Name : _____

Grade : VIII

Subject : Mathematics

Chapter : 10. Visualising Solid Shapes

Objective Type Questions

(1 Marks)

I. Multiple choice questions

1. Find the number of edges of a polyhedron having 20 faces and 12 vertices ? **[NCERT Exemplar]**

(a) 10 (b) 20 (c) 25 (d) 30

2. Find the number of faces of a polyhedron having 6 vertices and 12 edges ? **[NCERT Exemplar]**

(a) 8 (b) 10 (c) 12 (d) 14

3. Find the number of vertices of a polyhedron having 5 faces and 9 edges ? **[NCERT Exemplar]**

(a) 18 (b) 12 (c) 6 (d) 4

4. Which of the following is a regular polyhedron ? **[NCERT Exemplar]**

(a) Cuboid (b) Triangular prism (c) Cube (d) Square prism

5. Which of the following is a two dimensional figure ? **[NCERT Exemplar]**

(a) Rectangle (b) Rectangular prism

(c) Square pyramid (d) Square prism

6. Number of congruent faces of a cube is **[NCERT Exemplar]**

(a) 14 (b) 6 (c) 8 (d) 9

7. Which of the following can be the base of a pyramid ? **[NCERT Exemplar]**

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

8. The lateral faces of pyramid are : **[NCERT Exemplar]**

(a) Triangles (b) Parallelograms (c) Squares (d) Rectangles

9. Which of the following 3D shapes does not have a vertex ? **[NCERT Exemplar]**

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

10. Number of vertices in a pyramid with rectangular base is : **[NCERT Exemplar]**

(a) 3 (b) 4 (c) 5 (d) 6

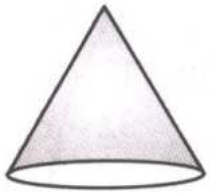
11. Solid having only line segments as its edges is a : **[NCERT Exemplar]**

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

12. The match box is an example of :

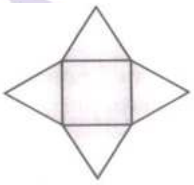
(a) Tetrahedron (b) Nested pyramid (c) Cuboid (d) Square pyramid

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

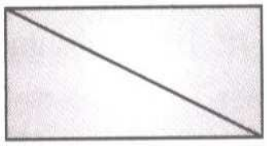


[NCERT Exemplar]

(a) 

(b) 

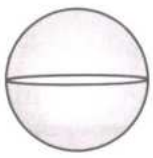
(c) 

(d) 

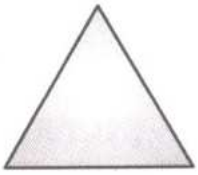
14. Side of a square is 30 m. If the scale used to draw its picture is 1 cm x 5 cm, the perimeter of the square in the picture is : **[NCERT Exemplar]**

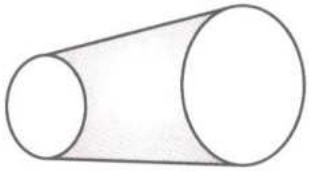
(a) 20 cm (b) 24 cm (c) 28 cm (d) 30 cm

15. Which of the following shapes has a vertex. [NCERT Exemplar]

(a) 

(b) 

(c) 

(d) 

16. 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 : **[NCERT Exemplar]**

(a) 1 : 11 (b) 1 : 10 (c) 1 : 100 (d) 1 : 3

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

[NCERT Exemplar]

(a) An equilateral triangle.

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

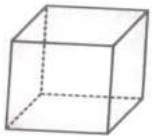
(c) 2 equilateral triangles with side length same as triangle.

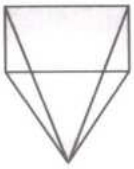
(d) 2 squares with side length same as triangle.

18. In a solid, if F = V = 5, then the number of edges in this shape is : **[NCERT Exemplar]**

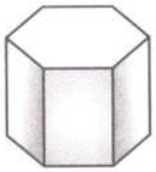
(a) 6 (b) 4 (c) 8 (d) 2

19. Which amongst the following is not a polyhedron ? **[NCERT Exemplar]**

(a) 

(b) 

(c) 

(d) 

20. Which of the following will not form a polyhedron ? **[NCERT Exemplar]**

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

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

1. (d)	2. (a)	3. (c)	4. (c)	5. (a)	6. (b)	7. (c)	8. (a)	9. (d)	10. (c)
11. (a)	12. (c)	13. (a)	14. (b)	15. (c)	16. (b)	17. (b)	18. (c)	19. (c)	20. (a)

