# Chapter - 15

# Visualising Solid Shape

**15.1** We see different type of objects around us be it in our house or in the school. For example books, copies, chalk pencil boxes etc. Each of these objects occupy a space. These are all solid shaped objects. All solid shaped objects found in the enviroment have three (3) dimension with length, breadth and height or depth. In other words we can say that three dimensional shapes are called solid shapes.

Look at the following figures –


**Figure -15.1**

All the shapes are familier to you. Isn't it? These are two (2) dimensional figures. They have only length and breadth. In short two dimensional figures can be termed as 2-D.

## 15.2 Face, Edge and Vertex :

You have already come across the Faces, Edge and Vertices of a solid shape. Let us recall again–

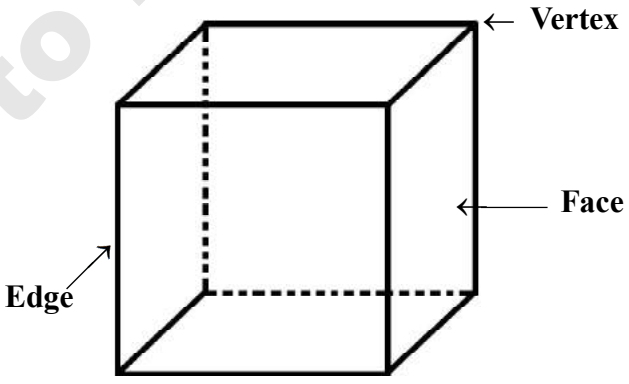



**Figure -15. 2**

How many vertices, Edges and Faces are there in the above given cube? Discuss in your group and find out.

Observe the following figures –

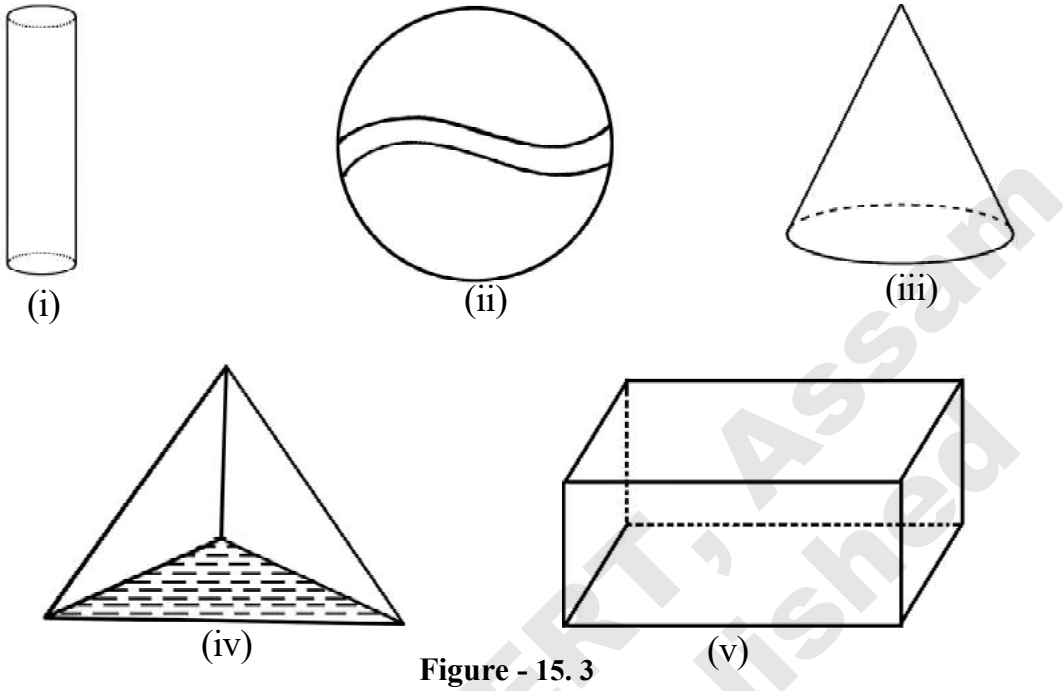



**Figure - 15. 3**

Are you familiar with the above given figures? These are the figures of Cylinder, Sphere, Cone, Pyramid and Cuboid respectively. All the objects shown in the figure have three dimensions. Therefore, these figures are called three dimensional (3-D) figures.

