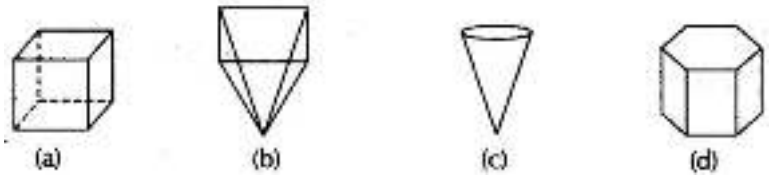
Unit 6 (Visualising The Solid Shapes)

Multiple Choice Questions

Question. 1 Which amongst the following is not a polyhedron?



Solution.

(c) According to the definition of a polyhedron, option (c) figure does not satisfies the condition of a polyhedron.

Since, a solid is a polyhedron if it is made up of only polygonal-faces, the faces meet at edges with one line segment and the edges meeting at a point. The point is generally called as vertex. But all the faces of option (c) are not polygons, there is a circular base, so the figure is not a polyhedron.

Question. 2 Which of the following will not form a polyhedron?

(a) 3 triangles (b) 2 triangles and 3 parallelograms

(c) 8 triangles (d) 1 pentagon and 5 triangles

Solution.

(a) A polyhedron is bounded by more than four polygonal faces. But in case of 3 triangles, it is not possible. So, option (a) does not form a polyhedron.

Question. 3 Which of the following is a regular polyhedron?

(a) Cuboid (b) Triangular prism

(c) Cube (d) Square prism

Solution.

(c) A polyhedron is regular, if its faces are congruent regular polygons and the same number of faces meet at each vertex. Hence, a cube satisfies- all the properties for a regular polyhedron.

Question. 4 Which of the following is a two dimensional figure?

(a) Rectangle (b) Rectangle prism

(c) Square pyramid (d) Square prism

Solution.

(a) A two dimensional figure have two dimensions (measurements) like length and breadth. In the given options, only rectangle has two dimensions, i.e. length and breadth.

Question. 5 Which of the following can be the base of a pyramid?

(a) Line segment (b) Circle (c) Octagon (d) Oval

Solution.

(c) Since, a pyramid is a polyhedron whose base is a polygon and lateral faces are triangles. Hence, octagon can be the base of a pyramid.

Question. 6 Which of the following 3-D shapes does not have a vertex?

(a) Pyramid (b) Prism (c) Cone (d) Sphere

Solution.

(d) As we kndw that, a vertex is a meeting point of two or more edges. Since, a sphere has only one curved face, so it has no vertex and no edges.

Question. 7 Solid having only line segments as its edges is a

(a) Polyhedron (b) Cone (c) Cylinder (d) Polygon

Solution.

(a) In polyhedron, the faces meet at edges which are line segments and edges meet at vertex.

–

Question. 8 In a solid, if F = V = 5, then the number of edges in this shape is

(a) 6 (b) 4 (0 8 (d) 2

Solution.

(c) Euler's formula for any polyhedron is

$$F + V - E = 2$$

Given, $F = V = 5$

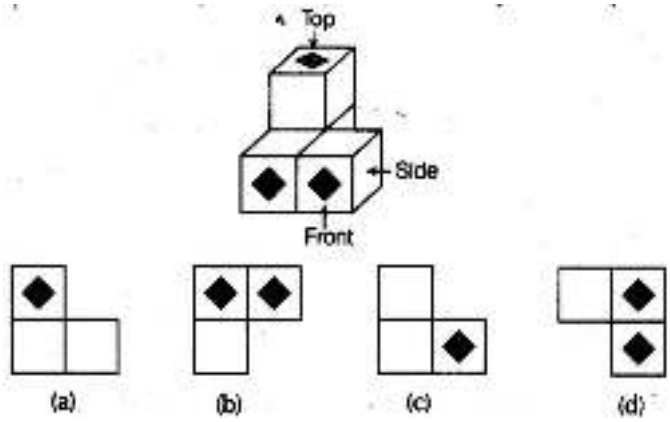
On putting the values of F and V in the Euler's formula, we get

$$5 + 5 - E = 2$$

$$\Rightarrow \quad 10 - E = 2 \quad \Rightarrow \quad E = 8$$

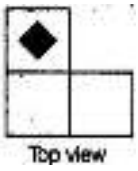
Note *F = faces, V = vertices and E = edges.*

Question. 9 Which of the following is the top view of the given shape?

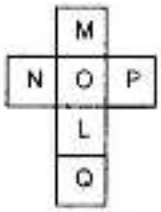


Solution.

(a) Since, top view is the picture of the solid which is seen from the top of the given figure. Therefore, the option (a) figure will be the top view, i.e.,



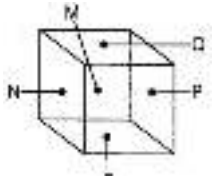
Question. 10 The net shown below can be folded into the shape of a cube. The face marked with the letter L is opposite to the face marked with which letter?



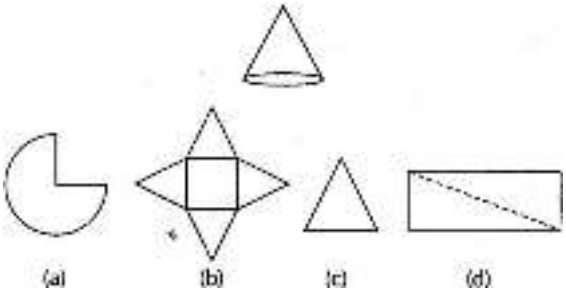
(a) M (b) N
(c) Q (d) O

Solution.

(a) Clearly, the given net is a cube. If we fold it into a cube, then N will face opposite to R Q on the top and 0 on the bottom. So, L faces opposite to M.



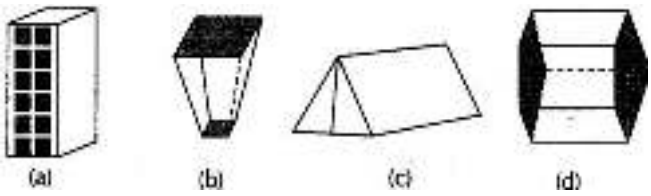
Question. 11 Which of the nets given below will generate a cone?



Solution.

(a) Option (a) net diagram gives a cone because other options has no circular base.
Since, a cone is a solid figure which has a circular base and it tapers from a circular base to a point called vertex.

Question. 12 Which of the following is not a prism?



Solution.

(b) We know that, a prism is a polyhedron whose bottom and top faces are congruent polygons and faces known as lateral faces are parallelograms. Clearly in option (b) figure, bottom and top faces are not congruent polygons and also lateral faces are not parallelograms.

Question. 13 We have 4 congruent equilateral triangles. What do we need more to make a pyramid?

(a) An equilateral triangle.

(b) A square with same side length as of triangle.

(c) 2 equilateral triangles with side length same as triangle.

(d) 2 squares with side length same as triangle.

Solution.

(b) We know that, a pyramid is a polyhedron, whose base is a polygon and lateral faces are triangles. But in the question, we have only 4 congruent equilateral triangles. Thus, we have to add a polygon in the base of atleast a four-sided figure.

Hence, option (b) is required to make a pyramid.

Question. 14 Side of a square garden is 30 m. If the scale used to draw its picture is 1 cm : 5 m, the perimeter of the square in the picture is

(a) 20 cm (b) 24 cm (c) 28 cm (d) 30 cm

Solution.

(b) Given, side of a square garden = 30 m

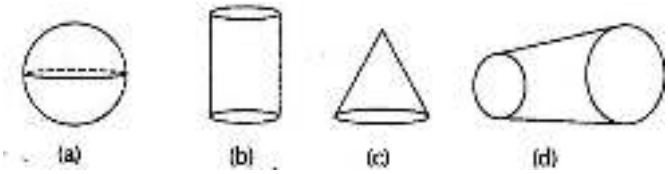
$\because$ Perimeter of a square = 4 × Side

$\therefore$ Perimeter of a square garden = 4 × 30 m = 120 m

Scale used to draw its picture = 1 cm : 5 m

Hence, the perimeter of a square in the picture = $\frac{120}{5}$ = 24 cm

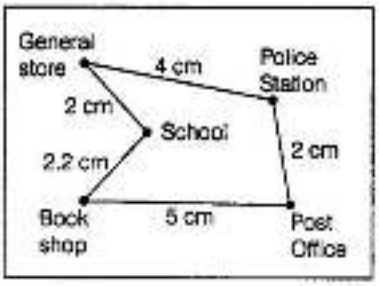
Question.15 Which of the following shapes has a vertex?



Solution.

(c) Figures given in options (a), (b) and (d) have no vertex but figure given in option (c), is a cone having a vertex. Since, vertex is a point where two or more edges meet.