II. Multiple Choice Questions

1. A prism is a polyhedron whose lateral faces are **[NCERT Exemplar]**

a. Circles b. Triangles c. Parallelograms d. Rhombuses or Rhombi

2. The other name of a triangular pyramid is

a. Tetrahedron b. Octahedron c. Cuboid d. Cube

3. How many vertices are there in a prism whose base is a polygon of n sides?

a. $n + 2$ b. $2n$ c. $3n$ d. $2n + 1$

4. If the pyramid has hexagonal base, then the number of vertices in

a. 7 b. 5 c. 6 d. 8

5. How many rectangles are there in a net of a rectangular prism?

a. 7 b. 4 c. 5 d. 6

1. c	2. a	3. b	4. a	5. d

I. Fill in the blanks

1. A cube has _____ vertices, _____ edges and faces. **[NCERT Exemplar]**

2. A pyramid with n sided polygon has _____faces. **[NCERT Exemplar]**

3. A cuboid is also known as a rectangular _____ **[NCERT Exemplar]**

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

[NCERT Exemplar]

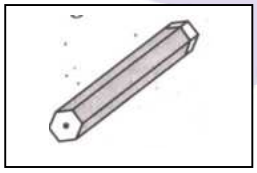
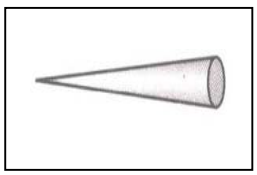
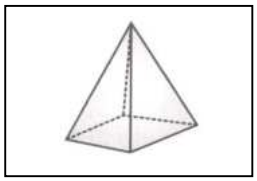
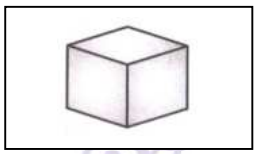
1. 8, 12, 6	2. (n + 1)	3. prism	5. Five

I. True or Flase

1. A polyhedron can have 3 faces.[NCERT Exemplar]
2. A polyhedron with least number of faces is known as a triangular pyramid. [NCERT Exemplar]
3. Euler's formula is true for all three-dimensional shapes. [NCERT Exemplar]
4. Every solid shape has a unique net. [NCERT Exemplar]
5. Pyramids do not have a diagonal. [NCERT Exemplar]

1. False	2. True	3. False	4. False	5. True

I. Match the following

	Figure	Name
1.		- (a) Hexahedron
2.		- (b) Hexagonal Prism
3.		- (c) Square Pyramid
4.		- (d) Cone

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

I. Very Short Answer Type Questions

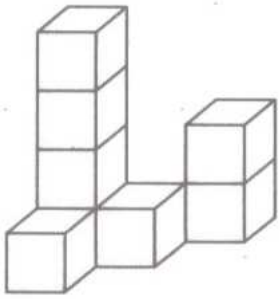
1. What is Euler formula. **[NCERT Exemplar]**

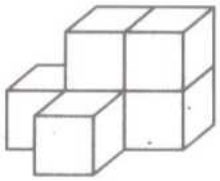
Sol. Euler's formula for any polyhedron is,

$F + V - E = 2$

where F stands for number of faces, V for number of vertices and E for number of edges.

2. Count the number of cubes in the given shapes. **[NCERT Exemplar]**





Sol. (a) 8 cubes (b) 6 cubes

3. What is a parallelepiped ? **[NCERT Exemplar]**

Sol. When the ends of a quadrilateral prism are parallelograms, then it is called a parallelepiped.

4. In the formula F + V- E = 2, on putting F = 40 and E = 60, find the value of V.

[NCERT Exemplar]

Given, $F + V - E = 2$ Here, $F = 40$ and $E = 60$ then $40 + V - 60 = 2$ $V - 20 = 2$ $V = 2 + 20$ $V = 22$ 1

5. How may vertices does a triangular prism have ? [NCERT Exemplar]

Sol. 6 vertices.

II. Very Short Answer Type Questions

1. How many faces, edges and vertices does a cube have?

A cube has 8 vertices, 12 edges and 6 faces.

2. What do you mean by regular polyhedra? Write all such polyhedron shapes.

A polyhedron is said to be regular if its faces are made up of regular polygons and the same number of faces meet at each vertex. There are five such solids: tetrahedron, cube, octahedron, dodecahedron and icosahedron.

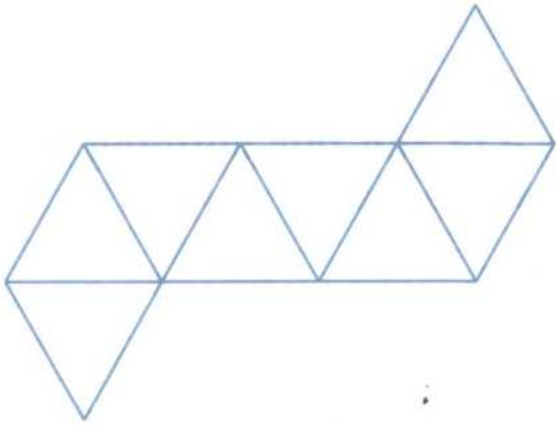
3. What type of figure a cylinder is ?

