



SpeedLabs

MATHS

CBSE 8th

TEEVRA EDUTECH PVT. LTD.

Visualizing 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?

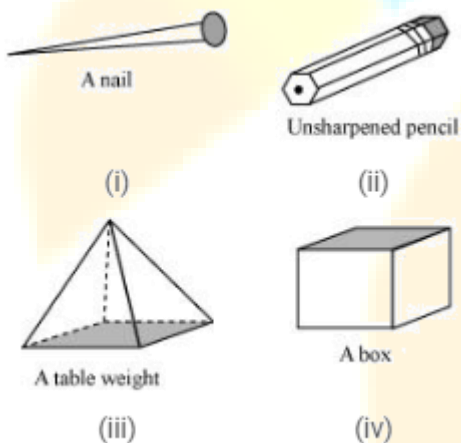
Sol:

- (i) No, a polyhedron cannot have 3 triangles for its faces.
- (ii) Yes, a polyhedron can have four triangles which is known as pyramid on triangular base.
- (iii) Yes, a polyhedron has its faces a square and four triangles which makes a pyramid on square base.

Q.2 Is it possible to have a polyhedron with any given number of faces? (Hint: Think of a pyramid).

Sol: It is possible, only if the number of faces are greater than or equal to 4.

Q.3 Which are prisms among the following?



Sol:

- (i) It is not a polyhedron as it has a curved surface. Therefore, it will not be a prism also.
- (ii) It is a prism
- (iii) It is not a prism. It is a pyramid.

(iv) It is a prism.

Q.4

(i) How are prisms and cylinders alike?

(ii) How are pyramids and cones alike?

Sol:

(i) A prism becomes a cylinder as the number of sides of base becomes larger and larger.

(ii) A pyramid becomes a cone as the number of sides of base becomes larger and larger.

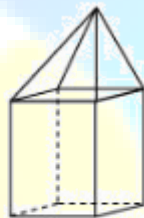
Q.5 Is a square prism same as a cube? Explain.

Sol: No, it can be a cuboid also.

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



(i)



(ii)

Sol:

(i) Fig. contains 7 faces, 10 vertices and 15 edges.

By using Euler's formula. We see $F + V - E = 2$.

Putting $F = 7$, $V = 10$ and $E = 15$

$$\text{L.H.S.} = F + V - E$$

$$= 7 + 10 - 5$$

$$= 17 - 15$$

$$= 2$$

L.H.S. = R.H.S.

It verifies Euler's formula.

(ii) Fig. In this figure, there are 9 faces, 9 vertices and 16 edges.

By using Euler's formula

$$F + V - E = 2$$

$$\text{L.H.S.} = F + V - E$$

$$= 9 + 9 - 16$$

$$= 18 - 16$$

$$= 2$$

L.H.S. = R.H.S.

It verifies Euler's formula.

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

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

Sol:

In first column

$$F = ?, V = 6 \text{ and } E = 12$$

By using Euler's formula,

$$F + V - E = 2$$

$$\Rightarrow F + 6 - 12 = 2$$

$$\Rightarrow F - 6 = 2 \Rightarrow F = 2 + 6 = 8$$

Hence, there are 8 faces.

In second column

$$F = 5, V = ? \text{ and } E = 9$$

$F + V - E = 2$ By using Euler's Formula,

$$\Rightarrow 5 + V - 9 = 2$$

$$\Rightarrow V - 4 = 2 \Rightarrow V = 2 + 4 = 6$$

Hence, there are 6 vertices.

In third column

$$F = 20, V = 12 \text{ and } E = ?$$

By using Euler's formula,

$$F + V - E = 2$$

$$\Rightarrow 20 + 12 - E = 2$$

$$\Rightarrow 32 - 2 = E \Rightarrow 30 = E \Rightarrow E = 30.$$

Hence, required edges are 30.

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

Sol: If $F = 10, V = 15$ and $E = 20$

We know by Euler's formula $F + V - E = 2$

$$\text{L.H.S.} = F + V - E$$

$$= 10 + 15 - 20 = 25 - 20 = 5$$

$$\text{L.H.S.} \neq \text{R.H.S.}$$

No, it does not follow Euler's formula.

So, polyhedron cannot have 10 faces, 20 edges and 15 vertices.