Question. 16 In the given map, the distance between the places is shown using the scale 1 cm: 0.5 km. Then the actual distance (in km) between school and the book shop is



(a) 1.25 (b) 2.5 (c) 2 (d) 1.1

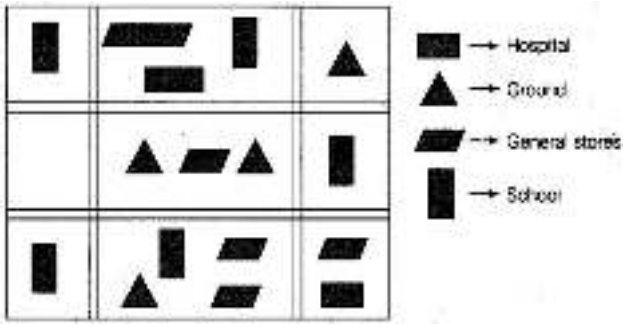
Solution.

(d) Given, scale 1 cm = 0-5 km ,
The distance between school and the book shop shown in map is equal to 2.2 cm. So, the actual distance between them will be = 2.2 x 0.5 km
= 1.1 km

Question .17 Which of the following cannot be true for a polyhedron?
(a) V = 4, F = 4, E = 6 (b) V=6,F=8,E=12
(c) V = 20,F = 12, E = 30 (d) V = 4, F = 6, E = 6
Solution.
(d) We know that, Euler's formula for any polyhedron isF+V-E = 2
where, F = faces, V = vertices
and E =edges
(a) $V = 4, F = 4$ and $E = 6$
$\text{LHS} = F + V - E$
$= 4 + 4 - 6$
$= 8 - 6 = 2$
$= \text{RHS}$
∴ Option (a) is true for a polyhedron.
(b) $V = 6, F = 8$ and $E = 12$
$\text{LHS} = F + V - E$
$= 8 + 6 - 12$
$= 14 - 12 = 2$
$= \text{RHS}$
∴ Option (b) is true for a polyhedron.
(c) $V = 20, F = 12$ and $E = 30$
$\text{LHS} = F + V - E$
$= 12 + 20 - 30$
$= 32 - 30 = 2$
$= \text{RHS}$
∴ Option (c) is true for a polyhedron.
(d) $V = 4, F = 6$ and $E = 6$
$\text{LHS} = F + V - E$
$= 6 + 4 - 6$
$= 10 - 6 = 4 \neq \text{RHS}$
∴ Option (d) is not true for a polyhedron.

Question. 18 In a blueprint of a room, an architect has shown the height of the room as 33 cm. If the actual height of the room is 330 cm, then the scale used by her is
(a) 1:11 (b) 1 : 10
(c) 1:100 (d) 1 : 3
Solution.
(b) Given, in a blueprint height of the room = 33 cm,
and actual height of the room = 330 cm
We know that,
$$\text{Scale of map} = \frac{\text{Size drawn}}{\text{Actual size}}$$
$$= \frac{33}{330} = \frac{1}{10}$$
i.e. Scale = 1 : 10

Question. 19 The following is the map of a town. Based on it answer questions 19-21.



The number of hospitals in the town is

(a) 1 (b) 2 (c) 3 (d) 4

Solution.

(b) Clearly, ▬ represent hospital. So, we will count ▬ in the given map. Hence, the number of ▬ in the map is 2.

Question. 20 The ratio of the number of general stores and that of the ground is

(a) 1:2 (b) 2 : 1

(02:3 (d) 3 : 2

Solution.

(d) Clearly, ▰ represent general stores and ▲ represent ground in the given map.

∴ Total number ▰ is 6

and total number ▲ is 4.

Hence, ratio of the number of general stores and that of the ground is

$$\frac{6}{4} = \frac{3}{2} = 3:2$$

Question. 21 According to the map, the number of schools in the town is

(a) 4 (b) 3

(c) 5 (d) 12

Solution.

(c) Clearly, ▮ represent school. So we count ▮ in the given map.

Hence, the number of ▮ in the map is 5.

Fill in the Blanks

In questions 22 to 41, fill in the blanks to make the statements true.

Question. 22 Square prism is also called a_____

Solution.

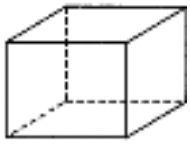
Square prism is called a cube.

We know that, a square prism has a square base, a congruent square top and the sides are parallelograms. So, it is also a cube.

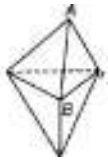
Question. 23 Rectangular prism is also called a_____

Solution.

Rectangular prism is also called a cuboid. Since, a rectangular prism has 8 vertices, 12 edges and 6 rectangular faces as cuboid shown in below figure.

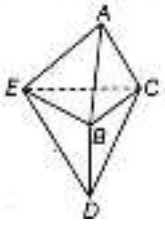


Question. 24

In the  the number of faces meeting at B is_____.

Solution.

In the given figure, the number of faces meeting at B is **4**.

 Here, faces are *EDB, DCB, EAB and ACB*

Question. 25 A pyramid on an n sided polygon has_____faces.

Solution.

A pyramid on an n sided polygon has n + 1 faces.

We know that, in a pyramid, the number of faces is 1 more than the number of sides of the polygohal base.

Question. 26 If a solid shape has 12 faces and 20 vertices,then the number of edges in this solid is_____

Solution.

We know that, Euler's formula for any polyhedron is, $F + V - E = 2$

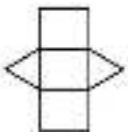
Given, faces, $F = 12$, vertices, $V = 20$

Now, on putting the value of F and V in the Euler's formula, we get $12 + 20 - E = 2$

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

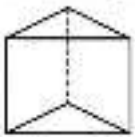
Hence, the number of edges = **30**

Question. 27

The given net  can be folded to make a_____.

Solution.

The given net can be folded to make a **prism**, i.e.



Question. 28 A solid figure with only 1 vertex is a_____

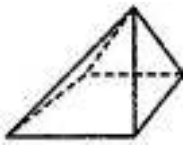
Solution.

A solid figure, with only 1 vertex is a cone. We know that, cone is a solid figure which has a circular base and its all other surfaces comes to a point called vertex.

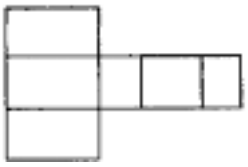
Question . 29 Total number of faces in a pyramid which has eight edges is_____

Solution.

Total number of faces in a pyramid which has eight edges is 5, i.e.



Question. 30 The net of a rectangular prism has _____rectangles.
[Hint Every square is a rectangle but every rectangle is not a square]
Solution.
The net of a rectangular prism is
Hence, net of a rectangular prism has 6 rectangles.



Question. 31 In a three-dimensional shape, diagonal is a line segment that joins two vertices that do not lie on the_____face.
Solution.
In a three-dimensional shape, diagonal is a line segment that joins two vertices that do not lie on the same face.

Question. 32 If 4 km on a map is represented by 1 cm, then 16 km is represented by_____cm.
Solution.
Given, 4 km on a map is represented by 1 cm, then 1 km on a map is represented by 1/4 cm.
Hence, 16 km on a map is represented by – x 16 = 4 cm

Question. 33 If actual distance between two places A and B is 110 km and it is represented on a map by 25 mm. Then the scale used is_____
Solution.

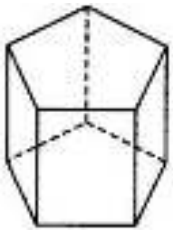
$$\because \text{Scale of map} = \frac{\text{Size drawn}}{\text{Actual size}} = \frac{25 \text{ mm}}{110 \text{ km}}$$

$$= \frac{25 \text{ mm}}{110000000} \qquad [\because 1 \text{ km} = 110000000 \text{ mm}]$$

$$= \frac{1}{4400000}$$

Hence, the scale used is **1 : 4400000.**

Question. 34 A pentagonal prism has_____faces.
Solution.
A pentagonal prism has 7 faces as shown in below figure



Question. 35 If a pyramid has a hexagonal base, then the number of vertices is_____
Solution.
If a pyramid has a hexagonal base, then the number of vertices is 7.
We know that, in a pyramid the number of vertices is 1 more than the number of sides of the polygonal base.

Question. 36

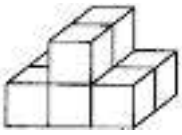
 is the _____ view of 

Solution.

 is the **top** view of the given figure.

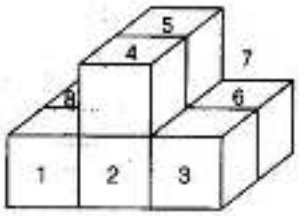
Note *If we see the given figure from the top, then view is,*

Question. 37

The number of cubes in  are _____

Solution.

The number of cubes in the given figure are **8**.



[7th cube is below the 5th cube]

Question. 38 If the sum of number of vertices and faces in a polyhedron is 14, then the number of edges in that shape is_____

Solution.

Given, the sum of number of vertices and faces in a polyhedron is 14, i.e. $V + F = 14$

We know that, Euler's formula, $F + V - E = 2$ for any polyhedron.

$\Rightarrow \quad 14 - E = 2$

$\Rightarrow \quad 14 - 2 = E$

$\Rightarrow \quad E = 12$

Hence, the number of edges are **12**.

Question. 39 Total number of regular polyhedron is_____

Solution.