A cylinder is a 3 dimensional shape having two circular faces of same radius.

4. What is a net?

A net is a sort of skeleton outline in 2D, which when folded results in a 3D shape.

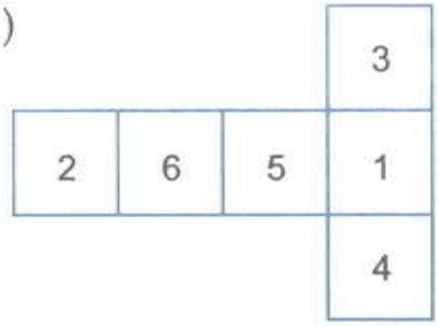
5. Identify the shape whose net is given below.



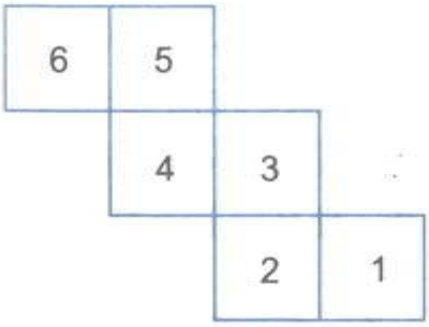
This shape is entirely made of equilateral triangles. When folded, it results in a regular octahedron. Note that since these are all equilateral and congruent faces, it is a regular polyhedron.

6. Dice are cubes where sum of the numbers on the opposite faces must be 7. Which of the following is dice?

(i)



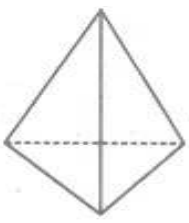
(ii)



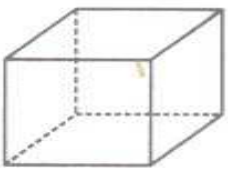
I. Short Answer Type Questions

1. Name the following polyhedrons and verify the Euler's formula for each of them.

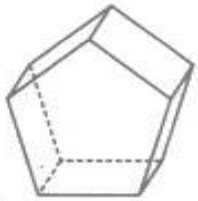
(a)



(b)



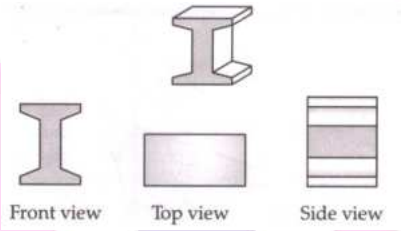
(c)



[NCERT Exemplar]

S. No	Polyhedron	F	V	F + V	E	F + V - E
i	Tetrahedron	4	4	8	6	2
ii	Cuboid	6	8	14	12	2
iii	Pentagonal prism	7	10	17	15	2

2. Draw the top, front and side views of the given solid. [NCERT Exemplar]



3. Height of a building is 9 m and this building is represented by 9 cm on a map. What is the scale used for the map ? [NCERT Exemplar]

Sol. Scale of map $= \frac{Sizedrawn}{Actual\ size}$

$= \frac{9\ cm}{900\ cm}\ (because\ 9\ m = 900\ cm)$

$= \frac{1}{100}$

Thus, scale is 1 : 100.

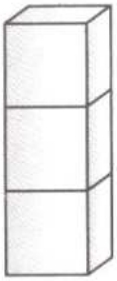
4. The scale on a map is 2 mm: 4m. Find the distance on the map for an actual distance of 52 m

Sol. Distance on map for an actual distance of 4 m =1 mm

Distance on map for actual distance of 52 m $= \frac{1}{4} .52 = 13$ mm

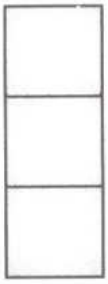
Thus, distance on map for actual distance of 52 m is 13 mm.

5. Let there be a combination of three cubes, one on the top of the other as shown in the following figure. What will be its top and side views? [NCERT Exemplar]



Sol. a. If we look at given solid structure from the top, we would see just a square.

b. If we look at it from a side, i.e, left or right, then we would see a figure as shown here.



6. The distance between City A and City B and a map is given as 6 cm. If the scale represents 1 cm = 200 km, then find the actual distance between City A and City B.

[NCERT Exemplar]

Sol. Actual distance represent by 1 cm = 200 km

Actual distance represented by 6 cm = 6 x 200 km = 1200 km

So, actual distance between City A and City B is 1200 km.

7. An iconsahedron is having 20 triangular face and 12 vertices. Find the number of its edges. **[NCERT Exemplar]**

Sol. Here, Number of faces (F) = 20

Number of vertices (V) = 12

Let the number edges be E.

$\therefore$ Using Euler's formula, we have

$$F + V = E + 2$$

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

$$\Rightarrow \quad 32 = E + 2$$

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

Thus, the required number of edges = 30.