By observing the above three dimensional figures you can visualise two dimensional surface within it. For example, the cylinder possesses two circular faces. Like ways, the cone possesses one circular face, the faces of a pyramid are triangular and faces cuboid are rectangler or square.

## 15.3 Let us make 3-D shaped objects using Art Paper or Card board.

Three dimensional objects can be made by Properly folding and cutting Art-paper or Card board. If you cut the edge of a shoe-box or sweet packing box, You will see a two dimensional shape of the box. Fig 15.4 shows a two dimensional form of a cuboid which if properly folded again will take the shape of a three dimensional figure. Different type of two-dimensional shapes can be made from cuboid, you can make two dimensional shapes from different types of cuboid.

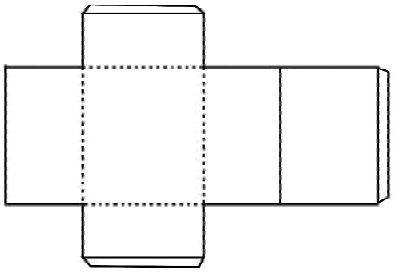
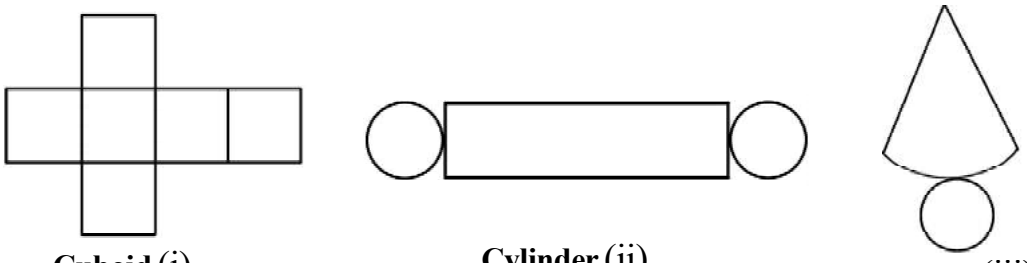


**Figure -15.4**

Similarly, if we cut the edges of a cube, a Cylinder and a cone we will get the following two-dimensional figures.



Cuboid (i) Cylinder (ii) Cone (iii)

**Figure - 15. 5**

You must be knowing about the Great Pyramids of Egypt.

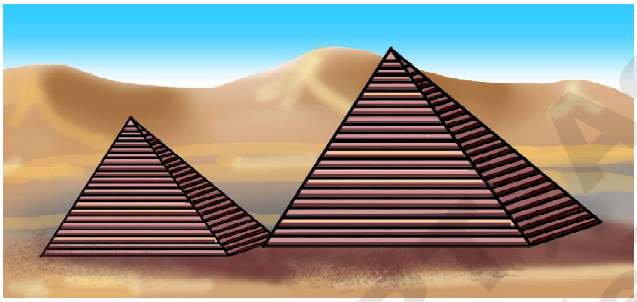


**Figure - 15. 6**

The base of a pyramid may be square shaped or triangular shaped.

The square based pyramid has one triangle on each of the four sides of the square. Therefore, the total number of triangles are four (4) in square based pyramid (Fig. 15.7)

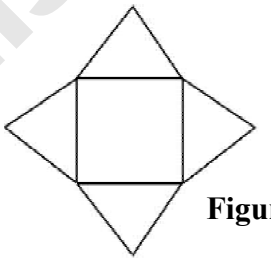


**Figure - 15.7**

You can make square based pyramid by properly cutting and folding art-paper and you will find that the pyramid has 5 vertices, 5 faces and 8 edges.