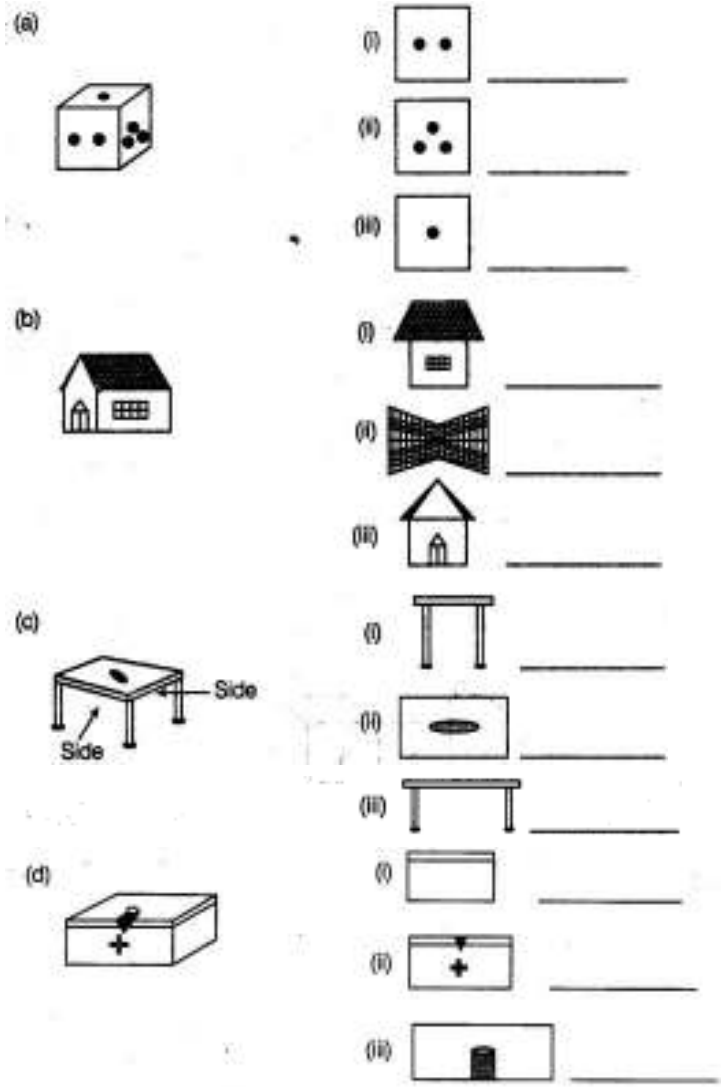
Total number of regular polyhedron is five, i.e. cube, octahedron, tetrahedron, dodecahedron and icosahedron.

Question. 40 A regular polyhedron is a solid made up of_____faces.

Solution.

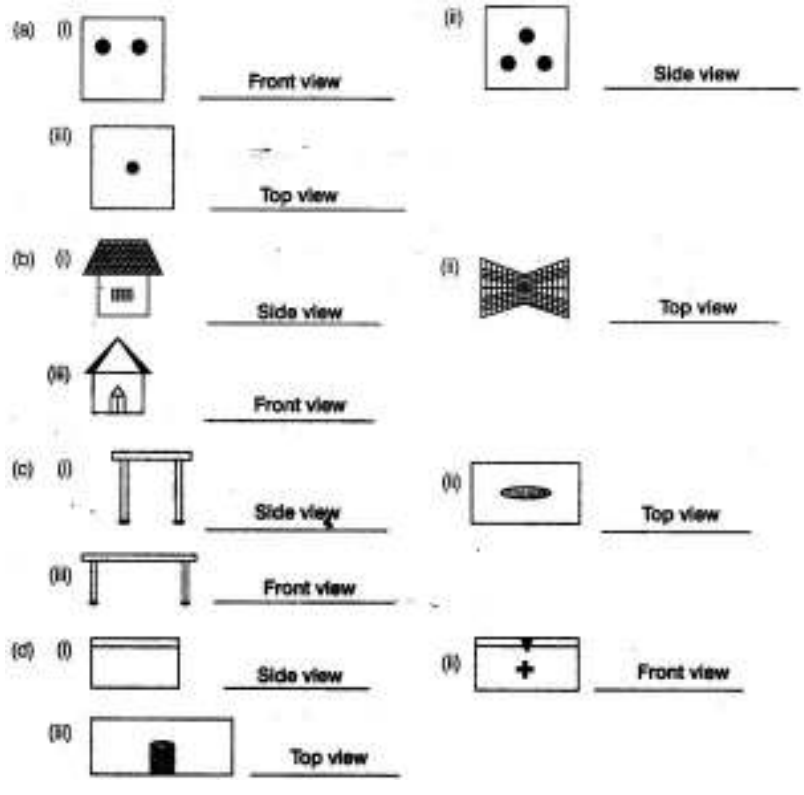
A regular polyhedron is a solid made up of congruent faces.
[according to the definition of regular polyhedron]

Question. 41 For each of the following solids, identify the front, side and top views and write it in the space provided.



Note *Top view is the picture of the solid as seen from the top.*

Solution.



True/False

In questions 42 to 61, state whether the following statements are True or False.

Question. 42 The other name of cuboid is tetrahedron.

Solution. False

The other name of cuboid is rectangular prism.

Question. 43 A polyhedron can have 4 faces.

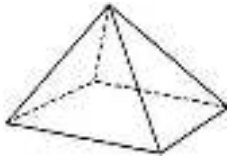
Solution. False

A polyhedron can have atleast 4 faces.

Question. 44 A polyhedron with least number of faces is known as a triangular pyramid.

Solution. True

A polyhedron have atleast 4 faces and a four faced polyhedron is known as pyramid.



Question. 45 Regular octahedron has 8 congruent faces which are isosceles triangles.

Solution. False

A regular octahedron is obtained by joining two congruent square pyramids such that the vertices of the two square pyramids coincide. It has eight congruent equilateral triangular faces.

Question. 46 Pentagonal prism has 5 pentagons.

Solution. False

Pentagonal prism has 2 pentagons, one on the top and other on the base.

Question. 47 Every cylinder has 2 opposite faces as congruent circles, so it is also a prism.

Solution. False

The cylinder has a congruent cross-section which is a circle, so it could be called as a circular prism.

Question. 48 Euler's formula is true for all three-dimensional shapes.

Solution. False

Euler's formula is true only for polyhedrons,

i.e. F+V-E = 2

Where F = faces, V = vertices

and E = edges

Question. 49 A polyhedron can have 10 faces, 20 edges and 15 vertices.

Solution. False

We know that, Euler's formula satisfies for every polyhedron,

i.e. $F + V - E = 2$

Here, $F = 10, E = 20$

and $V = 15$

On putting these values in the Euler's formula, we get

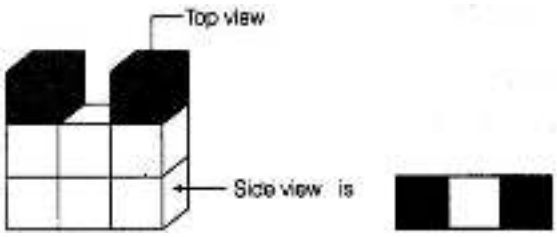
$10 + 15 - 20 = 2$

$\Rightarrow 25 - 20 = 2$

$\Rightarrow 5 \neq 2$

Hence,the given values does not satisfy the Euler's formula.

Question. 50 The top view of



Solution.

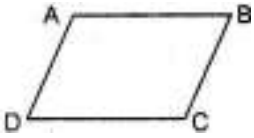
True

If we see the given figure from the top, then we obtain 

Question. 51 The number of edges in a parallelogram is 4.

Solution. True

AB, BC, CD and DA are the edges of a parallelogram ABCD.



Question. 52 Every, solid shape has a unique net.

Solution. False

A net is a flat figure that can be folded to form a closed, three-dimensional object. So, for an object, more than one net is possible but it is not true for the objects of all shapes.

Question. 53 Pyramids do not have a diagonal.

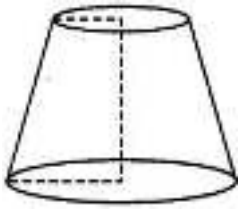
Solution. True ,

Pyramids are polyhedron with a polygon as its base and other faces as triangles meeting at a common vertex and diagonal is a line joining the two opposite vertex.

So, in pyramids, two opposite vertex cannot be formed.

So, we can say pyramids has no diagonal.

Question. 54 The given shape is a cylinder.



Solution.

False

The give shape is a frustum. The shape of a cylinder is,

Question. 55 A cuboid has atleast 4 diagonals.

Solution. True

In a cuboid, the number of diagonals is not least then 4.

Question. 56. All cubes are prism.

Solution. True

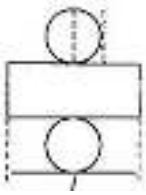
A cube is a prism because it has a square base, a congruent square top and the lateral sides are parallelograms.

Question. 57 A cylinder is a 3-D shape having two circular faces of different radii.

Solution. False

In a cylinder, the radii of the two circular faces are same. If the radii of two circular faces are different, then it will become frustum.

Question. 58 On the basis of ttte given figure, the length of a rectangle in the net of a cylinder is same as circumference of circles in its net.