8. A polyhedron have 8 vertices adn 12 edges. How many faces of it are there?

[NCERT Exemplar]

Sol. Number of vertices (V) = 8

Number of edges (E) = 12

Let the number of faces = F

Now, using Euler's formula

$$F + V = E + 2$$

We have, $F + 8 = 12 + 2$

$\Rightarrow$ $F + 8 = 14$

$\Rightarrow$ $F = 14 - 8$

$\Rightarrow$ $F = 6$

Thus, the required number of faces = 6.

9. A dodecahedron is having 20 vertices an 30 edges. How many faces are there?

[NCERT Exemplar]

Sol. Here:

Number of vertices (C) = 20

Number of edges (E) = 30

Let the number of faces = F

Then using Euler's formula, we have

$F + V = E + 2$

$\therefore$ Substituting the values of V and E in (1), we get

$F + 20 = 30 + 2$

$\Rightarrow$ $F + 20 = 32$

$\Rightarrow$ $F = 32 - 20$

$\Rightarrow$ $F = 12$

Thus, the required number of faces = 12.

10. A polyhedron has 7 faces and 10 vertices. How many edges does the polyhedron have?

[NCERT Exemplar]

Sol. For any polyhedron

Here, $F = 7, V = 10, E = ?$

Using above formula,

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

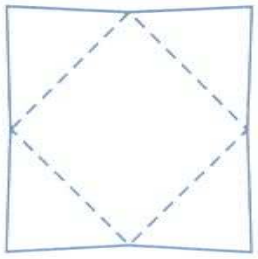
$\Rightarrow$ $17 - E = 2$

$\Rightarrow$ $17 - 2 = E$

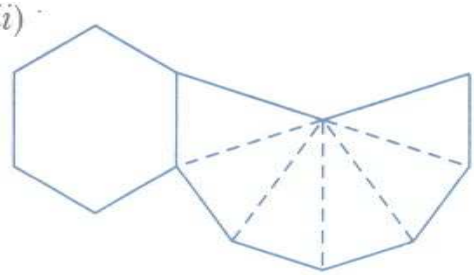
$\Rightarrow$ $E = 15$

II. Short Answer Type Questions

1. Name the polyhedron that can be made by folding each net:

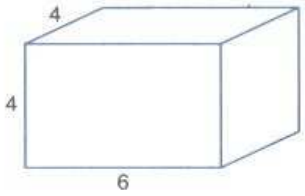
(i) 

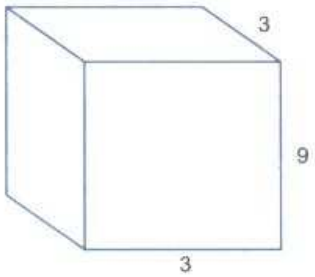
(ii) 

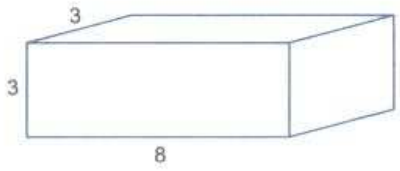
(iii) 

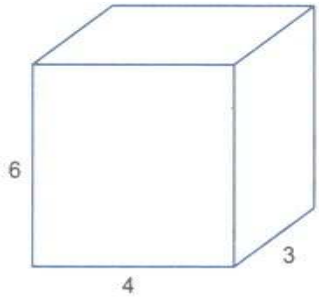
Sol. (i) Square pyramid, (ii) Triangular prism (iii) Hexagonal pyramid.

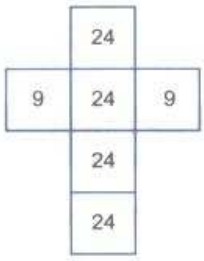
2. Match the following figures:

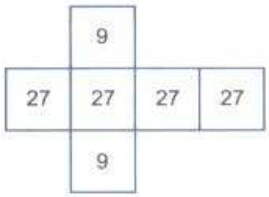
(i) 

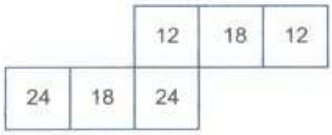
(ii) 

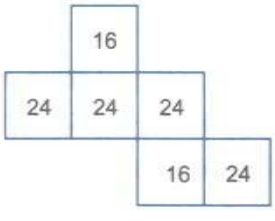
(iii) 

(iv) 

(a) 

(b) 

(c) 

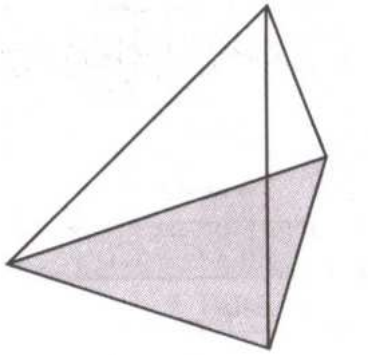
(d) 

i. d	ii. b	iii. a	iv. c

I. Long Answer Type Questions

1. What is the least number of planes that can enclose a solid? Name the simplest regular poyhedron and verify Euler's formula for it. [NCERT Exemplar]

Sol. At least 4 planes can enclose a solid. Tetrahedron is the simple polyhedron. Following figure represent a simplest solid, called tetrahedron.



