F.3 Mathematics – Supplementary Worksheet for NCM 3B Chapter 9

Name: _____

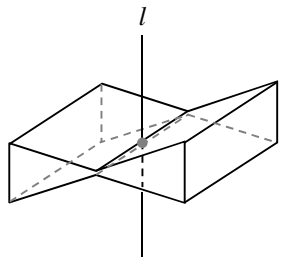
Class: **3**_____ **(** **)**

Date: _____

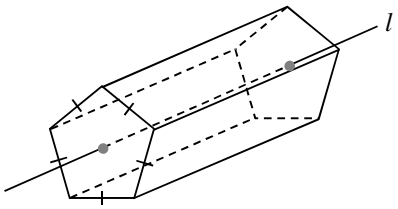
Level 1

1. In each of the following figures, if l is the axis of rotation, find the order of rotational symmetry of the prism.

(a)



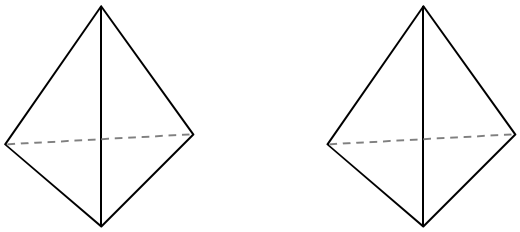
(b)



(10 marks)

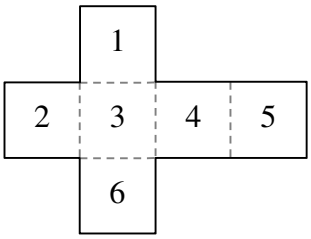
2. (a) How many planes of reflection are there in a regular tetrahedron?

   (b) Draw any two planes of reflection of a regular tetrahedron below.



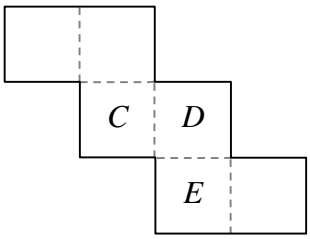
(12 marks)

3. Imagine a 3-D object is folded from the net below. What numbers will be on the four faces adjacent to the face with the number '3'?



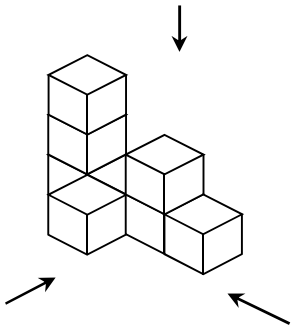
(10 marks)

4. The net in the given figure can be folded to form a dice. If this dice is thrown and the letter '*D*' is marked on the top face, what letter is marked on the bottom face?



(10 marks)

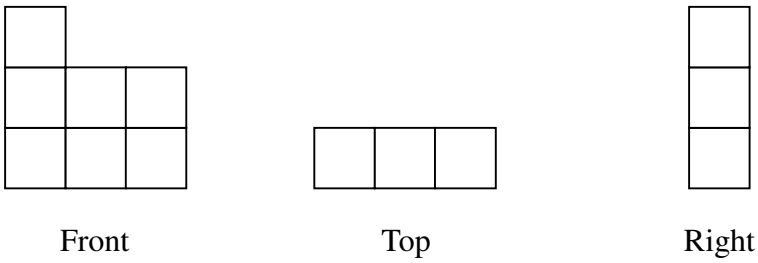
5. Draw the front, top and side views of the following 3-D object.



