

CBSE Class –VIII Mathematics
NCERT Solutions
CHAPTER - 10
Visualising Solid Shapes (Ex. 10.2)

1. Can a polygon have for its faces:

(i) 3 triangles

(ii) 4 triangles

(iii) a square and four triangles

Ans. (i) No, a polyhedron cannot have 3 triangles for its faces.

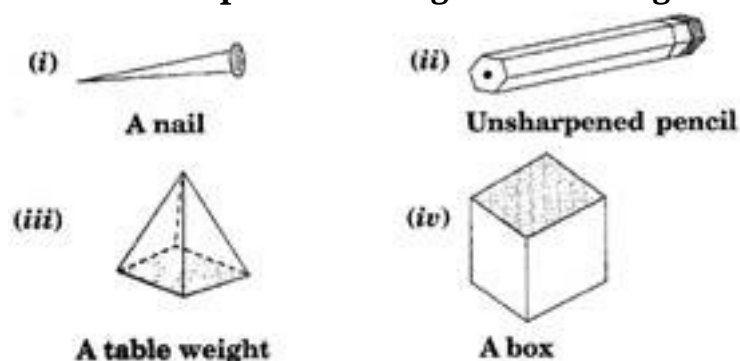
(ii) Yes, a polyhedron can have four triangles which is known as pyramid on triangular base.

(iii) Yes, a polyhedron has its faces a square and four triangles which makes a pyramid on square base.

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

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

3. Which are prisms among the following:



Ans. Figure (ii) unsharpened pencil and figure (iv) a box are prisms.

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

(ii) How are pyramids and cones alike?

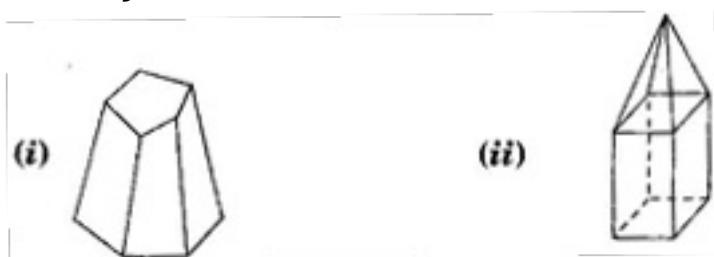
Ans. (i) A prism becomes a cylinder as the number of sides of its base becomes larger and larger.

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

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

Ans. Yes, a square prism is same as a cube, it can also be called a cuboid. A *cube* and a *square prism* are both special types of a rectangular *prism*. A *square* is just a special type of rectangle! *Cubes* are rectangular prisms where all three dimensions (length, width and height) have the *same* measurement.

6. Verify Euler's formula for these solids.



Ans. (i) Here, figure (i) contains 7 faces, 10 vertices and 15 edges.

Using Euler's formula, we see

$$F + V - E = 2$$

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

$$F + V - E = 2$$

$$\Rightarrow 7 + 10 - 15 = 2$$

$$\Rightarrow 17 - 15 = 2$$

$$\Rightarrow 2 = 2$$

$$\Rightarrow \text{L.H.S.} = \text{R.H.S.} \text{ Hence Euler's formula verified.}$$

(ii) Here, figure (ii) contains 9 faces, 9 vertices and 16 edges.

Using Euler's formula, we see

$$F + V - E = 2$$

$$F + V - E = 2$$

$$\Rightarrow 9 + 9 - 16 = 2$$

$$\Rightarrow 18 - 16 = 2$$

$$\Rightarrow 2 = 2$$

$$\Rightarrow \text{L.H.S.} = \text{R.H.S.}$$

Hence Euler's formula verified.

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

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

Ans. In first column, $F = ?$, $V = 6$ and $E = 12$

Using Euler's formula, we see

$$F + V - E = 2$$

$$F + V - E = 2$$

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

$$\Rightarrow F - 6 = 2$$

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

Hence there are 8 faces.

In second column, $F = 5$, $V = ?$ and $E = 9$

Using Euler's formula, we see

$$F + V - E = 2$$

$$F + V - E = 2$$

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

$$\Rightarrow V - 4 = 2$$

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

Hence there are 6 vertices.

In third column, $F = 20$, $V = 12$ and $E = ?$

Using Euler's formula, we see

$$F + V - E = 2$$

$$F + V - E = 2$$

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

$$\Rightarrow 32 - E = 2$$

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

Hence there are 30 edges.

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

Ans. If $F = 10$, $V = 15$ and $E = 20$.

Then, we know Using Eucler's formula,

$$F + V - E = 2$$

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

$$= 10 + 15 - 20$$

$$= 25 - 20$$

$$= 5$$

$$\text{R.H.S.} = 2$$

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

Therefore, it does not follow Eucler's formula.

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