1. a. A triangular prism has 5 faces.
   b. A triangular pyramid has 4 faces.
   c. Any polyhedron must have at least 4 faces.

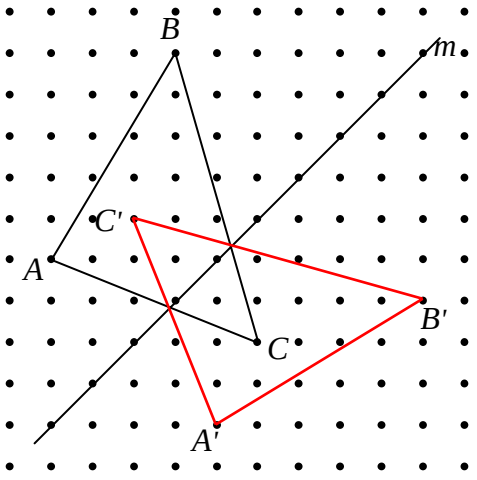
2. A nonagonal pyramid. To be a prism with 10 vertices, you must have a pentagonal prism, with 5 vertices at each base. But this prism would have 15 edges: 5 at each base and 5 between the bases. To be a pyramid with 10 vertices, you must have a nonagonal pyramid, with 9 vertices around the base, and the tenth at the apex. This pyramid would indeed have 18 edges—9 around the base and nine more going up to the apex.

3. Yes—an 11-gon prism has 33 edges: eleven at each base and eleven more between the bases. No—a pyramid cannot have 33 edges, since the number of edges around the base is equal to the number from the base to the apex, the number of edges must be even.

4. The polyhedron is not a pyramid and not a prism.

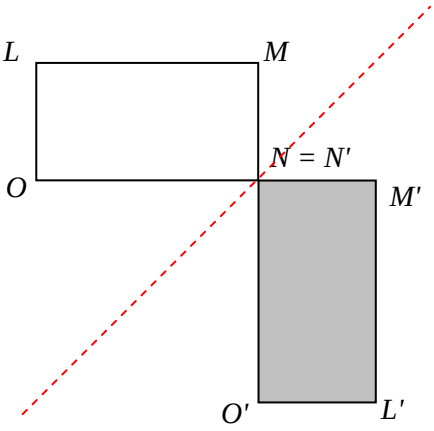
5. a. Not possible
   b. Not possible
   c. A 99-gon prism
   d. A pentagonal pyramid
   e. A 100-gon pyramid
   f. Not possible
   g. A nonagonal pyramid.

6. Sketch the image of triangle *ABC* after a reflection across line *m* and label it *A′B′C′*.



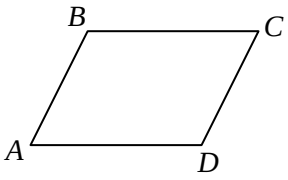
7. Answers shown on the figures below.

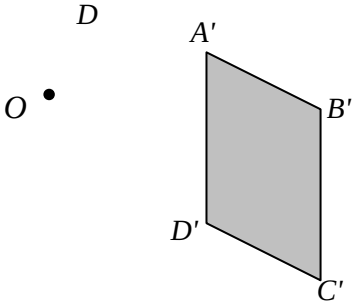
a.



Reflection about the line shown here.

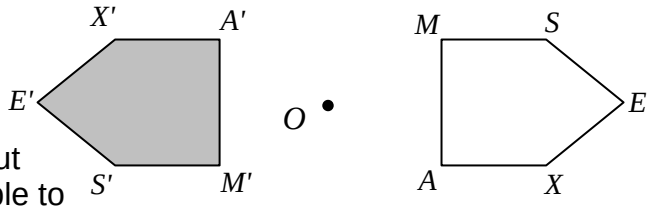
b.





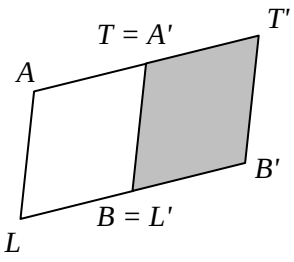
Rotation of 90˚ about *O*. You should be able to approximate the location of *O*.

c.



