14 Visualising Solid Shapes

INTRODUCTION

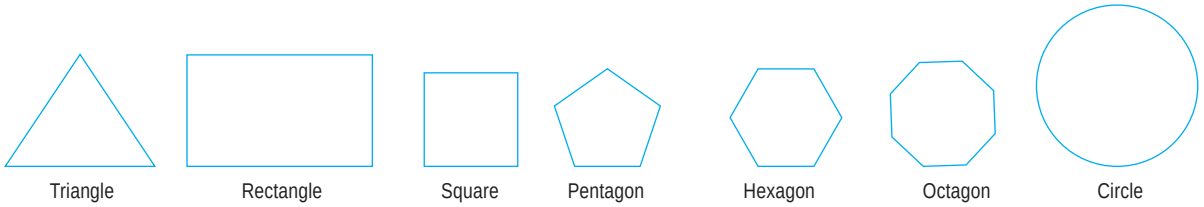
In class VII, you have learnt about 2-D shapes (plane figures) and 3-D shapes (solid figures), nets for 3-D shapes, drawing 3-D shapes on a flat surface (oblique sketches and isometric sketches) and different sections of a solid.

In this chapter, we will recall 2-D and 3-D shapes. We will identify and match the pictures with joint 2-D shapes and joint 3-D shapes, visualising the 3-D objects from different angles such as front view, top view and side view.

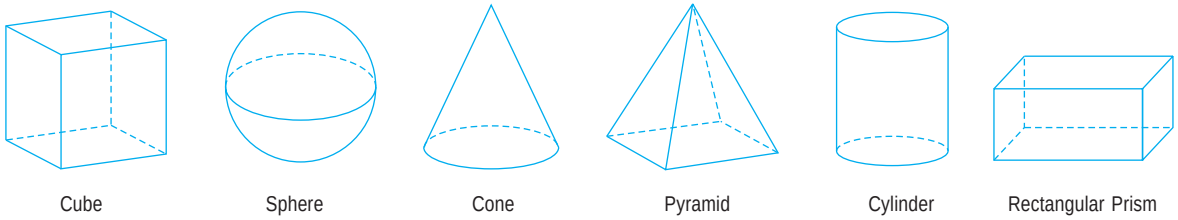
We will also count the edges, vertices and faces of 3-D figures with flat surfaces (cubes, cuboids, tetrahedrons, prisms and pyramids) and verify the Euler's relation.

Let us recall different 2-D and 3-D shapes.

2-Dimensional Shapes

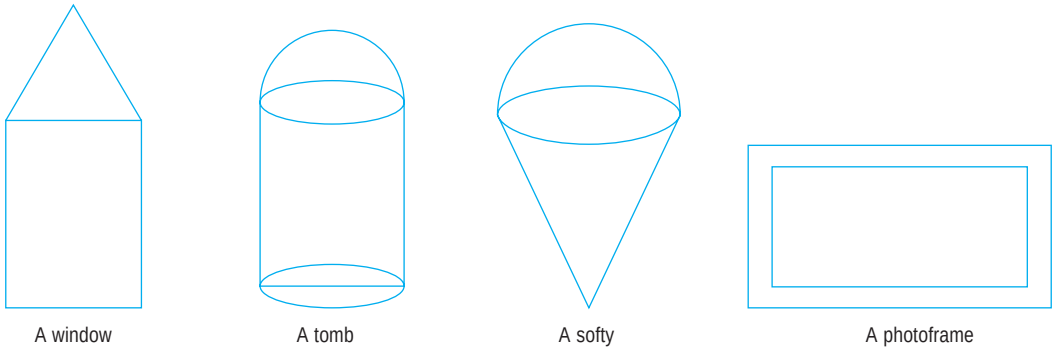


3-Dimensional Shapes



The 2-D and 3-D shapes given above are single. In our vicinity we see several objects which are the combinations of different shapes.

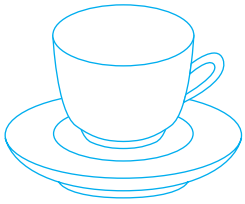
For example:

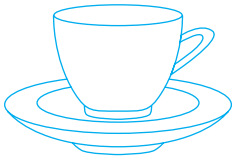


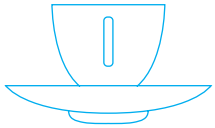
In the figures given above you can see the combination of different 2-D and 3-D shapes.
A window – In window, rectangle is surmounted by a triangle.
A tomb – In tomb, cylinder is surmounted by a hemisphere.
A softy – In softy, cone is surmounted by a hemisphere.
A photoframe – Photoframe is the combination of two rectangles forming a rectangular path.