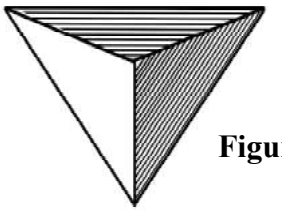


**Figure - 15.8**

If the base of the pyramid is triangular shaped, then how does it look like? Is it like (Fig. 15.8).

Triangular based pyramid can be made by paper cutting and folding as in Fig. 15.7. Discuss in the group. Find the number of edges, vertices and faces of a triangular base pyramid.

You can make triangular based pyramid by folding paper.

(i) (ii)

- Take an A-4 size paper. (Fig i)
- Fold the paper equally in two halves (Fig ii)

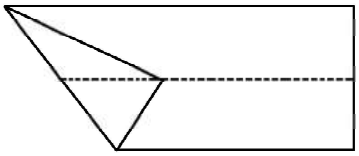


Figure -(iii)

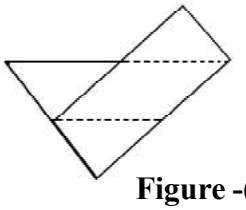


Figure -(iv)

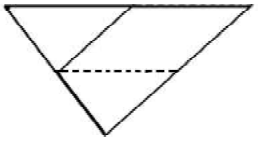


Figure -(v)

- Now open the folded paper. Fold the top left corner of the paper in such a manner that the opposite corner at bottom of the paper, can be folded along at the centre.
- Now bring the right part of the paper in a fold so that it aligns along the fold in the left side.
- There will be a triangular shaped part remaining on the upper right side. Insert this portion into the fold already made.

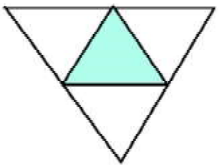


Figure -(vi)

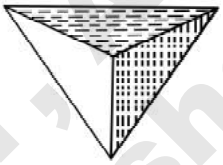
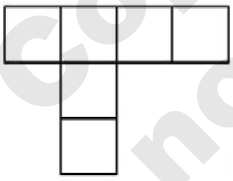


Figure -(vii)

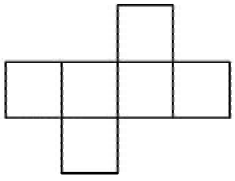
- Now you will see a triangle just beneath the folded centre of the paper. And if you fold this shape equally, you will get two more triangles. Now, you will get the triangular pyramid as given in diagram vi.
- You can paste the edge will cello tape to get your pyramid (diagram viii). The base, edges and vertices are 4, 6 and 4 in number respectively pyramids of such shapes are also known as tetrahedron.

## Exercise - 15.1

1. Classify the following as two-dimensional and three dimensional objects –
   Sphere, Circle, Rectangle, Pyramid, Pencil box, Marble, Cube, Quadrilateral, Match box
2. Write the name of three solid shapes which have no edge and vertex .
3. How many vertices are there in a cone?
4. Which of the following figures can be used for making cube ? Discuss in a group.



(i)



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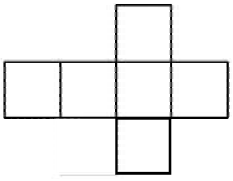

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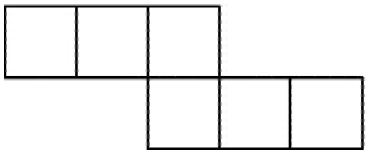

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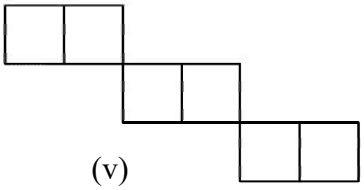