A tetrahedron has

4 traiangular faces, i.e., $F = 4$

4 Vertices, i.e., $V = 4$

6 edges, i.e., $E = n\ 6$

Now, substituting the values of F, V and E in Euler's formula i.e.,

$$F + V = E + 2$$

We have, $4 + 4 = 6 + 2$

$\Rightarrow$ $8 = 8$, which is true

Thus, Euler's formula is verified for a tetrahedron.

2. What is Euler's formula? Verify for Euler's formula for a pentagonal prism. [NCERT Exemplar]

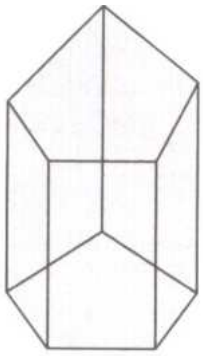
Sol. If a polyhedron is having number of faces as F, number of edges as E and the number of vertices as V, then the relationship.

$$F + V = E + 2$$

is known as Euler's formula

Following figure is a solid pentagonal prism.

It has:



Number of faces (F) = 7

Number of edges (E) = 15

Number of vertices (V) = 10

Substituting the values of F, E and V in the relation,

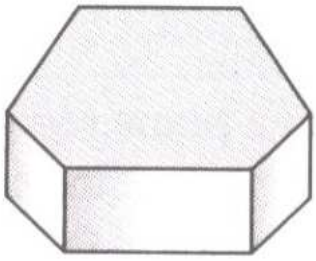
$$F + V = E + 2$$

We have, $7 + 110 = 15 + 2$

$\Rightarrow$ $17 = 17$

Which is true, the Euler's formula is verified.

3. Name the following polyhedron. **[NCERT Exemplar]**



How many faces, vertices and edges of this solid are there?

Sol. $\therefore$ The ends (bases) of the given solid are congruent rectilinear figure each of six sides.

$\therefore$ It is a hexagonal prism.