Solution. True

Since, the length of a rectangle in the net of a cylinder is same as circumference of circle in the given net.

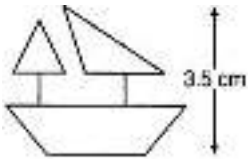
Question. 59 If a length of 100 m i% represented on a map by 1 cm, then the actual distance corresponding to 2 cm is 200 m.

Solution. True

When a length 100 m is respresented on a map by 1 cm.

Then, actual distance corresponding to 2 cm = 2 x 100 = 200 m

Question. 60 The model of a ship shown is of height 3.5 cm. The actual height of the ship is 210 cm, if the scale chosen is 1 : 60.



Solution.

True

Given, actual height = 210 cm and shown height = 3.5 cm

Scale chosen is 1 : 60.

So, $$\text{Scale} = \frac{\text{Shown height}}{\text{Actual height}} = \frac{3.5}{210}$$

$$= \frac{35}{2100} = \frac{1}{60} = 1:60$$

Question. 61 The actual width of a store room is 280 cm. If the scale chosen to make its drawing is 1 : 7, then the width of the room in the drawing will be 40 cm.

Solution.

True

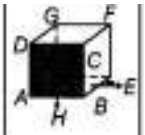
Actual width of a store room = 280 cm

Given, scale = 1 : 7

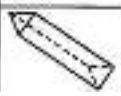
Width of the room in the drawing will be = Actual Size × Scale $\left[\because \text{scale} = \frac{\text{size drawing}}{\text{actual size}}\right]$

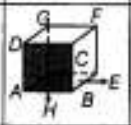
$$= 280 \times \frac{1}{7} = \frac{280}{7} = 40 \text{ cm}$$

Question. 62 Complete the table given below :

S. No.	Solid	Shape of Solid	Number of faces (F)	Number of vertices (V)	Number of edges (E)	F + V	E + 2
a.	Cuboid						
b.	Triangular Pyramid						
c.	Square Pyramid						
d.	Rectangular Pyramid						
e.	Pentagonal Pyramid						
f.	Hexagonal Pyramid						
g.	Triangular Prism						
h.	Square Prism						
i.	Cube						
j.	Pentagonal Prism						
k.	Octagonal Prism						
l.	Heptagonal Prism						

Solution. By using Euler's formula for polyhedron,

S. No.	Solid	Shape of Solid	Number of faces (F)	Number of Vertices (V)	Number of edges (E)	F + V	E + 2
a.	Cuboid		6	8	12	6 + 8 = 14	12 + 2 = 14
b.	Triangular Pyramid		4	4	6	4 + 4 = 8	6 + 2 = 8
c.	Square Pyramid		5	5	8	5 + 5 = 10	8 + 2 = 10
d.	Rectangular Pyramid		5	5	8	5 + 5 = 10	8 + 2 = 10
e.	Pentagonal Pyramid		6	6	10	6 + 6 = 12	10 + 2 = 12
f.	Hexagonal Pyramid		7	7	12	7 + 7 = 14	12 + 2 = 14
g.	Triangular Prism		5	6	9	5 + 6 = 11	9 + 2 = 11

h.	Square Prism		6	8	12	6+8=14	12+2=14
i.	Cube		6	8	12	6+8=14	12+2=14
j.	Pentagonal Prism		7	10	15	7+10=17	15+2=17
k.	Octagonal Prism		10	16	24	10+16=26	24+2=26
l.	Heptagonal Prism		9	14	21	9+14=23	21+2=23

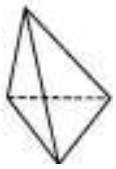
Question. 63 How many faces does each of the following solids have?

(a) Tetrahedron (b) Hexahedron

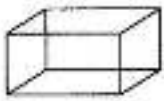
(c) Octagonal pyramid (d) Octahedron

Solution.

(a) Tetrahedron has 4 faces.

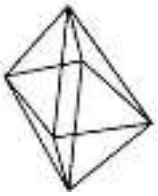


(b) Hexahedron has 6 faces.



(c) Octagonal pyramid has 9 faces.

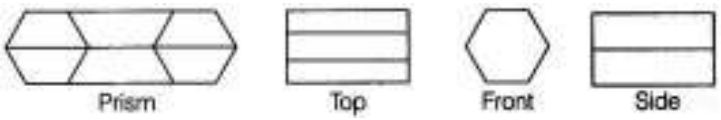
(d) Octahedron has 8 faces.



Question. 64 Draw a prism with its base as regular hexagon with one of its face facing you. Now draw the top view, front view and side view of this solid.

Solution.

The following figure shows a prism with its base as regular hexagon with one of its face to us. And also, we shows the top view, front view and side view of the prism.



Question. 65 How' many vertices does each of the following solids have?

(a) Cone (b)Cylinder

(c) Sphere (d)Octagonal Pyramid

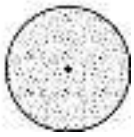
(e) Tetrahedron (f) Hexagonal Prism

Solution.

(a) Cone has one vertex.

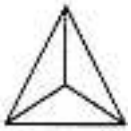
(b) Cylinder has no vertex.

(c) Sphere has no vertex.



(d) Octagonal pyramid has one vertex.

(e) Tetrahedron has 4 vertices.



(f) Hexagonal prism has 12 vertices.

Question. 66 How many edges does each of following solids have?

(a) Cone (b)Cylinder

(c) Sphere (d)Octagonal Pyramid

(e) Hexagonal Prism(f)Kaleidoscope

Solution.

(a) Cone has one edge.

(b) Cylinder has two edges.

(c) Sphere has no edge.

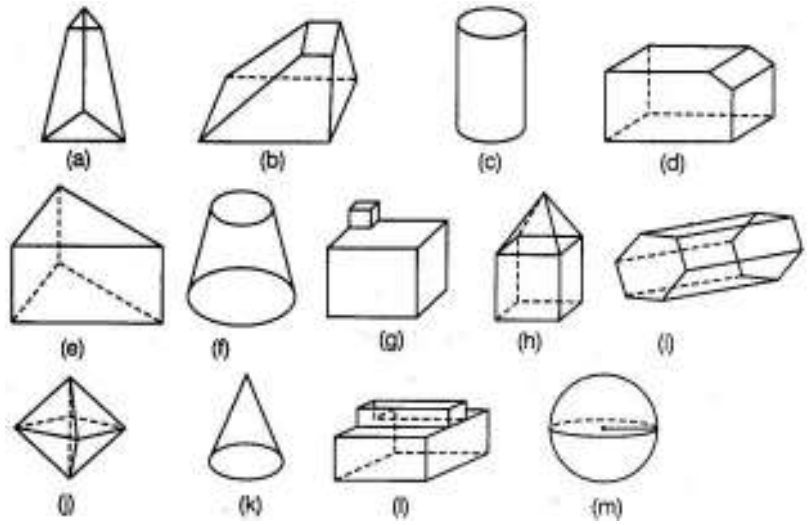
(d) Octagonal pyramid has 16 edges.

(e) Hexagonal prism has 18 edges.

(f) Kaleidoscope has 9 edges.

Note See edges in previous question's solution figures.

Question. 67 Look at the shapes given below and state which of these are polyhedra using Euler's formula.



Solution.

(a) In the given figure, we have
Faces (F) = 5, Vertices (V) = 6 and edges (E) = 9
On putting these values in Euler's formula, we get

$$F + V - E = 2$$
$$\Rightarrow \quad 5 + 6 - 9 = 2$$
$$\Rightarrow \quad 11 - 9 = 2$$
$$\Rightarrow \quad 2 = 2$$

Hence, these values satisfies the Euler's formula. So, it is a polyhedra.

(b) In the given figure, we have
Faces (F) = 6, vertices (V) = 8 and edges (E) = 12
On putting these values in Euler's formula, we get

$$F + V - E = 2$$
$$\Rightarrow \quad 6 + 8 - 12 = 2$$
$$\Rightarrow \quad 14 - 12 = 2$$
$$\Rightarrow \quad 2 = 2$$

Hence, these values satisfies the Euler's formula. So, it is a polyhedra.

(c) In the given figure, we have
Faces (F) = 3, vertices (V) = 0 and edges (E) = 2
On putting these values in Euler's formula, we get

$$F + V - E = 2$$
$$\Rightarrow \quad 3 + 0 - 2 = 2$$
$$\Rightarrow \quad 1 \neq 2$$

Hence, these values do not satisfy the Euler's formula. So, it is not a polyhedra.

(d) In the given figure, we have
Faces (F) = 7, vertices (V) = 10 and edges (E) = 15
On putting these values in Euler's formula, we get

$$F + V - E = 2$$
$$\Rightarrow \quad 7 + 10 - 15 = 2$$
$$\Rightarrow \quad 17 - 15 = 2$$
$$\Rightarrow \quad 2 = 2$$

Hence, these values satisfies the Euler's formula. So, it is a polyhedra.

(e) In the given figure, we have
Faces (F) = 5, vertices (V) = 6 and edges (E) = 9
On putting these values in Euler's formula, we get

$$F + V - E = 2$$
$$\Rightarrow \quad 5 + 6 - 9 = 2$$
$$\Rightarrow \quad 11 - 9 = 2$$
$$\Rightarrow \quad 2 = 2$$

Hence, these values satisfies the Euler's formula. So, it is a polyhedra.