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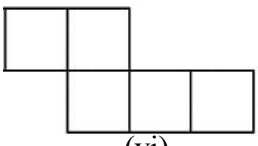
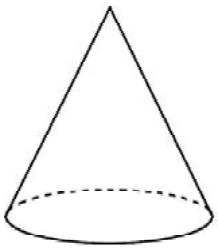
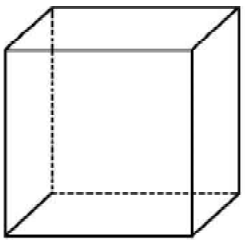
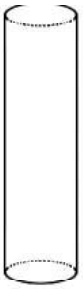


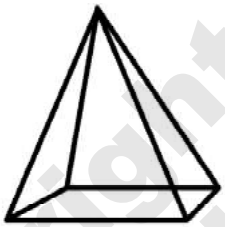
(vi)

5. Match the shapes of L.H.S. with the shapes of R.H.S..

(i) 

(ii) 

(iii) 

(iv) 

(i) 

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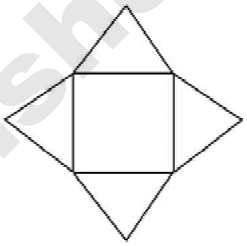
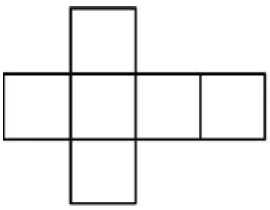
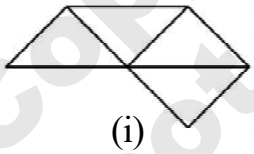
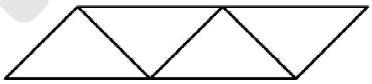
(iii) 

(iv) 

6. Discuss and identify the following rectilinear figure which can be used to make tetrahedron. Discuss


(i)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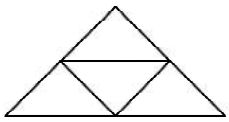
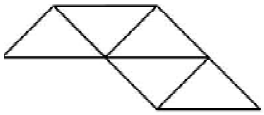

(iii)


(iv)

## 15.4 Drawing solids on a Flat-Surface

We can adopt two techniques for drawing solid shapes on a flat surface

(i) Oblique Sketches

(ii) Isometric Sketches

(i) **Oblique Sketches :** The length, breadth and height/depth of a solid shape may not be exact in oblique sketches. For example, the faces of a cube are square shaped,

but if we draw oblique sketch of the cube, some of the faces may not be square shaped. However, the oblique sketch shall appear like a cube. Such sketch of a solid is called an oblique sketch.

Now let us see how an oblique sketch of a cube can be drawn in a plane surface – Take a square line paper. You can make one on white paper. Let us draw the front face of the cube as show in diagram (i). The opposite face of the cube can be drwan as shown in diagram (ii). Now, if the corresponding corners are joined as shown in diagram (iii) we shall get the sketch of a cube. The edge of the cube can be made by dotted lines as shown in diagram (iv).