In a hexagonal prism, we have

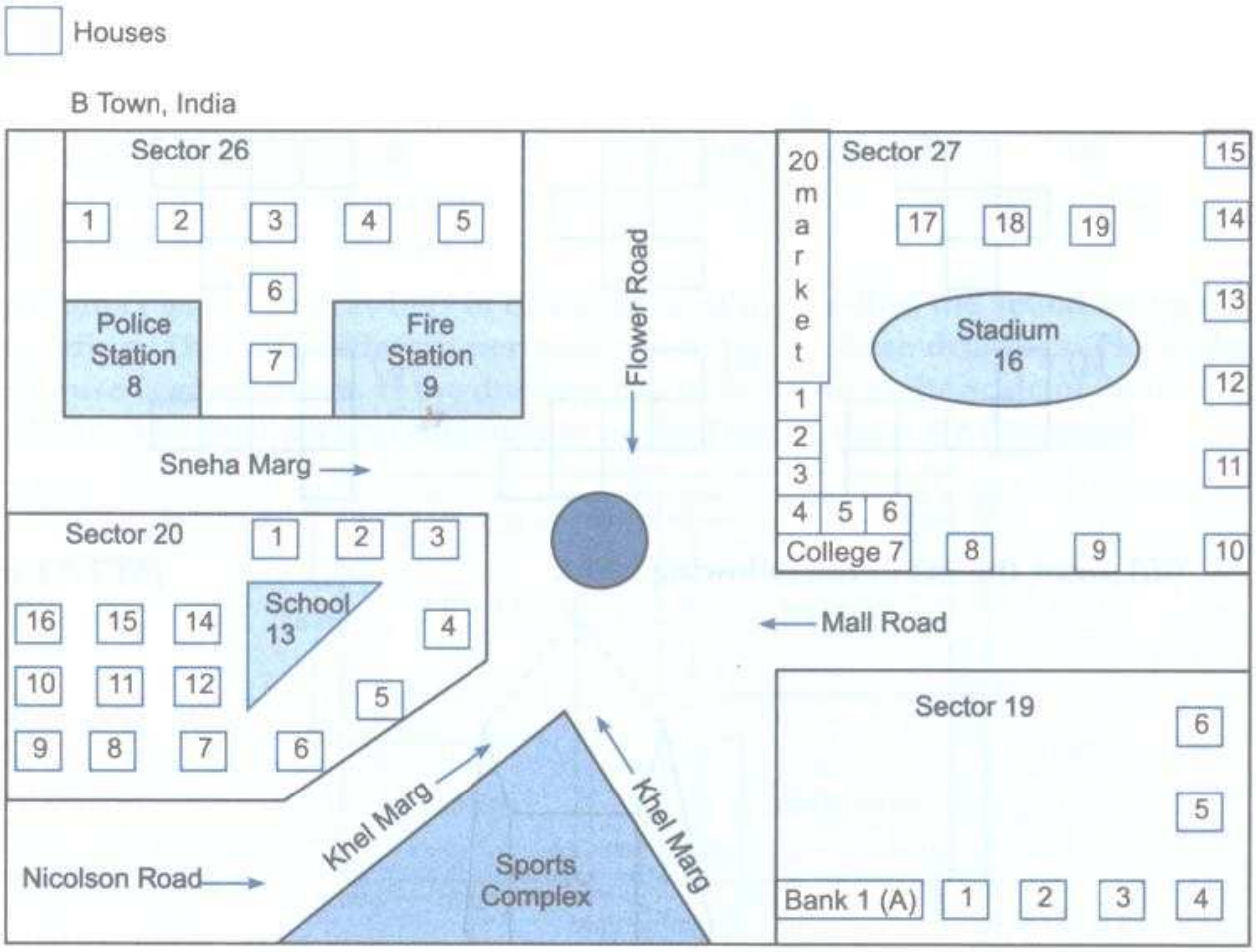
The number of faces = 8

The number of edges = 18

The number of vertices = 12

II. Long Answer Type Questions

1. Look at the map given below. **[NCERT Exemplar]**



Now answer the following questions.

i. Name the roads that meet at round about.

ii. What is the address of the stadium?

iii. On which road is the Police Station situated?

iv. Which sector has maximum number of houses?

v. In the map, how many sectors have been shown?

Sol.

i. Flower Road, Khel marg, Mall road and Sneha marg are roads that meet at round about.

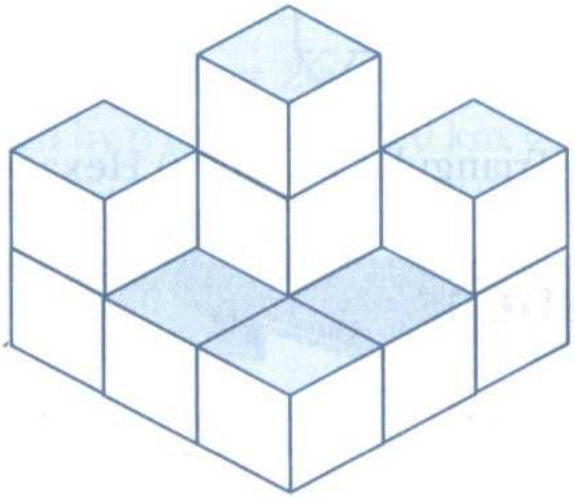
ii. Stadium sector 27, B Town, India

iii. Sneha marg

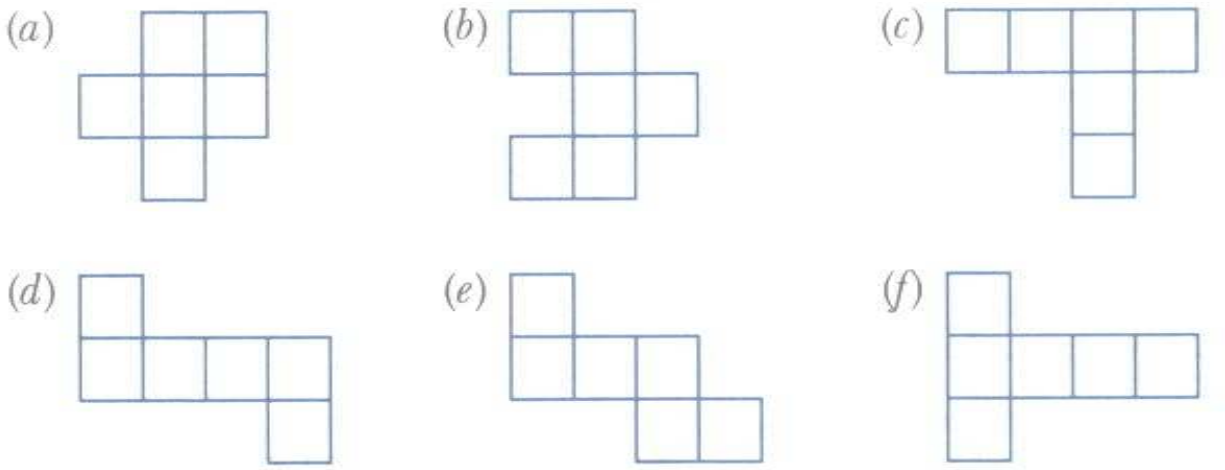
iv. Sector 27

v. 4 Sectors have been shown in the map.