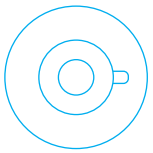
VIEWS OF 3-D SHAPES

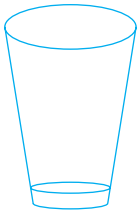
In previous class, we have learnt that 3-dimensional objects can have different looks from different positions, so they can be drawn from different perspectives.
When we see at a solid object, it is not necessary that whose solid object can be seen from one position. The view of the solid depends upon the position from where it is seen. A solid can be seen from different angles having different looks. It can be seen from the front, side or top.
Some examples of solids along with their different views are given below:

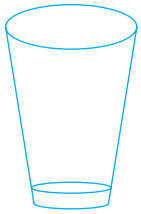

Cup and saucer

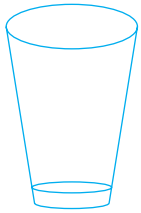

Front view

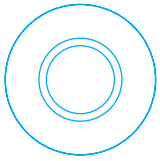

Side view


Top view

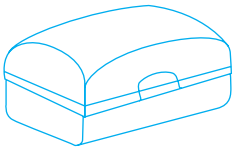

A glass

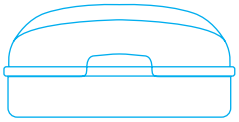

Front view

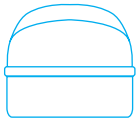

Side view

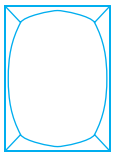

Top view

A glass has the same front view and side view.


A soap case

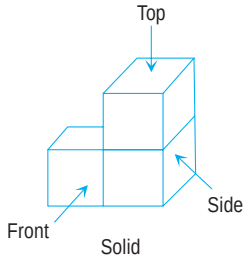

Front view


Side view

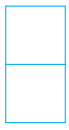

Top view

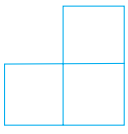
We can also get different views of figures made by joining cubes.

For example:

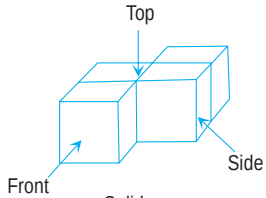


Solid
made of three cubes

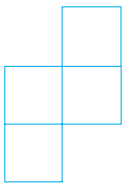

Side view


Front view


Top view



Solid
made of four cubes

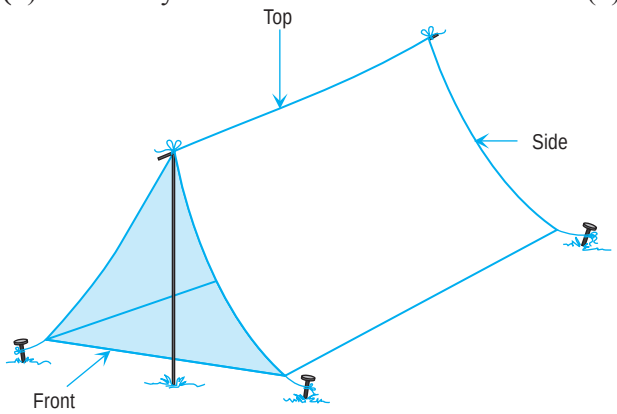

Top view


Front view

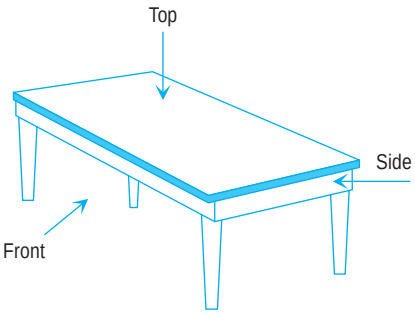

Side view

Example. Draw the front view, side view and top view of each of the given objects:

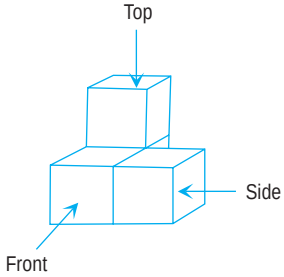
(*a*) A military tent



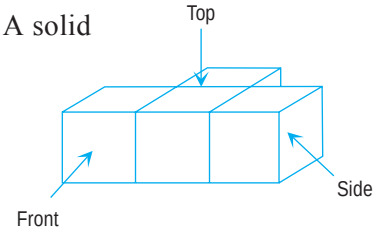
(*b*) A table



(*c*) A solid

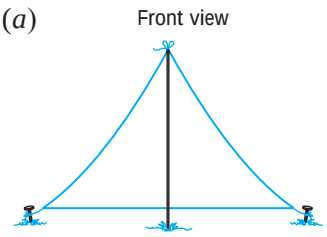


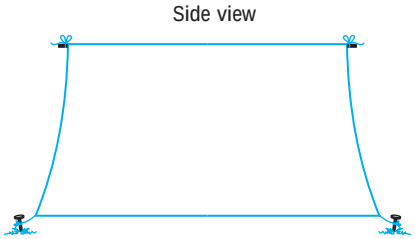
(*d*) A solid

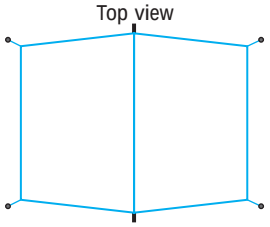


Solution.