(f) In the given figure, we have
Faces (F) = 3, vertices (V) = 0 and edges (E) = 2
On putting these values in Euler's formula, we get

$$F + V - E = 2$$
$$\Rightarrow \quad 3 + 0 - 2 = 2$$
$$\Rightarrow \quad 1 \neq 2$$

Hence, these values do not satisfy the Euler's formula. So, it is not a polyhedra.

(g) In the given figure, we have

Faces $(F) = 11$, vertices $(V) = 11$ and edges $(E) = 20$

On putting these values in Euler's formula, we get

$$F + V - E = 2$$
$$\Rightarrow \quad 11 + 11 - 20 = 2$$
$$\Rightarrow \quad 22 - 20 = 2$$
$$\Rightarrow \quad 2 = 2$$

Hence, these values satisfies the Euler's formula. So, it is a polyhedra.

(h) In the given figure, we have

Faces $(F) = 9$, vertices $(V) = 9$ and edges $(E) = 16$

On putting these values in Euler's formula, we get

$$F + V - E = 2$$
$$\Rightarrow \quad 9 + 9 - 16 = 2$$
$$\Rightarrow \quad 18 - 16 = 2$$
$$\Rightarrow \quad 2 = 2$$

Hence, these values satisfies the Euler's formula. So, it is a polyhedra.

(i) In the given figure, we have

Faces $(F) = 8$, vertices $(V) = 12$ and edges $(E) = 18$

On putting these values in Euler's formula, we get

$$F + V - E = 2$$
$$\Rightarrow \quad 8 + 12 - 18 = 2$$
$$\Rightarrow \quad 20 - 18 = 2$$
$$\Rightarrow \quad 2 = 2$$

(j) In the given figure, we have

Faces $(F) = 8$, vertices $(V) = 6$ and edges $(E) = 12$

On putting these values in Euler's formula, we get

$$F + V - E = 2$$
$$\Rightarrow \quad 8 + 6 - 12 = 2$$
$$\Rightarrow \quad 14 - 12 = 2$$
$$\Rightarrow \quad 2 = 2$$

Hence, these values satisfies the Euler's formula. So, it is a polyhedra.

(k) In the given figure, we have

Faces $(F) = 2$, vertices $(V) = 1$ and edges $(E) = 0$

On putting these values in Euler's formula, we get

$$F + V - E = 2$$
$$\Rightarrow \quad 2 + 1 - 0 = 2$$
$$\Rightarrow \quad 3 \neq 2$$

Hence, these values do not satisfy the Euler's formula. So, it is not a polyhedra.

(l) In the given figure, we have

faces $(F) = 10$, vertices $(V) = 16$ and edges $(E) = 24$

On putting these values in Euler's formula, we get

$$F + V - E = 2$$
$$\Rightarrow \quad 10 + 16 - 24 = 2$$
$$\Rightarrow \quad 26 - 24 = 2$$
$$\Rightarrow \quad 2 = 2$$

Hence, these values satisfies the Euler's formula. So, it is a polyhedra.

(m) In the given figure, we have

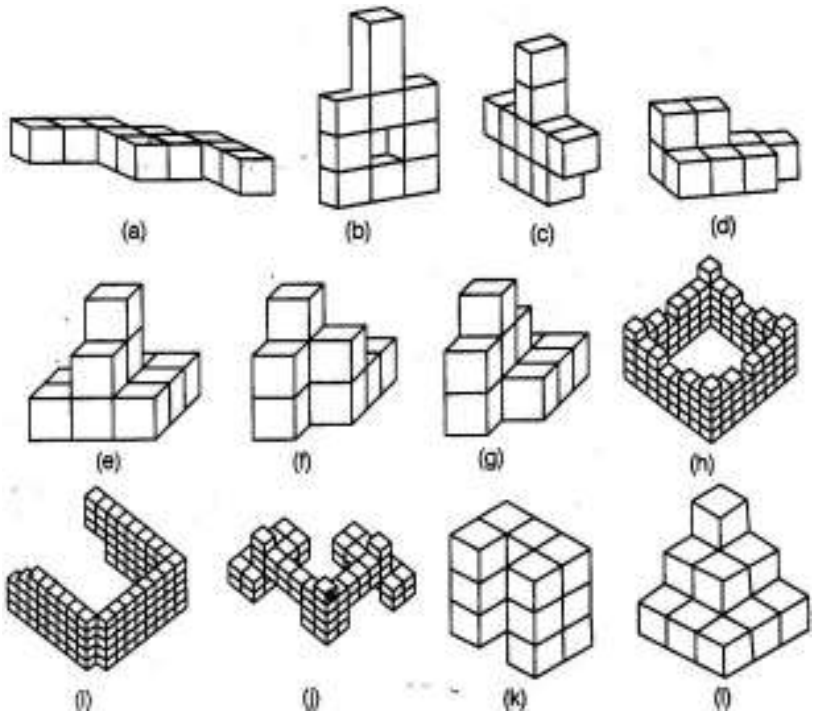
Faces $(F) = 1$, vertices $(V) = 0$ and edges $(E) = 1$

On putting these values in Euler's formula, we get

$$F + V - E = 2$$
$$\Rightarrow \quad 1 + 0 - 1 = 2$$
$$\Rightarrow \quad 0 \neq 2$$

Hence, these values do not satisfy the Euler's formula. So, it is not a polyhedra.

Question. 68 Count the number of cubes in the given shapes.



Solution.

For finding the number of cubes in the given shapes you have to count all cubes which are visible or not. Hence, we have the total number of cubes for the given figures as:

(a) 10 cubes (b)10 cubes

(c) 10 cubes (d) 9 cubes

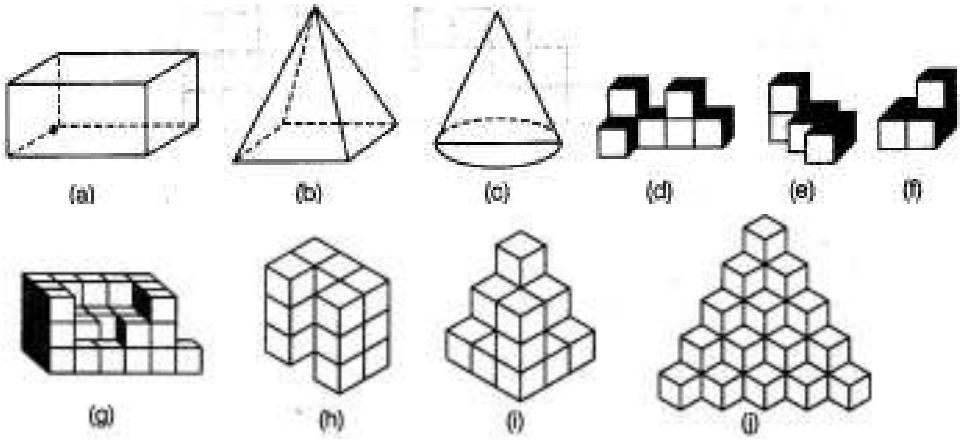
(e) 11 cubes (f) 9 cubes

(g) 11 cubes (h) 110 cubes

(i) 113 cubes(j)66 cubes

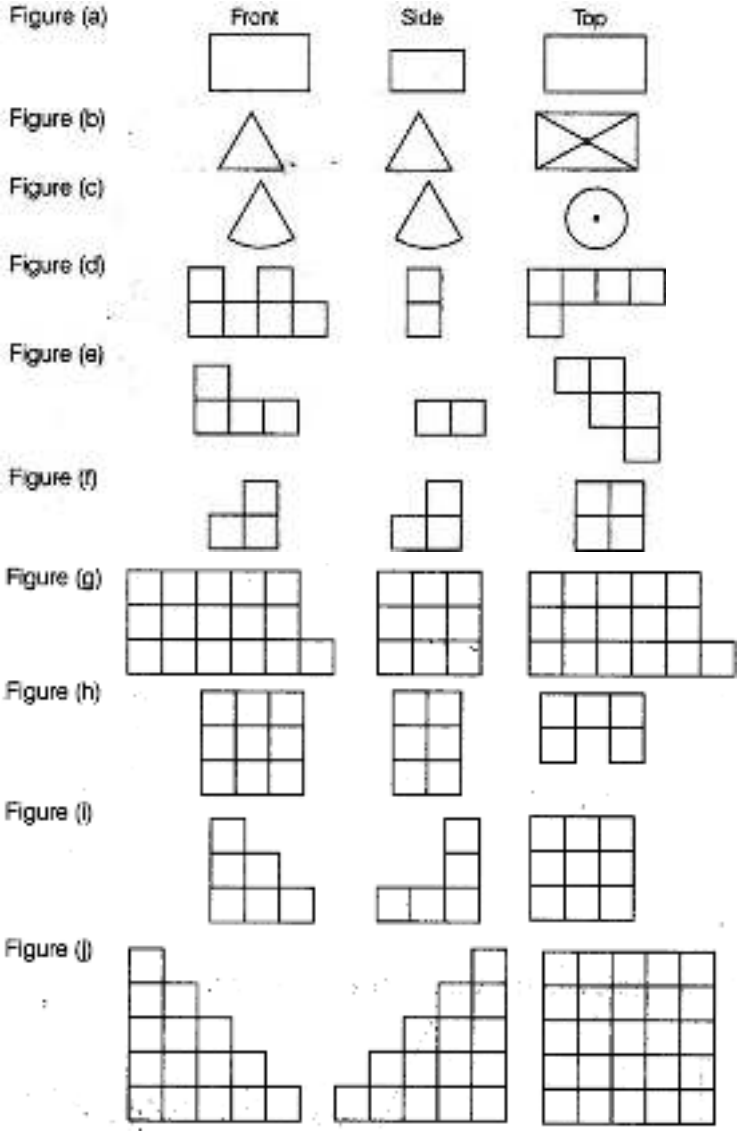
(k) 15 cubes (l)14 cubes

Question .69 :Draw the front, side and top view of the given shapes.



