

**CBSE Class 10 Maths Notes Chapter 13:** Here is a definition of surface area and volume for Class 10. The surface area and volume of many solid shapes, including cubes, cuboids, cones, cylinders, and others, will be covered in this article. There are three primary categories for surface area: Curved Surface Area (CSA), Total Surface Area (TSA), and Lateral Surface Area (LSA).

Let's take a closer look at the volume and surface area formulas for various three-dimensional shapes now. The combination of several solid shapes can be examined in this chapter. Additionally, the precise method for determining the volume and surface area.

## CBSE Class 10 Maths Notes Chapter 13

### Surface Area and Volume of Cuboid

A cuboid is a shape that has six rectangular faces covering it. The total area of a cuboid's six rectangular sides equals its surface area.

The total surface area of the cuboid (TSA) = Sum of the areas of all its six faces

$$\text{TSA (cuboid)} = 2(l \times b) + 2(b \times h) + 2(l \times h) = 2(lb + bh + lh)$$

Lateral surface area (LSA) is the area of all the sides apart from the top and bottom faces.

The lateral surface area of the cuboid = Area of face AEHD + Area of face BFGC + Area of face ABFE + Area of face DHGC

$$\text{LSA (cuboid)} = 2(b \times h) + 2(l \times h) = 2h(l + b)$$

$$\text{Length of diagonal of a cuboid} = \sqrt{l^2 + b^2 + h^2}$$

### Volume of a Cuboid

The area that is occupied by a cuboid's six rectangular faces is its volume.

$$\text{Volume of a cuboid} = (\text{base area}) \times \text{height} = (lb)h = lbh$$

## Surface Area and Volume of Cube

Three-dimensional solids with six square faces, twelve edges, and eight vertices are called cubes.

### Surface Area of Cube

As we know, one of the important properties of a cube is length = breadth = height.

If we assume that the length of the cube is "l", and hence we get

$l = \text{breadth} = \text{height}$

So, obviously, here we get,

Breadth = l

Height = l

Cube with length l

The total surface area of the cube (TSA) = Sum of the areas of all its six faces.

In case of all faces has an equal area, TSA of Cube =  $6 \times \text{area of Square} = 6l^2$  square units.

Similarly, the Lateral surface area of cube =  $2(l \times l + l \times l) = 4l^2$

Note: Diagonal of a cube =  $\sqrt{3}l$

## Volume of a Cube

Volume of a cube = base area  $\times$  height

Since all dimensions of a cube are identical, volume =  $l^3$

Where l is the length of the edge of the cube.

## Surface Area and Volume of Cylinder

A cylinder is a solid form consisting of two circular bases joined by a lateral surface. A cylinder thus has three faces: one lateral, one round, and one circular. We can calculate a cylinder's volume and surface area using these measurements.

### Surface Area of Cylinder

Consider a cylinder with height h and base radius r in units. When the curved surface of this cylinder is opened along the circular base's diameter ( $d = 2r$ ), it can be turned into a rectangle with dimensions of h units for height and  $2\pi r$  for length. Consequently,

Transformation of a Cylinder into a rectangle.

CSA of a cylinder of base radius r and height h =  $2\pi \times r \times h$

TSA of a cylinder of base radius r and height h =  $2\pi \times r \times h + \text{area of two circular bases}$

$= 2\pi \times r \times h + 2\pi r^2$

$= 2\pi r(h + r)$

## Surface Area and Volume of Right Circular Cone

A cone is a three-dimensional geometry with a single circular base that gently narrows to a point known as the vertex.

### Surface Area of Cone

Consider a right circular cone with slant length  $l$ , radius  $r$  and height  $h$ .

### Volume of a Right Circular Cone

A right circular cone has a volume that is one-third that of a cylinder with the same height and base.

Put another way, a cylinder with the same height and base is formed by three cones.

## Surface Area and Volume of Sphere

A solid with a circular form and points on its surface that are equally spaced from the centre is called a sphere.

## Surface Area and Volume of Hemisphere

A hemisphere is a form with one flat surface that makes up half of a sphere. The hemisphere's other side resembles a circular bowl. Take a look at the following figure.

## Surface Areas and Volumes Formulas

A quick review of several solid forms together with their corresponding surface area and volume calculations is shown in the following table:

Shape	Parameters	Surface Area (Square units)	Volume (Cubic units)
Cuboid	Length = $l$	$TSA = 2(lb + bh + lh)$	$V = l \times b \times h$
	Breadth = $b$	$LSA = 2h(l + b)$	
	Height = $h$		
Cube	Length = Breadth = Height = $l$	$TSA = 6l^2$	$V = l^3$
		$LSA = 4l^2$	
Cylinder	Radius = $r$	$CSA = 2\pi \times r \times h$	$V = \pi r^2 h$
	Height = $h$	$TSA = 2\pi r(h + r)$	
Cone	Radius = $r$	$CSA = \pi rl$	$V = (1/3)\pi r^2 h$
	Height = $h$	$TSA = \pi r(l + r)$	
	Slant Height = $l$		
Sphere	Radius = $r$	$CSA = TSA = 4\pi r^2$	$V = (4/3)\pi r^3$
Hemisphere	Radius = $r$	$CSA = 2\pi r^2$	$V = (2/3)\pi r^3$
		$TSA = 3\pi r^2$	

Frustum

Radius of top circular part  
=  $r_1$

Radius of bottom circular  
part =  $r_2$

Height =  $h$

Slant height =  $l$

$$CSA = \pi(r_1 + r_2)l$$

$$TSA = \pi(r_1 + r_2)l + \pi(r_1^2 + r_2^2)$$

$$V = \frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1r_2)$$

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