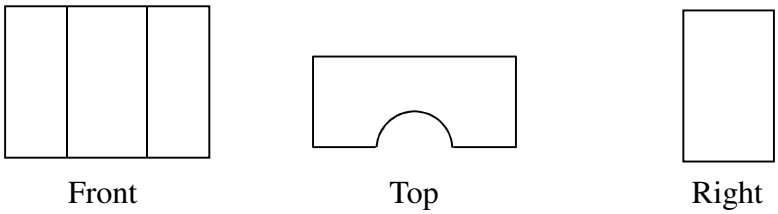
(10 marks)

6. In each of the following, according to the three 2-D representations of a solid, sketch the corresponding 3-D object.

(a)

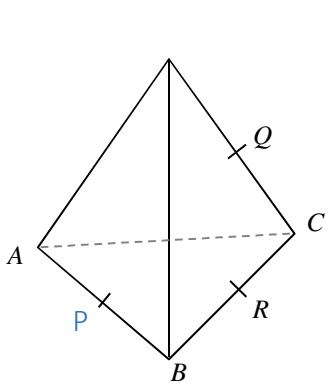


(b)



(14 marks)

7. The figure shows a regular tetrahedron. P, Q and R are the mid-points of AB, VC and BC respectively.



(a) Mark the angles between the following planes.

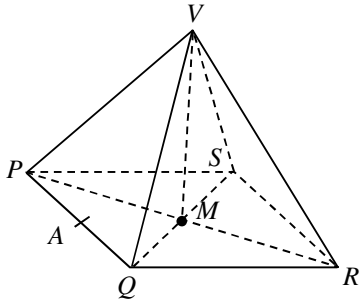
(i) VBC and ABC

(ii) VBC and VAC

(b) $\angle VPC$ is the angle between two planes of the tetrahedron. Name these two planes.

(10 marks)

8. Refer to the 3-D object on the right. The base $PQRS$ is a square. A is the mid-point of PQ, $VP = VQ = VR = VS$. The projection of point V on the plane $PQRS$ is M, which is also the intersection point of PR and SQ.



(a) Name the angle between the planes VPQ and $PQRS$.

(b) Name the angle between the base $PQRS$ and each of the following edges.

(i) VP

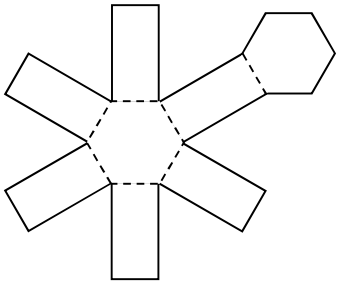
(ii) VS

(iii) VR

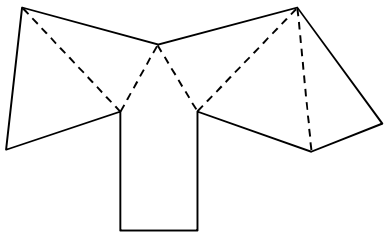
(12 marks)

9. The following figures show the nets of two polyhedra. Find the number of faces, number of vertices and number of edges of these polyhedra.

(a)



(b)

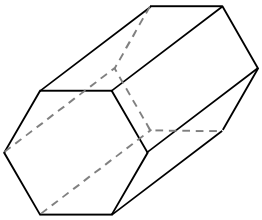


(12 marks)

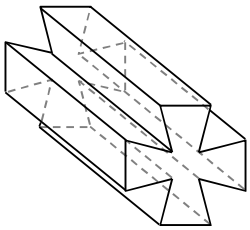
Level 2

1. In each of the following, write down the number of planes of reflection of the given solid.

(a)



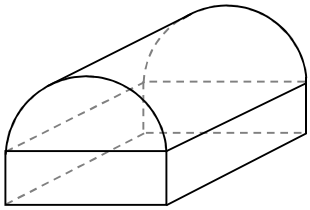
(b)



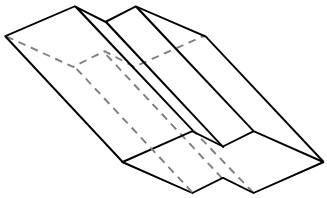
(10 marks)

2. In each of the following, write down the number of axis/axes of rotation of the given solid.

(a)

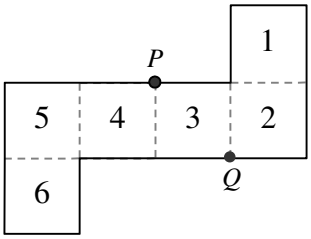


(b)



(10 marks)

3. The figure shows a net which can be folded into a cube.



(a) In the cube, find the numbers on the faces that will coincide with

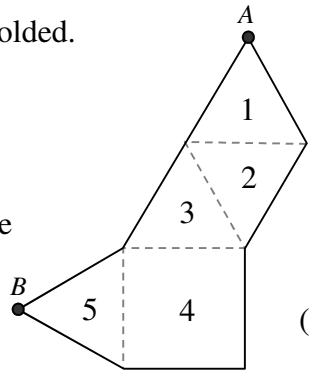
(i) the point P,

(ii) the point Q.

(b) By using the answers in (a), determine which number is on the face opposite to the face with the number '3'.

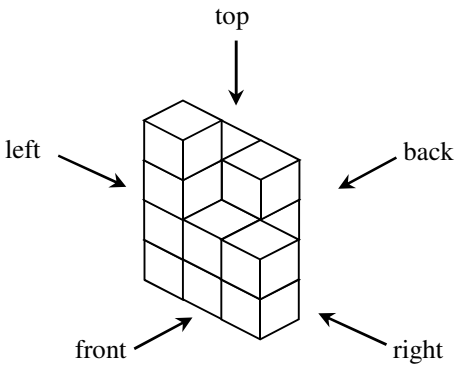
(12 marks)

4. The figure on the right shows the net of a 3-D object. The net is then folded.
   (a) Find the numbers on the faces that will coincide with
      (i) the point A,
      (ii) the point B.
   (b) Find the numbers on the faces that are adjacent to the face with the number '1'.



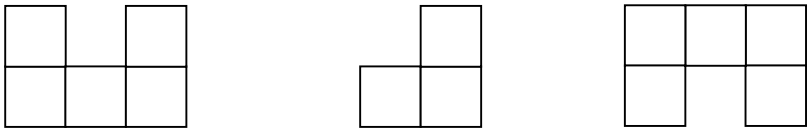
(12 marks)

5. Draw the front, back, top, left and right views of the following 3-D object.



(12 marks)

6. A 3-D object is made up of identical cubes. The figures below show three of its 2-D representations.

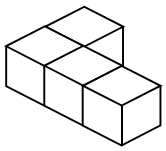


Front Right Top

   (a) Sketch the corresponding 3-D object.
   (b) How many cubes are there in the 3-D object?

(12 marks)

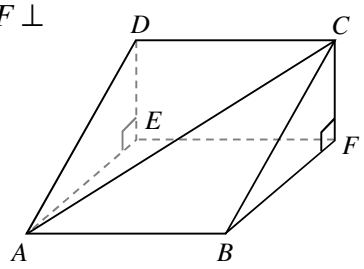
7. The figure on the right shows a 3-D object formed by cubes.



   (a) If one cube is added to the object so that the new 3-D object formed has the property/properties given in each question below, sketch the new 3-D object formed.
      (i) Rotational symmetry only.
      (ii) Both reflectional and rotational symmetry.
   (b) Draw the top, front and right views of the new 3-D object for the cases in (a)(i) and (a)(ii).

(14 marks)

8. The figure shows a triangular prism. $ABCD$ and $ABFE$ are rectangles, $CF \perp BF$ and $DE \perp AE$.



(a) Find the projection of CA on the plane $ABFE$.

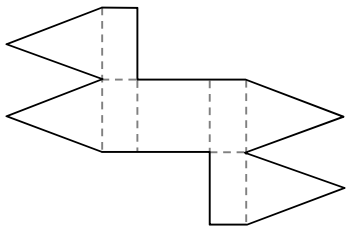
(b) Find the projection of CA on the plane $CDEF$.

(c) Name the angle between CA and the plane $ABFE$.

(d) Name the angle between CA and the plane $CDEF$.

(12 marks)

9. The following figure shows the net of a polyhedron. Find the number of faces, number of vertices and number of edges of this polyhedron.



(6 marks)