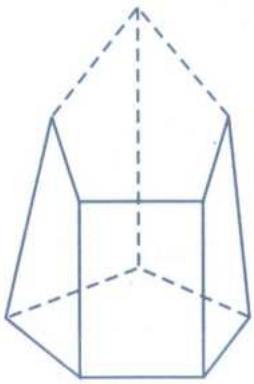
2. (i) In the figure, if only the shaded cubes are visible from the top, draw the base layer. **[NCERT Exemplar]**



(ii) Which among the following are nets for a cube?

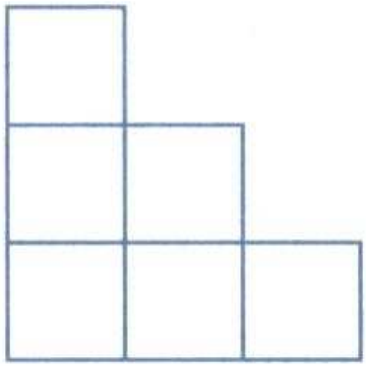


(iii) Draw the net of the following solid. **[NCERT Exemplar]**



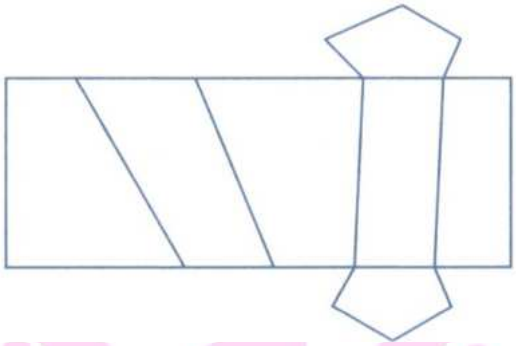
[NCERT Exemplar]

Sol. (i)

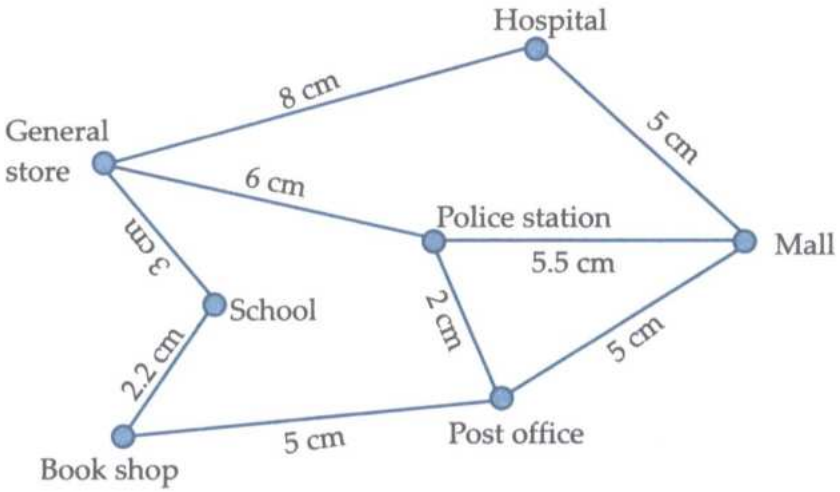


(ii) (d), (e) and (f) are nets of the cube.

(iii)



3. Map of a certain locality is given on a scale of 1 cm : 5 km. Hospital



Find the shortest distance between:

(a) Police station and bookshop (b) Hospital and bookshop

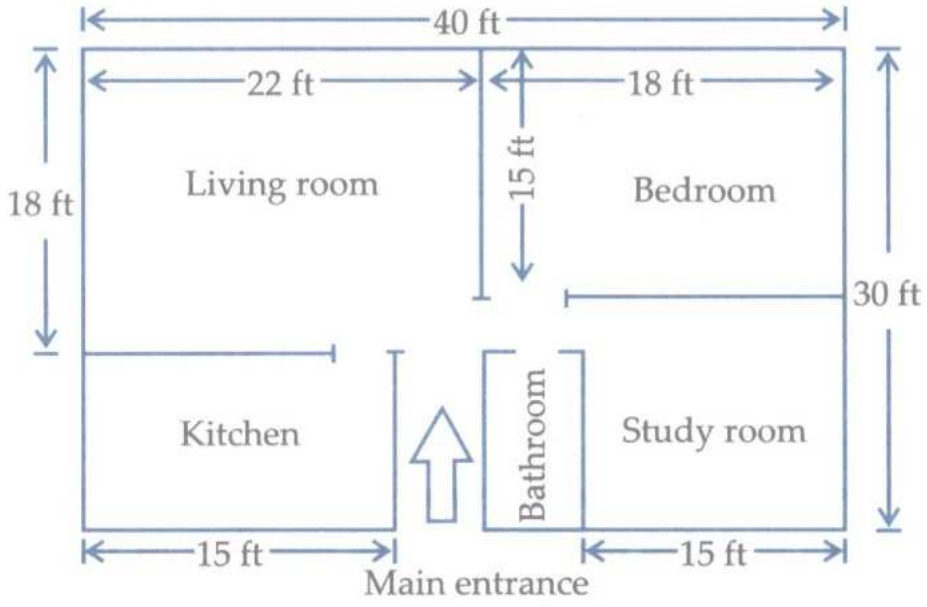
(c) Post office and general store (d) Police station and hospital

(e) Mall and general store Sol. (f) School and mall

Sol.

