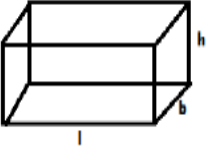
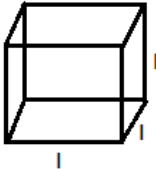
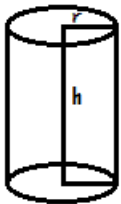
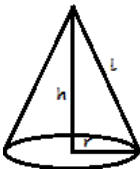
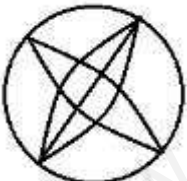





## SURFACE AREAS AND VOLUMES

## IMPORTANT FORMULA

## TAKE A LOOK

SNo	NAME	FIGURE	LATERAL CURVED SURFACE AREA	TOTAL SURFACE AREA	VOLUME	NOMENCLATURE
1	Cuboid		$2(l+b) \times h$	$2(l \times b + b \times h + h \times l)$	$l \times b \times h$	L=length, b=breadth, h=height
2	Cube		$4l^2$	$6l^2$	$l^3$	l=edge of cube
3	Right Circular Cylinder		$2\pi r h$	$2\pi r(r+h)$	$\pi r^2 h$	r= radius h=height
4	Right Circular Cone		$\pi r l$	$\pi r(l+r)$	$\frac{1}{3} \pi r^2 h$	r=radius of base, h=height, l=slant height = $\sqrt{r^2 + h^2}$
5	Sphere		$4\pi r^2$	$4\pi r^2$	$\frac{4}{3} \pi r^3$	r=radius of the sphere
6	Hemisphere		$2\pi r^2$	$3\pi r^2$	$\frac{2}{3} \pi r^3$	r=radius of hemisphere
7	Spherical shell		$2\pi(R^2 + r^2)$	$3\pi(R^2 - r^2)$	$\frac{4}{3} \pi(R^3 - r^3)$	R=External radius, r=internal radius
8	Frustum of a cone		$\pi l(R+r)$ where $l^2 = h^2 + (R-r)^2$	$\pi[R^2 + r^2 + l(R+r)]$	$\frac{\pi h}{3}[R^2 + r^2 + Rr]$	R and r = radii of the base, h=height, l=slant height.

9. Diagonal of cuboid =  $\sqrt{l^2 + b^2 + h^2}$

10. Diagonal of Cube =  $\sqrt{3}l$

## LEVEL-I

1. In a right circular cone the cross section made by a plane parallel to the base is a.
  - i. Circle
  - ii. Frustum of a cone
  - iii. Sphere
  - iv. Semi sphere

[Ans-i]
2. The radius and height of cylinder are in the ratio 5:7 and its volume is  $550 \text{ cm}^3$ . Its radius is
  - i. 1 cm
  - ii. 7 cm
  - iii. 5 cm
  - iv. 6 cm

[Ans-iii]
3. A cylinder, a cone and a hemisphere are of equal base and have the same height. What is the ratio of their volumes.
  - i. 1:2:3
  - ii. 3:1:3
  - iii. 3:1:2
  - v.  $2/3:1/3:1$

[Ans-iii]
4. If surface areas of two spheres are in the ratio 4:9 then the ratio of their volumes is :
  - i.  $16/27$
  - ii.  $4/27$
  - iii.  $8/27$
  - iv.  $9/27$

[Ans-iii]
5. Determine the ratio of the volume of a cube to that of a sphere which will exactly fit inside the cube:
  - i.  $4:\pi$
  - ii.  $\pi:2$
  - iii.  $3:\pi$
  - iv.  $6:\pi$

[Ans-iv]

## LEVEL-II

1. The slant height of a frustum of a cone is 10 cm. If the height of the frustum is 8 cm, then find the difference of the radius of its two circular ends.
 

[Ans  $r_1, r_2=6\text{cm}$ ]
2. A solid metallic sphere of radius 12 cm is melted and recast into a number of small cones each of radius 4 cm and height 3 cm . Find the number of cones so formed.
 

[Ans-144]
3. How many spherical lead shots of radius 2 cm can be made out of a solid cube of lead whose edge measures 44 cm? [Ans-2541]
4. Three cubes of metal whose edges are in the ratio 3:4:5 are melted and converted into a single cube of diagonal  $24\sqrt{3}$  cm. Find the edges of the three cubes.
 