Solution.

On the basis of properties and features of front view, top view and side view, we can draw all the three views of the given figures as:



Question.70 Using Euler's formula. Find the value of unknown x, y, z, p, q andr in the following table.

	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Faces	7	y	9	p	6	8
Vertices	10	12	z	6	q	11
Edges	x	18	16	12	12	r

Solution.

By using Euler's formula for polyhedron

From (i), $F = 7$, $V = 10$ and $E = x$

So, $F + V - E = 2$

$\Rightarrow 7 + 10 - x = 2$

$\Rightarrow 17 - x = 2$

$\Rightarrow 17 - 2 = x$

$\Rightarrow x = 15$

From (ii), $V = 12$, $E = 18$ and $F = y$

So, $F + V - E = 2$

$\Rightarrow y + 12 - 18 = 2$

$\Rightarrow y - 6 = 2$

$\Rightarrow y = 2 + 6$

$\Rightarrow y = 8$

From (iii), $F = 9$, $E = 16$, and $V = z$

So, $F + V - E = 2$

$\Rightarrow 9 + z - 16 = 2$

$z - 7 = 2$

$\Rightarrow z = 2 + 7$

$\Rightarrow z = 9$

From (iv), $V = 6$, $E = 12$ and $F = p$

So, $F + V - E = 2$

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

$\Rightarrow$ $p - 6 = 2$

$\Rightarrow$ $p = 2 + 6$

$\Rightarrow$ $p = 8$

From (v), $F = 6$, $E = 12$ and $V = q$

So, $F + V - E = 2$

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

$\Rightarrow$ $q - 6 = 2$

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

From (vi), $F = 8$, $V = 11$ and $E = r$

So, $F + V - E = 2$

$\Rightarrow$ $8 + 11 - r = 2$

$\Rightarrow$ $19 - r = 2$

$\Rightarrow$ $r = 19 - 2$

$\Rightarrow$ $r = 17$

Question. 71 Can a polyhedron haveV = F = 9 and E = 16 ? If yes, draw its figure.

Solution.

Given, vertices = 9, faces = 9 and edges = 16

Using Euler's formula for polyhedron, $F + V - E = 2$ [where, F = faces, V = vertices and E = edges]

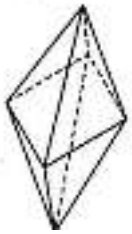
$\Rightarrow$ $9 + 9 - 16 = 2$

$\Rightarrow$ $18 - 16 = 2$

$\Rightarrow$ $2 = 2$

Hence, the given values satisfies the Euler's formula. So, a polyhedron can have $V = F = 9$ and $E = 16$

Thus, we can draw a octagonal pyramid.



Question. 72 Check whether a polyhedron can have V = 12,E = 6 and F = 8.

Solution.

By using Euler's formula for polyhedron,

$F + V - E = 2$ [where, F = faces, V = vertices, E = edges]

$\Rightarrow$ $8 + 12 - 6 = 2$

$\Rightarrow$ $20 - 6 = 2$

$\Rightarrow$ $14 \neq 2$

∴ Given values do not satisfy the Euler's formula. Its mean this type of polyhedron cannot be possible.

Question. 73 A polyhedron has 60 edges and 40 vertices. Find the number of its faces.

Solution.

By using Euler's formula for polyhedron,

$F + V - E = 2$ [where, F = faces, V = vertices, E = edges]

$\Rightarrow$ $F + 40 - 60 = 2$ [$\because E = 60$ and $V = 40$, given]

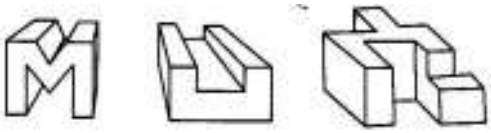
$\Rightarrow$ $F - 20 = 2$

$\Rightarrow$ $F = 2 + 20$

$\Rightarrow$ $F = 22$

Hence, the number of faces are 22.

Question. 74 Find the number of faces in the given shapes.



Solution. In the first figure, the number of faces are equal to 14.

In the second figure, the number of faces are equal to 10.
In the third figure, the number of faces are equal to 16.

Question. 75 A polyhedron has 20 faces and 12 vertices. Find the edges of the polyhedron.

Solution.

By using Euler's formula for polyhedron,

$$F + V - E = 2 \quad \text{[where, } F = \text{faces, } V = \text{vertices, } E = \text{edges]}$$

Given, faces $(F) = 20$, vertices $(V) = 12$

$$\Rightarrow \quad 20 + 12 - E = 2$$
$$\Rightarrow \quad 32 - E = 2$$
$$\Rightarrow \quad E = 32 - 2$$
$$\Rightarrow \quad E = 30$$

Hence, the edges of the polyhedron are 30.

Question. 76 A solid has forty faces and sixty edges. Find the number of vertices of the solid.

Solution.

By using Euler's formula for polyhedron

$$F + V - E = 2$$

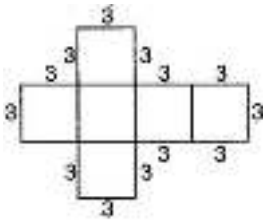
Given, faces $(F) = 40$, edges $(E) = 60$.

$$\Rightarrow \quad 40 + V - 60 = 2$$
$$\Rightarrow \quad V - 20 = 2$$
$$\Rightarrow \quad V = 2 + 20 = 22$$

Hence, the vertices of the solid are 22.

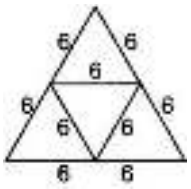
Question. 77 Draw the net of a regular hexahedron with side 3 cm. [Hint Regular hexahedron cube]

Solution. The net of a regular hexahedron with side 3 cm is given below:

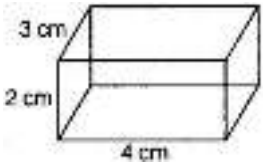


Question. 78 Draw the net of a regular tetrahedron with side 6 cm.

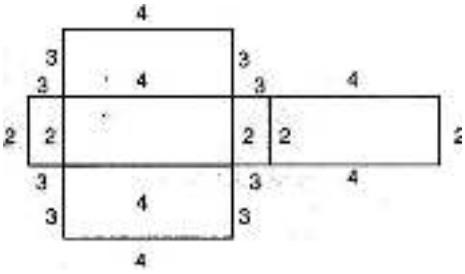
Solution. The net of a regular tetrahedron with side 6 cm is given below:



Question. 79 Draw the net of the following cuboid:



Solution. The net of the given cuboid is shown below:



Question. 80 Match the following

	Figure		Name
(i)		(a)	Hexahedron
(ii)		(b)	Hexagonal prism
(iii)		(c)	Square pyramid
(iv)		(d)	Cone

Solution.

In figure (i), the base and top both are the hexagonal polygons.

So, it is a hexagonal prism.

In figure (ii), only one vertexes available.

So, it is a cone.

In figure (iii), the base is square and rest four faces are equilateral triangles.

So, it is a square pyramid. .

In figure (iv), the base is square and it has 6 faces and 8 vertices. So, it is a hexahedron (cube).

[Note Cube is also known as Hexahedron.]

Hence, the correct matching is as:

(i) -> (b) (ii) -> (d) (iii) -> (c) (iv) -> (a)

Question. 81

Complete the table given below by putting tick mark across the respective property found in the solids mentioned.

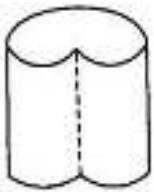
	Properties	Cone	Cylinder	Prism	Pyramid
1.	The figure is a polyhedron.				
2.	The figure has diagonals.				
3.	The shape has curved edges.				
4.	The base of figure is a polygon.				
5.	The bases are congruent.				
6.	The base of figure is a polygon and other faces meet at a single point.				
7.	The base of figure is a curved edge and other faces meet at a single point.				

Solution.