(a) 35 km (b) 66 km (c) 40 km (d) 52.5 km (e) 57.5 km (f) 61 km

4. Architect use scale drawings of different buildings to find the actual set up of that building. They use different perspectives to sketch these drawings. Floor plan of a house is given below. If the drawing has to be made in the scale of 20 ft : 1 unit, what will be the different dimensions of the floor in the scale drawings?



Sol.

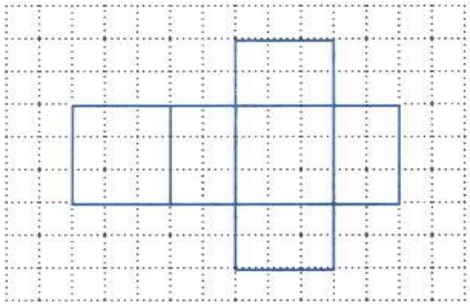
Plot :	Length = 2 units,	Breadth = 1.5 units
Living room:	Length = 1.1 units,	Breath = 0.9 unit
Bedroom:	Length = 0.9 unit,	Breadth = 0.7 unit
Kitchen:	Length = 0.15 unit,	Breadth = 0.6 unit

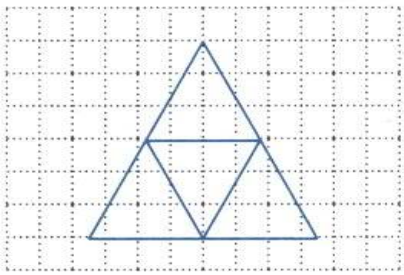
I. HOTS (Higher Order Thinking Skills)

1. Draw net pattern for

i. Cuboid ii. Tetrahedron iii. Pyramid (square)

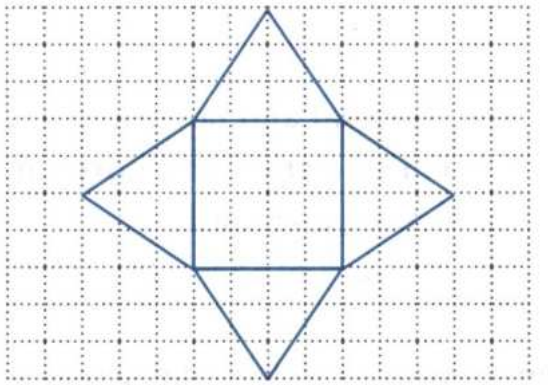
Sol. i. Net pattern for a cuboid: ii. Net pattern of tetrahedrom





kz

iii. Net pattern for a square pyramid:



2. Find the number of faces, edges and vertices in a prism whose base is a polygon with 8 sides. Hence verify Euler's formula for the solid.

Sol. If base of a prism is n sided polygon edges $3n, vertices = 2n, faces = n + 2$

$Here, n = 8$

$\Rightarrow$ Edges = 3 x 8 = 24, Vertices = 2 x 8 = 16

Faces = 8 + 2 = 10

Applying Euler's Formula

F - E + V = 2

$\Rightarrow$ LHS = 10 - 24 + 16 = 26 - 24 = 2 = RHS

Hence verified.

3. Name and draw the solid whose number of faces and vertices are equal and the number of edges is three more than the number of faces.

Sol. Let the number of faces and vertices be x.

According to questions,

Number of edges = $x + 3$

According to Euler's rule, $F + V - E = 2$

$\Rightarrow x + x - (x + 3) = 2$ $\Rightarrow 2x - x - 3 = 2$

$\Rightarrow x - 3 = 2$ $\Rightarrow x = 2 + 3$

$\Rightarrow x = 5$

Hence, given polyhedron has 5 faces, 5 vertices and 8 edges.

Therefore, polyhedron is a square pyramid. Its figure is shown above.

I. Value Based Questions

1. Define the following.

a. Polyhedron

b. find the number of vertices in a polyhedron which has 30 edges and 12 faces.

[NCERT Exemplar]

Sol. **a. Polyhedron:** A solid shapes bounded by polygons is called a polyhedron. For example, cube, cuboid, etc.

b. For any polyhedron,

$$F + V - E = 2$$

Here, $F = 12, V = ?, E = 30$

Using above formula,

$$12 + V - 30 = 2$$

$$V - 18 = 2$$

$$V = 2 + 18$$

$$V = 20$$