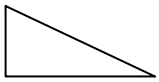
Rotation of 180˚ about *O*. You should be able to approximate the location of *O*.

d.

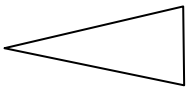


Translation.

8. For each condition below, sketch a triangle that satisfies the condition. If it is not possible to sketch such a triangle, state briefly why it is not possible.
   a. It has no lines of symmetry.

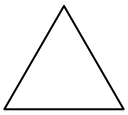


   b. It has exactly one line of symmetry.



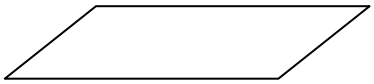
   c. It has exactly two lines of symmetry.
   It is not possible to make a triangle with exactly two lines of symmetry. Each line of symmetry implies a pair of congruent sides. So a figure with only three sides to have two pairs of symmetric sides, all three sides must be congruent. But that means you have an equilateral triangle, which has three lines of symmetry.

   d. It has exactly three lines of symmetry.

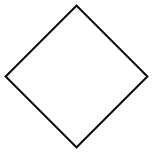


9. Possible solutions are shown below.

   a) A quadrilateral that has rotational symmetry but no reflection symmetry.



   b) A quadrilateral that has both rotational and reflection symmetry.



10. The figure has 8 rotation symmetries: 45°, 90°, 135°, etc.

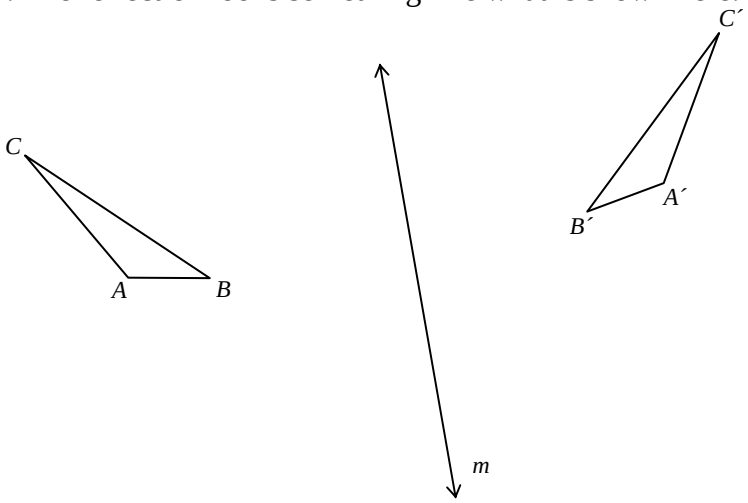
11. The capital H has two lines of reflection symmetry and 2 rotation symmetries.

12. The capital N has 2 rotation symmetries.

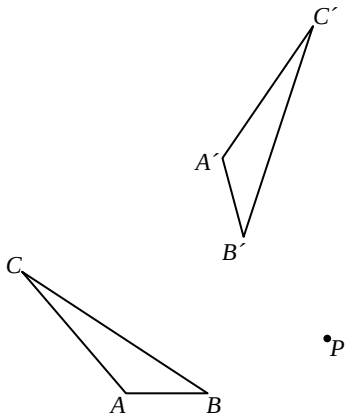
13. A. The figure has reflection symmetry with 4 lines of symmetry: 1 horizontal, 1 vertical, and 2 diagonal. It also has 4 rotation symmetries, at 90 degree intervals (so at 90, 180, 270, and 360 degrees).
    B. The figure has reflection symmetry, with one vertical line of symmetry. There are no rotation symmetries. (The figure would have more lines of symmetry and 5 rotation symmetries if it was a regular pentagon, but it is clear from the picture that the pentagon is NOT regular).

C. The figure has reflection symmetry, with 8 lines of symmetry. 4 of the lines cut directly down the center of the triangles; the other 4 fall directly between pairs of triangles. The figure also has 8 rotation symmetries. They are at 45 degree intervals (so at 45, 90, 135, 180, 225, 270, 315, and 360 degrees). You can figure this out once you recognize there are 8 of them by taking 360/8.

14. The reflection looks something like what is shown here.



15. The rotation looks something like what is shown here.



16. The completed design is: