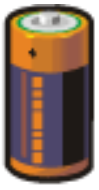
Representing 3-D in 2-D

- We see a few shapes in our day- to-day life which are not flat. Some of these shapes are solids.

(Cricket ball : a sphere)

(Brick : a cuboid)

(Ice cream : a cone)

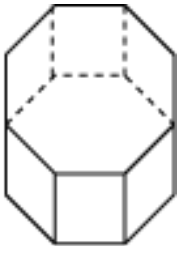


(Battery : a cylinder)

(Die : a cube)

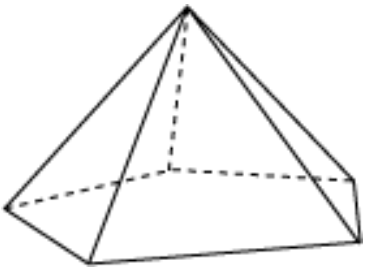
- A prism is a polyhedron whose base and top are congruent polygons and whose lateral faces are parallelograms in shape.

  For example:



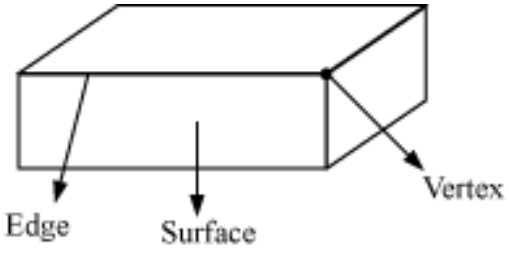
- A pyramid is a polyhedron whose base is a polygon (of any number of sides) and whose lateral faces are triangles with a common vertex.

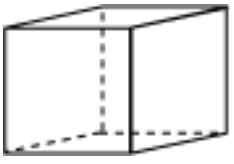
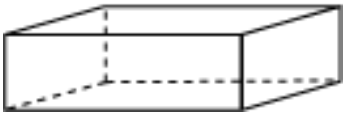
  For example:

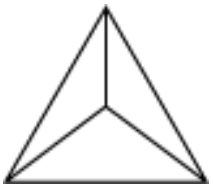
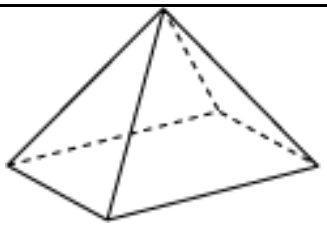
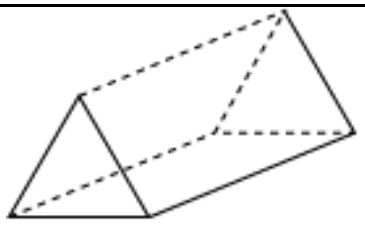


  Note: A prism or a pyramid is named subsequent to the shape of its base. For instance, pentagonal prism and pentagonal pyramid are named after their base, pentagon.

- Each side of a cuboid is flat, called a **flat surface** (or surface). Two faces meet at a line segment called an **edge**. Three edges meet at a point called the **vertex.**



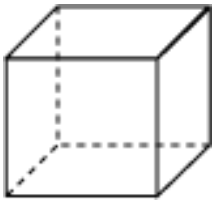
Solid	Figure	Properties
Cube		6 faces 12 edges 8 vertices (corners)
Cuboid		6 faces 12 edges 8 vertices
Cylinder		2 flat faces (circles)

		1 curved face
Cone		1 flat surface 1 curved surface 1 vertex
Triangular Pyramid		4 faces 6 edges 4 vertices
Square pyramid		5 faces 8 edges 5 vertices
Triangular prism		5 faces 9 edges 6 vertices

- For any polyhedron, F + V – E = 2, where F is the number of faces, V is the number of vertices and E is the number of edges.

  This relationship is called Euler's formula.

  Example: Verify Euler's formula for the given solid.



Solution:

The given figure is a cube.

We have

Number of vertices, $V = 8$

Number of edges, $E = 12$

Number of faces, $F = 6$

Thus, $F + V – E = 6 + 8 – 12 = 14 – 12 = 2$

Hence, Euler’s formula is verified.