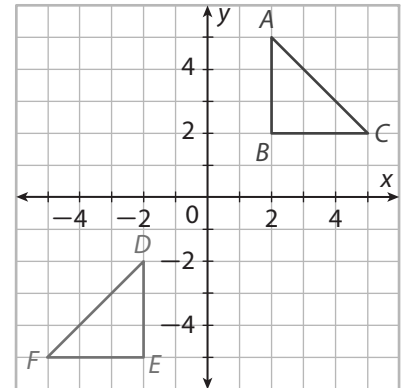


20. A teacher gave students this puzzle: "I had a triangle with vertex A at $(1, 4)$ and vertex B at $(3, 2)$. After two rigid transformations, I had the image shown. Describe and show a sequence of transformations that will give this image from the preimage."



H.O.T. Focus on Higher Order Thinking

21. **Analyze Relationships** What two transformations would you apply to $\triangle ABC$ to get $\triangle DEF$? How could you express these transformations with a single mapping rule in the form of $(x, y) \rightarrow (?, ?)$?



22. **Multi-Step** Muralists will often make a scale drawing of an art piece before creating the large finished version. A muralist has sketched an art piece on a sheet of paper that is 3 feet by 4 feet.



- If the final mural will be 39 feet by 52 feet, what is the scale factor for this dilation?
- The owner of the wall has decided to only give permission to paint on the lower half of the wall. Can the muralist simply use the transformation $(x, y) \rightarrow (x, \frac{1}{2}y)$ in addition to the scale factor to alter the sketch for use in the allowed space? Explain.

23. **Communicate Mathematical Ideas** As a graded class activity, your teacher asks your class to reflect a triangle across the y -axis and then across the x -axis. Your classmate gets upset because he reversed the order of these reflections and thinks he will have to start over. What can you say to your classmate to help him?