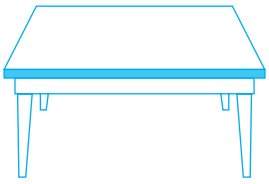
(*a*)

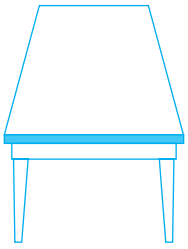


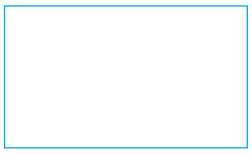




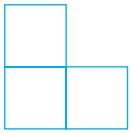
(*b*)

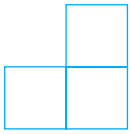


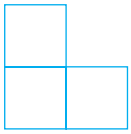




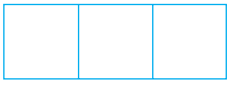
(*c*)

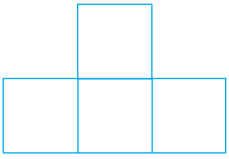






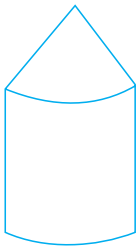
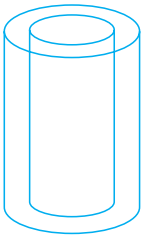
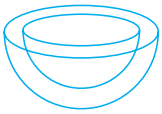
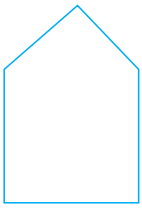
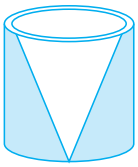
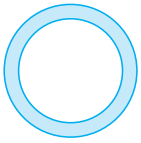
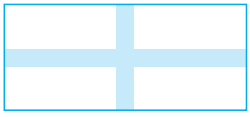
(*d*)



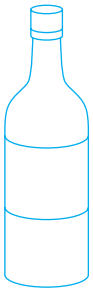
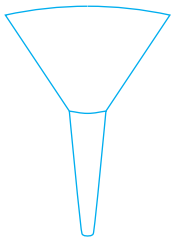
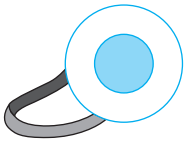
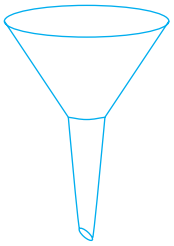
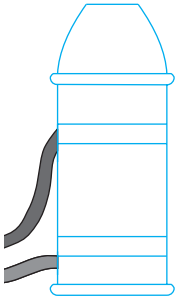
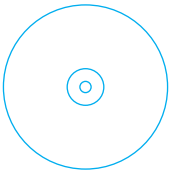
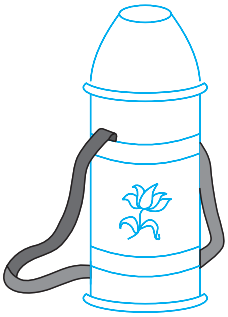
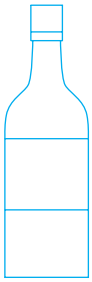
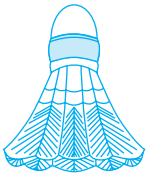
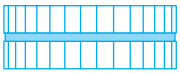
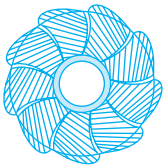
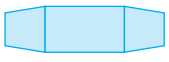
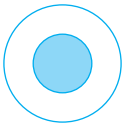
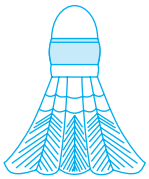


Exercise 14.1

1. Match the objects with their shapes:

	Picture (object)	Shape
(*i*) A tent		(*a*) A triangular field adjoining a square field.
(*ii*) A tin		(*b*) A hemispherical shell.
(*iii*) A bowl		(*c*) Two rectangular cross paths inside a rectangular park.
(*iv*) An agricultural field		(*d*) A hemisphere surmounted on a cone.
(*v*) A groove		(*e*) A circular path around a circular ground.
(*vi*) A toy		(*f*) A cylindrical shell.
(*vii*) A circular park		(*g*) A cone surmounted on a cylinder.
(*viii*) A cross path		(*h*) A cone taken out of a cylinder.

2. For each of the given solid, the two views are given. Match for each solid the corresponding front and top views.

	Object		Front view		Top view
(*a*)	 A bottle	(*i*)		(*u*)	
(*b*)	 A funnel	(*ii*)		(*v*)	
(*c*)	 A flask	(*iii*)		(*w*)	
(*d*)	 A shuttle cock	(*iv*)		(*x*)	
(*e*)	 A box	(*v*)		(*y*)	
(*f*)	 A weight	(*vi*)		(*z*)