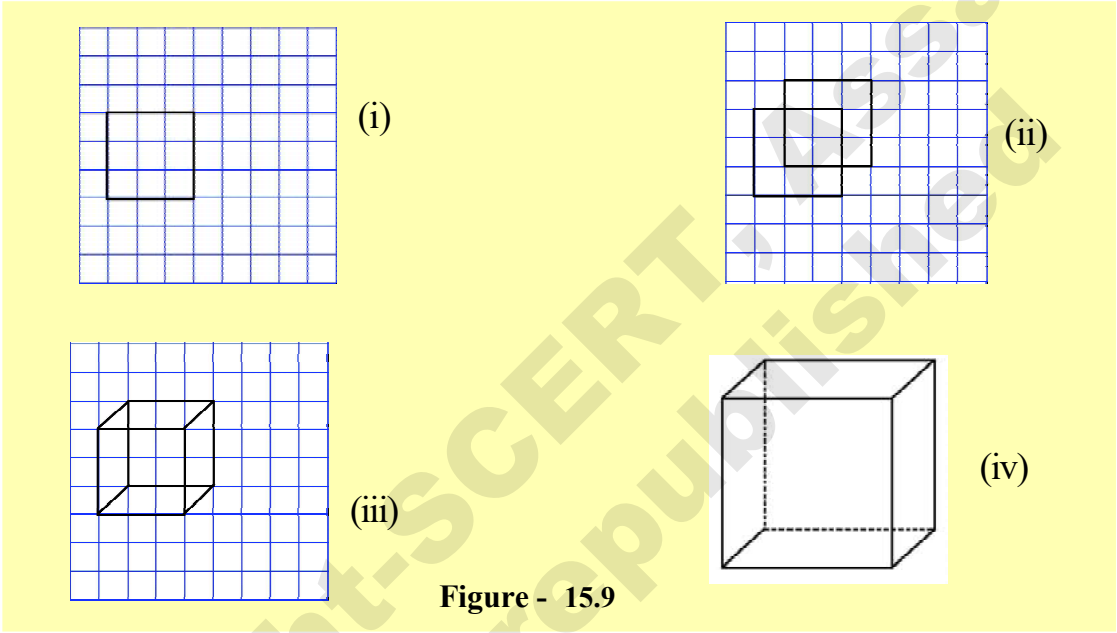



**Figure - 15.9**

(ii) **Isometric Sketch :** In Isometric sketch, the length, breadth and height or depth of a solid shape is Proportionate.

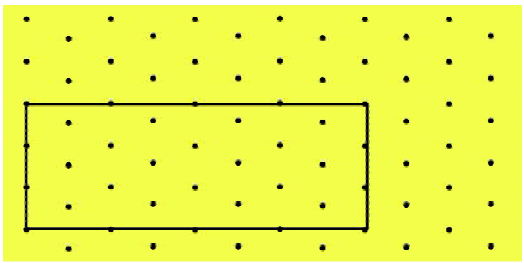
Let us see how an isometric sketch can be drawn in a plane surface.

Isometric sketches are drawn on isometric dot-sheet. On a sheet-some dots are arranged in such a way so that three dots make equilateral triangles.

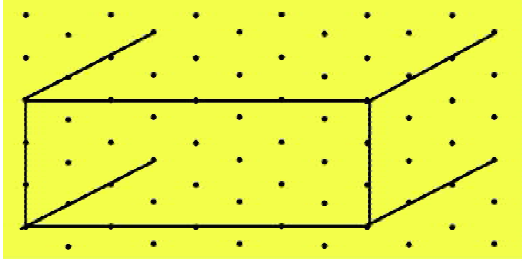
Let us try to draw an Isometric sketch of a cuboid of. The measurement of length, breadth and height of the cuboid are 4, 3 and 3 units (dimension 4 ×3× 3).

♦ First draw a rectangle to show the front face. whose length and breadth are 4 units and 3 units respectively.

Now draw four parrallel line segments of length 3 from the four corners of the rectangle (Fig ii)



(**Figure** - i)



(**Figure**-ii)

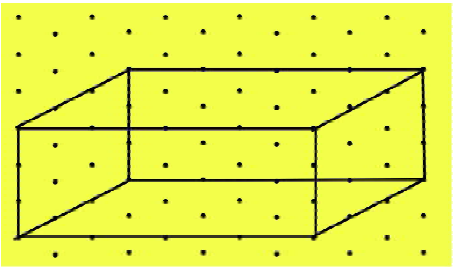


Figure - (iii)

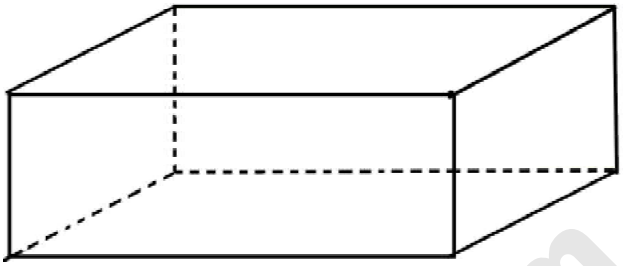


Figure - (iv)