[Ans-12cm,16,cm,20cm]
5. A heap of rice in the form of a cone of radius 3 m and height 3 m. Find the volume of the rice. How much cloth is required to just cover the heap?
 

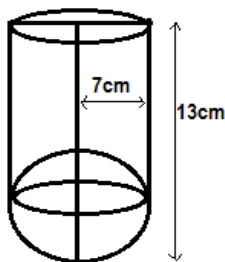
[Ans  $9\pi \text{ cm}^3, 9\sqrt{2}\pi \text{ m}^2$ ]

## LEVEL-III

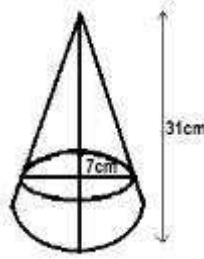
- Three solid metallic spheres of radii 3 cm , 4cm and 5cm respectively are melted to form a single solid sphere. Find the diameter of the resulting sphere.  
[Ans 12 cm]
- Find the number of coins 1.5 cm in diameter and 0.2 cm thick to be melted to form a right circular cylinder of height 10 cm and diameter 4.5 cm.  
[Ans-450]
- The rain water from a roof 22m x 20m drains into a cylindrical vessel having diameter of base 2 m and height 3.5 of the vessel is just full . Find the rainfall in cm.  
[Ans 2.5 cm]
- The radius of the base and the height of a solid right circular cylinder are in the ratio of 2:3 and its volume is  $1617 \text{ cm}^3$ . Find the total surface area of the cylinder.  
[Ans -770  $\text{cm}^2$ ]
- A semispherical bowl of internal radius 9 cm is full of liquid. The liquid is to be filled into cylindrical shaped small bottles each of diameter 3 cm and height 4 cm. How many bottles are needed to empty the bowl?  
[Ans-54]

## LEVEL-IV

- A sphere of diameter 12 cm is dropped in a right circular cylindrical vessel, partly filled with water. If the sphere is completely submerged in water, the water level in the cylindrical vessel rises by  $3 \frac{5}{9}$  cm. Find the diameter of the cylindrical vessel.  
[Ans-180cm]
- A bucket made up of metal sheet in the form of a frustum of a cone. Its depth is 24 cm and the diameters of the top and bottom are 30cm and 10cm respectively. Find the cost of milk which can completely fill the bucket at rate of Rs 20 per litre and the cost of the metal sheet used, if it costs Rs 10 per  $100 \text{ cm}^2$ .  
(use  $\pi = 3.14$ )  
[Ans- Rs163.28 Rs 171.13]
- A vessel is in the form of a semi spherical bowl mounted by a hollow cylinder. The diameter of the hemisphere is 14cm and the total height of the vessel is 13 cm. Find the capacity of the vessel. (Take  $\pi = \frac{22}{7}$ )  
[Ans-  $1642.67 \text{ cm}^3$  approx]



- If the radii of the ends of a bucket, 45 cm height, are 28 cm and 7 cm determine the capacity and total surface area of the bucket,  
[Ans - $4850 \text{ cm}^3$ ,  $5616.6 \text{ cm}^2$ ]
- A toy is in the form of a cone mounted on a hemisphere of common base radius 7cm. The total height of the toy is 13 cm . Find the total surface of the toy. ( $\pi = \frac{22}{7}$ )  
[Ans-  $858 \text{ cm}^2$ ]

**SELF EVALUATION QUESTION**

1. The base radii of two right circular cone of the same height are in the ratio 3:5. Find the ratio of their volumes.
2. If  $a, b, c$  are the dimensions of a cuboid,  $S$  be the total surface area and  $v$  its volume then prove that  $1/v = 2/s(1/a + 1/b + 1/c)$ .
3. If  $h, c, v$  respectively are the height, the curved surface area and volume of a cone prove that  $3\pi v h^3 - c^2 h^2 + 9v^2 = 0$
4. A toy is in the form of a cone mounted on a hemisphere of radius 3.5 cm. If the total height of the toy is 15.5 cm. Find the volume of the toy .(use  $\pi = 22/7$ ).