On the basis of properties and features of cone, cylinder, prism and pyramid, we can fill the given table as follows:

	Properties	Cone	Cylinder	Prism	Pyramid
1.	The figure is a polyhedron.	×	×	✓	✓
2.	The figure has diagonals.	×	×	×	✓
3.	The shape has curved edges	✓	✓	×	×
4.	The base of figure is a polygon.	×	×	✓	✓
5.	The bases are congruent	×	✓	✓	×
6.	The base of figure is a polygon and other faces meet at a single point.	×	×	×	✓
7.	The base of figure is a curved edge and other faces meet at a single point.	✓	×	×	×

Question. 82 Draw the net of the following shape.

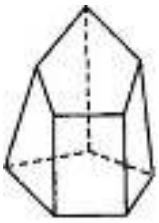


Solution.

The net of the given shape is shown below:

Note *If we open this shape from dotted line, we will find above net.*

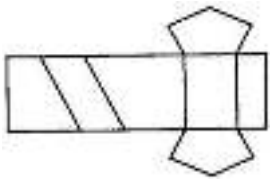
Question. 83 Draw the net of the following solid.



[Hint Pentagons are not congruent.]

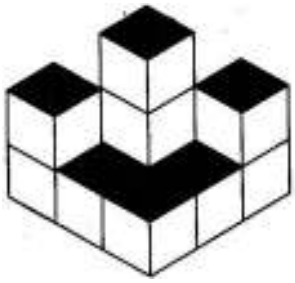
Solution.

The net of the given solid is shown below:



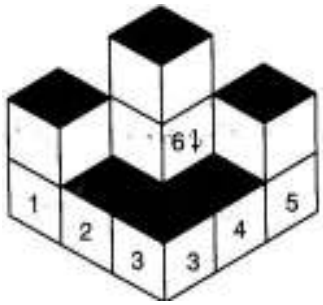
Note If we open this solid shape, we will find above net.

Question. 84 Find the number of cubes in the base layer of the following figure.



Solution.

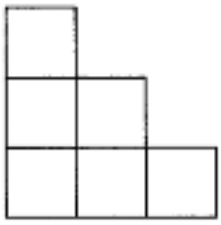
The number of cubes in the the base layer of the given figure is 6.



Question. 85 In the figure given in Q.84, if only the shaded cubes are visible from the top, draw the base layer.

Solution.

The top view of the figure is shown below:



Note If we see the given figure from top, we will only see upper layer not base layer.

Question. 86 How many faces, edges and vertices does a pyramid have with n sided polygon as its base? _

Solution.

In a pyramid, the number of vertices is 1 more than the number of sides of the polygon base, i.e. vertices = n + 1

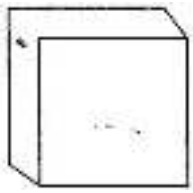
Also, the number of faces is 1 more than the number of sides of the polygonal base, i.e. faces = n+ 1

But the number of edges is 2 times the number of sides of the polygonal base, i.e. edges = 2 n .

Question. 87 Draw a figure that represents your mathematics textbook. What is the name of this figure? Is it a prism?

Solution.

The figure of our mathematics textbook is cuboid which is shown below. Also, we know that the another name of cuboid is a rectangular prism.



Question. 88 In the given figures, identify the different shapes involved.

Solution.

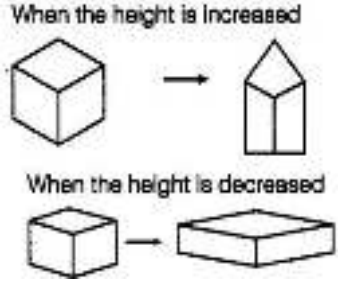
First figure is made by using a hemisphere and cylinder. In this figure, cylinder is mounted by hemisphere.

The second figure is made by using.aoone and hexagonal prism. In this figure, hexagonal prism is mounted by a cone.

Question. 89 What figure is formed if only the height of a cube is increased or decreased?

Solution.

If we only increase on decrease the height of a cube, the obtained figure is cuboid.



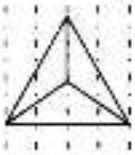
Question. 90 Use isometric dot paper to draw each figure.

(a) A tetrahedron..

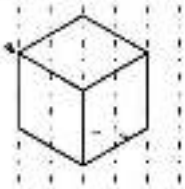
(b) A rectangular prism with length 4 units, width 2 units and height 2 units.

Solution.

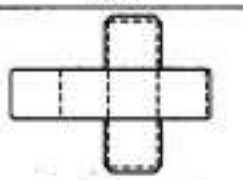
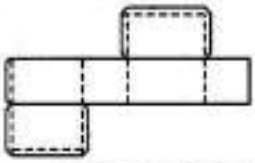
(a) The following tetrahedron figure is made by using isometric dot paper.



(b) The following rectangular prism with length 4 units, width 2 units and height 2 units is made by using isometric dot paper.



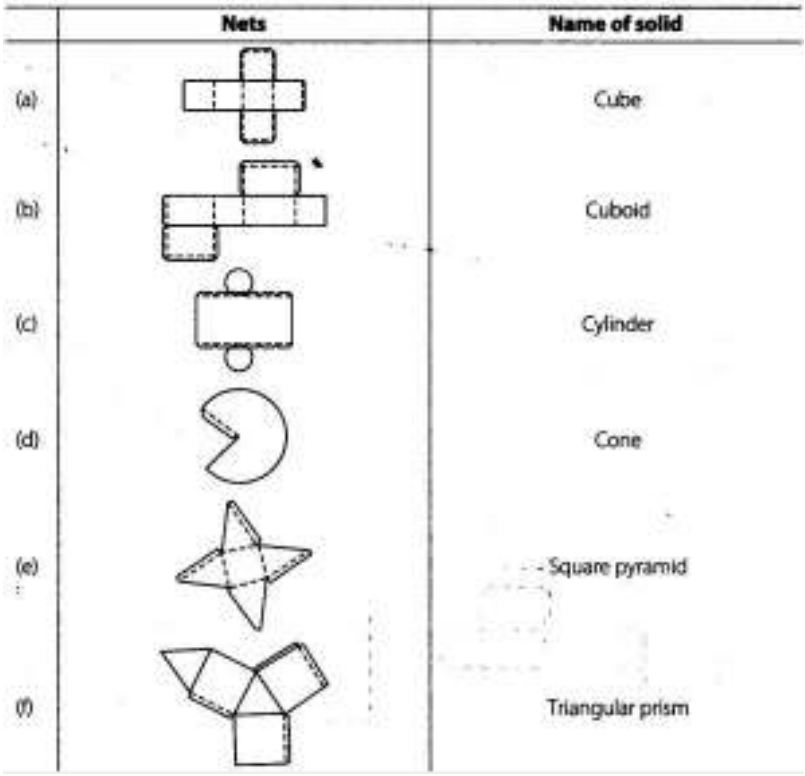
Question. 91 Identify the nets given below and mention the name of the corresponding solid in the space provided.

	Nets	Name of solid
(a)		
(b)		

	Nets	Name of solid
(c)		
(d)		
(e)		
(f)		

Solution.

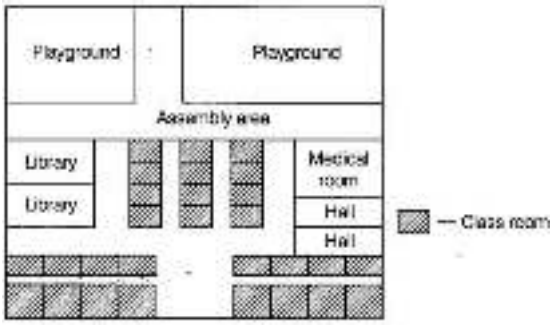
On the basis of properties regarding drawing a net diagram of a solid figure, we can easily name the solid by using the net.



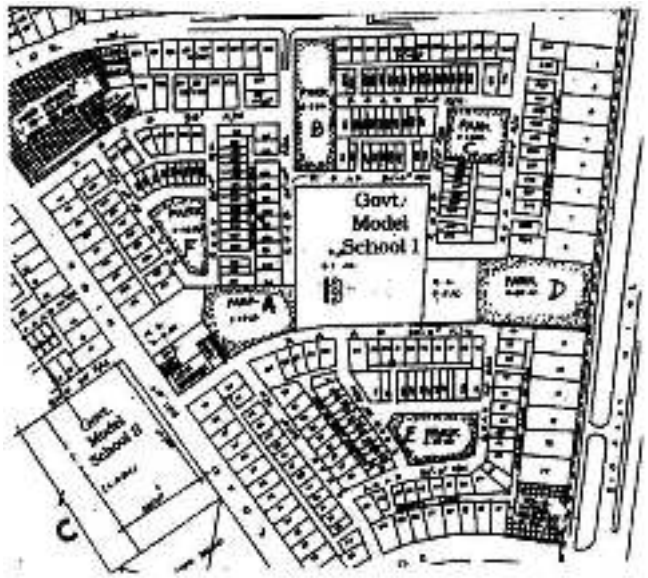
Question. 92 Draw a map of your school playground. Mark all necessary places like 2 Library, Playground, Medical Room, Classrooms, Assembly area, etc.

Solution.

A number of maps can be drawn for a school from which one map is given below :



Question .93 Refer to the given map to answer the following questions.



(a) What is the built-up area of Govt. Model School I?