**Figure - 15.10**

Connect the matching corner with appropriate line segments to get the opposite surface of the front face of the rectangle. (Fig iii). This is an isometric sketch of the cuboid. (Fig iv)

## Exercise - 15.2

1. Draw an isometric sketch by observing the oblique sketch of the rectangle given in the figure (i)

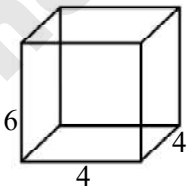
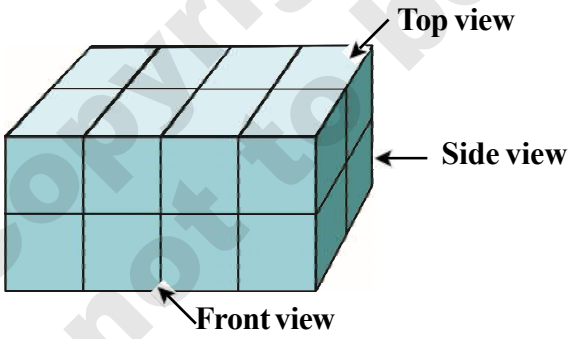
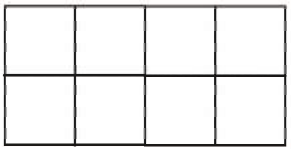



**Figure -** (i)

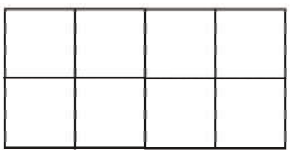
2. Draw an Isometric sketch and an oblique sketch having dimension of 5cm, 3cm, 2cm.
3. Write the name of a solid shape which has no vertex and plane surface.
4. Three cubes having dimension of 3cm, 3cm and 3cm each are placed one upon another what would be the length, breadth and height of resulting object. Name it.

**15.5** Let us have a look at solid shapes from different sides –

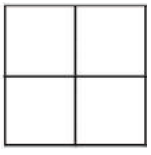


**Top view**



**Front view**



**Side view**

**Figure - 15.11**

## Exercise - 15.3

1. How many cubes are there in Fig (i)

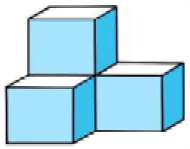


**Figure -** (i)

2. How many cubes are there in Fig (ii) ? If the dimension of one cube is 2cm, 2cm, and 2cm, then find the dimension of the cuboid?

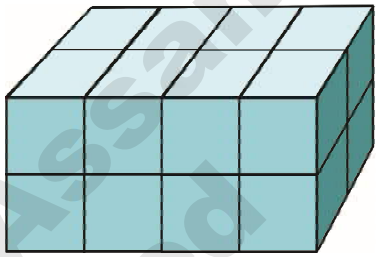


**Figure** (ii)

3. Draw the views from different direction (front view, top view and side view) by keeping 5 cubes of same dimension one upon another as well as side by side.
4. Draw a three dimensional figure of Ludo dice that gives the view of 5 dots from the side. If the dice would be seen from top, how many dots are to be seen. (discuss in group)

### What we have learnt

1. The circle, the square, the rectangle, the triangle, the quadrilateral are examples of plane figures. Plane figures have two dimension having length and breadth.
2. The cube, the cuboid, the sphere, the cylinder, the pyramid are examples of solid shapes. Solid shapes are of three dimensional having length, breadth, height/depth.
3. A **net** is a skeleton-outline of a solid. A solid may have different types of nets. The solid can be made folding the nets.
4. Solid shapes can be drawn on a flat surface (like paper). It is called 2-D respresentation of a 3-D solid.
5. Looking at solid shape from different directions we see different parts and it help to see and understand the hidden parts of the solid shape.
6. There are 2 types of sketches of a solid. These are oblique sketch and Isometric sketch.