Math 9 Line and Rotation Symmetry

Use the webstart button at www.geogebra.org or paper and pencil to complete the following.

Part A

1. Create polygon ABCDE by joining the following coordinates in order.
   A (2, 5) B(5, 5) C(3, 3) D(5, 1) E(2, 1) (back to A)
2. Create line segment FG by joining the following coordinates.
   F(-1, 3) G(7, 3)
3. Reflect polygon ABCDE over the line segment FG. What do you notice? What does this mean?
4. Are there any other lines of symmetry? Describe them.
5. Does this shape have any rotation symmetry? (If you're not sure what that is, complete part B and then come back to this shape.)

Part B

1. Create polygon ABCDEF by joining the following coordinates in order.
   A(3, 4) B(7, 4) C(6, 1) D(5, 2) E(1, 2) F(2, 5) (back to A)
2. Create point G at (4, 3).
3. Rotate the polygon clockwise 180° about point G. What do you notice? What does this mean?
4. Is there any other rotation symmetry? If yes, describe the rotations.
5. Does this shape have any line symmetry?

Part C

1. Create polygon ABCDEFGHIJKL by joining the following coordinates in order.
   A(1, 5) B(2, 5) C(2, 4) D(3, 4) E(3, 3) F(2, 3) G(2, 2) H(1, 2) I(1, 3) J(0, 3) K(0, 4) L(1, 4) (back to A)
2. Create point M at (1.5, 3.5).
3. Rotate the polygon clockwise about point M by 90°. What do you notice? What does this mean?
4. Is there any other rotation symmetry? If yes, describe the rotations.
5. Create line segment NO by joining the following coordinates.
   N(-1, 6) O(4, 1)
6. Reflect the polygon over line segment NO. What do you notice? What does this mean?
7. Are there any other lines of symmetry? Describe them.

Part D

1. Create quadrilateral ABCD by joining the following coordinates in order.
   A(1, 5) B(3, 6) C(5, 5) D(3, 4) (back to A)
2. Does quadrilateral ABCD have any line symmetry? If yes, describe the location of any lines of symmetry. Verify your solution.
3. Does quadrilateral ABCD have any rotation symmetry? If yes, describe the rotation(s) that would result in rotation symmetry.

Part E

1. Create three shapes of your own that would meet the following qualifications:
   a) Has line symmetry but no rotation symmetry.
   b) Has rotation symmetry but no line symmetry.
   c) Has exactly one line of symmetry.
   d) Has more than one line of symmetry.
   e) Has line and rotation symmetry.

   For each, record your work. (Include diagrams of your original shape, the location of any lines of symmetry, and rotation description(s). You can do this by pasting your work into a Word document from Geogebra or by using graph paper and pencil.)