(b) Name the schools shown in the picture.

(c) Which park is nearest to the dispensary?

(d) To which block does the main market belong?

(e) How many parks have been represented in the map?

Solution.

If we see the given map, we can answer the given questions as:

(a) The built-up area of Govt. Model School I is equal to 2.1 acre.

(b) Two schools shown in the picture, Govt. Model School I and II.

(c) Part A is nearest to the dispensary.

(d) The main market belongs to block A.

(e) 6 parks have been represented in the map.

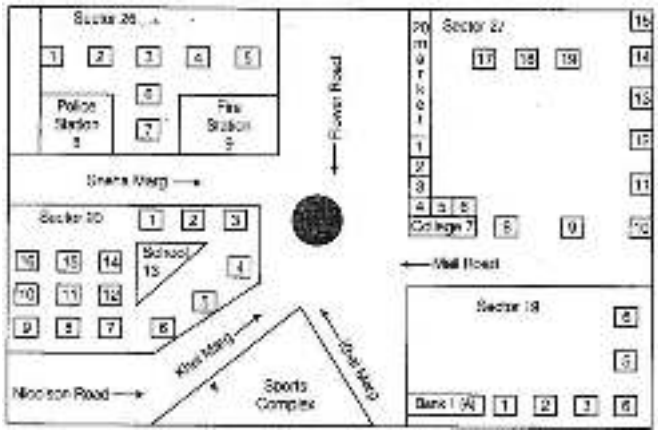
Question. 94 Look at the map given below.

Answer the following questions.

(a) Which two hospitals are opposite to each other?

(b) A person residing at Niti Bagh has to go to Chirag Delhi after dropping her daughter at Asiad Tower. Mention the important landmarks he will pass alongwith the roads taken.

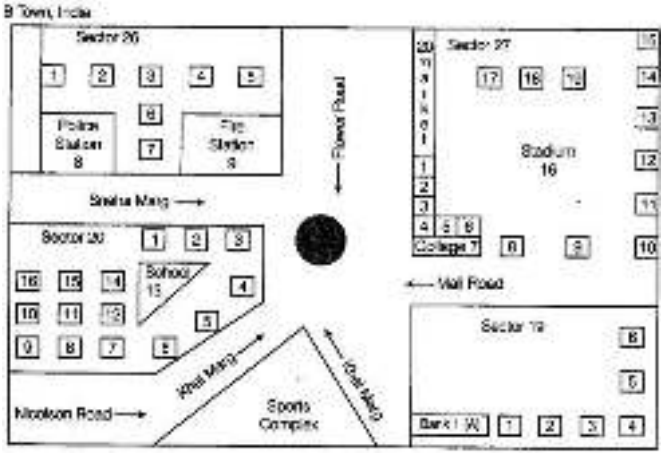
(c) Name of which road is similar to the name of some month.



Solution.

The given map is not sufficient to answer these questions.

Question. 95 Loot at the map given below.



Now, answer the following questions.

(a) Name the roads that meet at round about.

(b) What is the address of the stadium?

(c) On which road is the Police Station situated?

(d) If Ritika stays adjacent to bank and you have to send her a card. What address will you write?

(e) Which sector has maximum number of houses?

(f) In which sector is Fire Station Located?

(g) In the map, how many sectors have been shown?

Solution.

Carefully see the map.

(a) Flower road, Khel marg, Mall road and Sneha marg meet at round.

(b) The address of the stadium is given below:

Sector 27.

BTown, India

(c) The police station is situated on Sneha marg.

(d) Sneha's address is given below :

H.N-1Nr. Bank 1 (A)

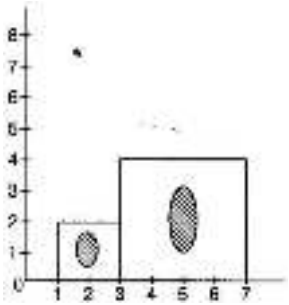
Sector 19, B town, India

(e) Sector 27 has maximum number of houses.

(f) Fire station is located in sector 26.

(g) In the map, four sectors have been shown.

Question. 96 A photographer uses a computer program to enlarge a photograph. What is the scale according to which the width has enlarged?



Solution.

By the given graph, we have width before editing = 2 units

Width after editing = 4 units

We know that, $\text{Scale} = \frac{\text{Size before editing}}{\text{Size after editing}}$

$\therefore \quad \text{Scale} = \frac{2}{4} = \frac{1}{2} = 1:2$

Hence, scale used to enlarge the photograph is 1 : 2.

Question. 97 The side of a square board is 50 cm. A student has to draw its image in her notebook. If the drawing of the square board in the notebook has perimeter of 40 cm, then by which scale the figure has been drawn?

Solution.

Given, the side of a square board is 50 cm.

So, perimeter of the square board = 4 × Side = 4 × 50 = 200 cm

On drawing in the notebook, the perimeter of a square board = 40 cm

$\therefore \quad \text{Scale} = \frac{\text{Size of actual square board}}{\text{Size in notebook}}$

$= \frac{200}{40} = 5:1$

Hence, the used scale is 5 : 1.

Question. 98 The distance between school and house of a girl is given by 5 cm in a picture, using the scale 1cm : 5 km. Find the actual distance between the two places?

Solution.

Given scale = 1 cm : 5 km, i.e. 1 cm in picture = 5 km of actual distance

∴ 5 cm in picture = 5 × 5 km of actual distance

Hence, the actual distance between the two places is 25 km.

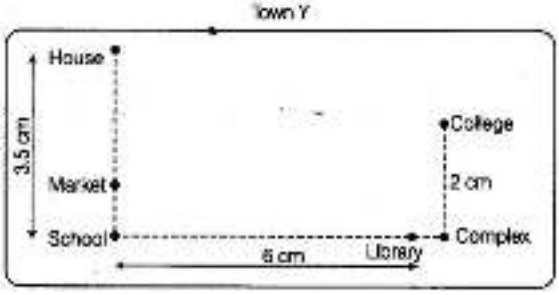
So, 5 cm represent = 5 × 5 = 25 km distance

Question. 99 Use a ruler to measure the distance in cm between the places joined by dotted lines. If the map has been drawn using the scale, 1 cm : 10 km, find the actual distances between

(a) School and Library

(b) College and Complex

(c) House and School



Solution.

Given scale is 1 cm : 10 km, i.e. 1 cm in a picture = 10 km of actual distance

(a) The distance between the school and libarary in the picture = 6 cm.

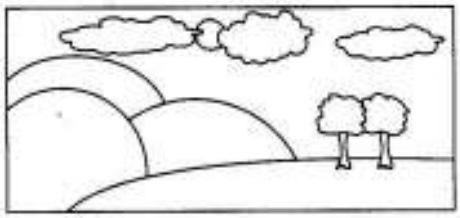
Hence, the actual distance between the school and library = 6 x 10 = 60 km

(b) Distance between the college and complex in the picture = 2 cm

Hence, the actual distance between the college apd complex = 2 x 10 = 20 km

(c) Distance between the house and school in the picture = 3.5 cm … Hencp, the actual distance between the house and school = 3.5 x 10 = 35 km

Question. 100 The' actual length of a painting was 2m. What is the length in the photograph if the scale used is 1 mm : 20 cm.



Solution.

The actual length of the painting was 2 m or $2 \times 100 = 200$ cm $[\because 1\text{ m} = 100\text{ cm}]$

Scale used in the painting = 1 mm : 20 cm

Hence, length of painting in photograph = Scale × Actual Size $\left[\because \text{scale} = \frac{\text{size drawn}}{\text{actual size}}\right]$

$$= \frac{1}{20} \times 200 = 10\text{ mm}$$

Question. 101 Find the scale,

(a) Actual size 12 m

. Drawing size 3 cm

(b) Actual size 45 feet Drawing size 5 inches

Solution.

(a) By using, $\text{scale} = \frac{\text{Size drawn}}{\text{Actual size}}$

$$= \frac{3\text{ cm}}{12\text{ m}}$$

$$= \frac{1\text{ cm}}{4\text{ m}} = 1\text{ cm}: 4\text{ m}$$

Hence, scale = 1 cm : 4 m

(b) By using, $\text{scale} = \frac{\text{Size drawn}}{\text{Actual size}} = \frac{5\text{ inches}}{45\text{ feet}}$

$$= \frac{1\text{ inch}}{9\text{ feet}} = 1\text{ inch} : 9\text{ feet}$$

Hence, scale = 1 inch : 9 feet

Question. 102 In a town, an ice-cream parlour has displayed an ice-cream sculpture of height 360 cm. The parlour claims that these ice-creams and the sculpture are in the scale 1 : 30. What is the height of the ice-creams served? .

Hence, the height of thel ice-cream served is 12 cm.

Solution.

Given, height of ice-cream sculpture = 360 cm

Scale used for ice-cream and sculpture = 1 : 30

The height of the ice-creams served = Scale × Actual size $\left[\because \text{scale} = \frac{\text{size drawn}}{\text{actual size}}\right]$

$$= \frac{1 \times 360}{30} = 12 \text{ cm}$$

Hence, the height of thel ice-cream served is 12 cm.