Mathematics

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(Chapter – 10) (Visualising Solid Shapes)

(Class – VIII)

Exercise 10.3

Question 1:

Can a polygon have for its faces:

(i) 3 triangles (ii) 4 triangles (iii) a square and four triangles

Answer 1:

(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.

Question 2:

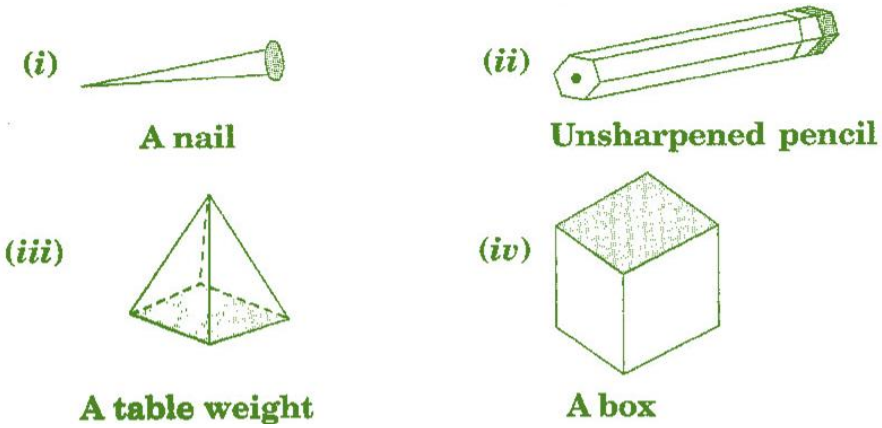
Is it possible to have a polyhedron with any given number of faces? (Hint: Think of a pyramid)

Answer 2:

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

Question 3:

Which are prisms among the following:



Answer 3:

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

Question 4:

(i) How are prisms and cylinders alike?

(ii) How are pyramids and cones alike?

Answer 4:

(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.

Question 5:

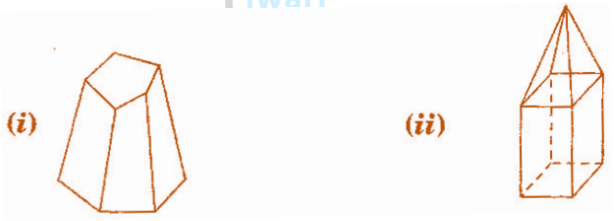
Is a square prism same as a cube? Explain.

Answer 5:

No, it can be a cuboid also.

Question 6:

Verify Euler's formula for these solids.



Answer 6:

(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 – 5 = 2

$\Rightarrow$ 17 – 15 = 2

$\Rightarrow$ 2 = 2

$\Rightarrow$ L.H.S. = R.H.S.

(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

⇒ 9 + 9 – 16 = 2

⇒ 18 – 16 = 2

⇒ 2 = 2

⇒ L.H.S. = R.H.S.

Question 7:

Using Euler's formula, find the unknown:

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

Answer 7:

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

Using Euler's formula, we see F + V – E = 2

F + V – E = 2

⇒ F + 6 – 12 = 2

⇒ F – 6 = 2

⇒ 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

⇒ 5 + V – 9 = 2

⇒ V – 4 = 2

⇒ 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

⇒ 20 + 12 – E = 2

⇒ 32 – E = 2

⇒ E = 32 – 2 = 30

Hence there are 30 edges.

Question 8:

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

Answer 8:

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

Then, we know Using Euler's formula, F + V – E = 2

L.H.S. = F + V – E

= 10 + 15 – 20

= 25 – 20

= 5

R.H.S. = 2

$\because$ L.H.S. $\neq$ R.H.S.

Therefore, it does not follow Euler's formula.