

Visualising Solid Shapes: Exercise 10.3

Q.1 Can a polyhedron have for its faces

(i) 3 triangles?

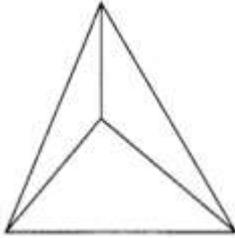
(ii) 4 triangles?

(iii) a square and four triangles?

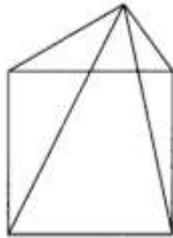
Sol.

(i) No, because the edges of the polyhedron must meet at the vertices which are points.

(ii) Yes, because all the edges of 4 triangles are meeting at the vertices as shown in figure.



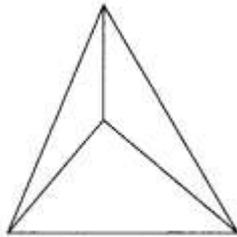
(iii) Yes, since all the eight edges of a square and four triangles meet at the vertices.



Q.2 Is it possible to have a polyhedron with any given number of faces?

(Hint: Think of a pyramid)

Sol.



Pyramid

Yes, if the number of faces is greater than or equal to 4 then polyhedron is possible. Such as, pyramid which has 4 faces.

Q.3 Which are prisms among the following?

(i)



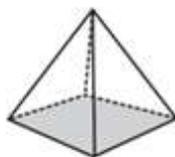
A nail

(ii)



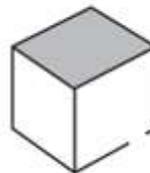
Unsharpened pencil

(iii)



A table weight

(iv)



A box

Sol. Figure (ii) which is unsharpened pencil and figure (iv) which is a box are the prism.

Q.4 (i) How are prisms and cylinders alike?

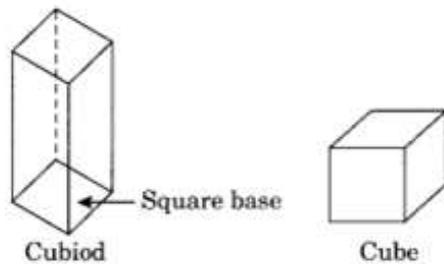
(ii) How are pyramids and cones alike?

Sol. (i) If the number of sides in a prism is increased to some extent, the prism will convert in to shape of a cylinder.

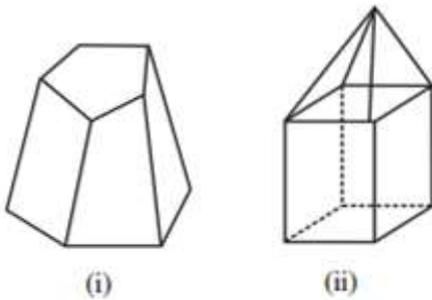
(ii) If the number of sides of the pyramid is increased to same extent, then the pyramid converts into a cone.

Q.5 Is a square prism same as a cube? Explain.

Sol. Every square prism cannot be always a cube. It may be cuboid also as shown in figure.



Q.6 Verify Euler's formula for these solids.



Sol.

(i) Since, in the figure Faces = 7
Sides = 15
and Vertices = 10
Since, Euler's formula: $F + V - E = 2$
 $\Rightarrow 7 + 10 - 15 = 2$
 $\Rightarrow 2 = 2$
Thus, Euler's formula is verified.

(ii) Since, in the figure Faces = 9
Sides = 16
and Vertices = 9
Since, Euler's Formula: $F + V - E = 2$
 $\Rightarrow 9 + 9 - 16 = 2$
 $\Rightarrow 2 = 2$
Thus, Euler's formula is verified.

Q.7 Using Euler's formula find the unknown.

Faces	?	5	20
Vertices	6	?	12
Edges	12	9	?

Sol. By using Eulers Formula: $F + V - E = 2$

Faces	8	5	20
Vertices	6	6	12
Edges	12	9	30

Q.8 Can a polyhedron have 10 faces, 20 edges and 15 vertices?

Sol. Given: Faces = 10, Edges = 20 and Vertices = 15

Now, Euler's Formula:

$$F + V - E = 2$$

$$\Rightarrow 10 + 15 - 20 = 25 - 20$$

$$\Rightarrow 5 \neq 2$$

Thus, a polyhedron do not have 10 Faces, 20 Edges and 15 Vertices.

EDUGEEKS