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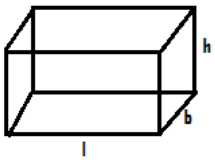
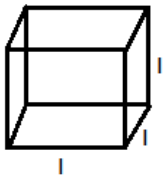
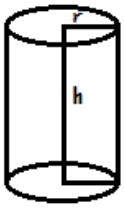
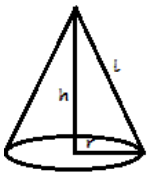
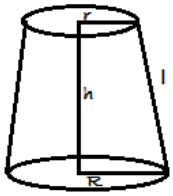
SURFACE AREAS AND VOLUMES

IMPORTANT FORMULA

TAKE A LOOK

SNo	NAME	FIGURE	LATERAL CURVED SURFACE AREA	TOTAL SURFACE AREA	VOLUME	NOMENCLATURE
1	**Cuboid**		$2(l+b)xh$	$2(lxb + bxh + hx\ l)$	$l \times b \times h$	**L=length, b=breadth, h=height**
2	**Cube**		$4l^2$	$6l^2$	l^3	**l=edge of cube**
3	**Right Circular Cylinder**		$2\pi rh$	$2\pi r(r+h)$	πr^2h	**r= radius h=height**
4	**Right Circular Cone**		πrl	$\pi r(l+r)$	$\frac{1}{3}\pi r^2h$	**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**		$2\pi(R^2 + r^2)$	$3\pi(R^2 - \pi r^2)$	$\frac{4}{3}\pi(R^3 - r^3)$	**R=External radius, r=internal radius**
8	**Frustum of a cone**		$\pi l(R+r)$ where $l^2=h^2+(R-r)^2$	$\pi[R^2 + r^2 + l(R+r)]$	$\pi h/3[R^2 + r^2 + Rr]$	**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 = $\sqrt{3}l$

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(LEVEL - 1)

[1] The height of a cone is 60 cm.A small cone is cut off at the top by a plane parallel to the base and its volume is $\frac{1}{64}^{th}$ the volume of original cone. Find the height from the base at which the section is made?

ANS :- 45 cm

[2] Find the volume of the largest right circular cone that can be cut out from a cube of edge 4.2 cm?

ANS:- 19.4 cm^3.

[3] A cubical ice cream brick of edge 22cm is to be distributed among some children by filling ice cream cones of radius 2cm and height 7cm up to its brim.how many children will get ice cream cones?

ANS :-363.

[4] Find the volume of the largest right circular cone that can be cut out from a cube of edge 4.9 cm is?

ANS :- 30.8cm^3.

[5] The slant height of a frustum of a cone is 4 cm and the perimeter of its circular ends are18cm and 6cm. Find the curved surface area of the frustum [use $\pi = \frac{22}{7}$].

ANS :- 48cm^2.

[6] A plumbline is a combination of which geometric shapes?

ANS :-A cone with hemisphere.

LEVEL - 2

[1] The slant height of the frustum of a cone is 5 cm . If the difference between the radii of its two circular ends is 4cm . write the height of the frustum.

ANS :- 3cm

[2] A cylinder, a cone and a hemisphere are of same base and of same height . Find the ratio of their volumes?

ANS :- [3:1:2].

[3] A cone of radius 4cm is divided into two parts by drawing a plane through the midpoint of its axis and parallel to its base, compare the volume of the two parts.

ANS :- 1:7

[4] How many spherical lead shots each having diameter 3cm can be made from a cuboidal lead solid of dimensions 9cm X 11cm X 12cm .

ANS :- 84

[5] Three metallic solid cubes whose edges are 3cm, 4cm, and 5cm are melted and converted into a single cube .Find the edge of the cube so formed?

ANS :- 6cm .

(LEVEL-3)

[1] How many shots each having diameter 4.2 cm can be made from a cuboidal lead solid of dimensions 66cm X 42cm X 21cm?

ANS:-1500

[2] Find the number of metallic circular disk with 1.5cm base diameter and of height 0.2 cm to be melted to form a right circular cylinder of height 10cm and diameter 4.5cm ?

ANS:-450

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[3] From a solid cube of side 7cm,a conical cavity of height 7cm and radius 3cm is hollowed out . Find the volume of remaining solid?

ANS:-277cm^3.

[4] A cubical block of side 7cm is surmounted by a hemisphere. what is the greatest diameter of the hemisphere can have? Find the surface area of the solid?

ANS:- 7cm,332.5cm^2.

[5] A heap of rice is in the form of a cone of diameter 9m and height 3.5m .Find the volume of the rice .How much canvas cloth is required to just cover the heap?

ANS:-74.25m^3, 80.61 m^2 .

[6] A square field and an equilateral triangle park have equal perimeter .If the cost of ploughing the field at the rate of Rs 5/m^2 is Rs 720. Find the cost of maintain the park at the rate of Rs10/m^2?

ANS:-Rs1108.48

(LEVEL -4)

[1] A well of diameter 3cm and 14m deep in dug. The earth, taken out of it, has been evenly spread all around it in the shape of a circular ring of width 4m to form an embankment.find the height of embankment?

ANS:-$\frac{9}{8}$ m.

[2] 21 glass spheres each of radius 2cm are packed in a cuboidal box of internal diamenions 16cmX8cmX8cmand then the box is filled with water. Find the volume of water filled in the box?

ANS:-320cm^3.

[3] The slant height of the frustum of a cone is 4cm and the circumferences of its circular ends are 18cm and 6cm. Find curved surface area and total surface area of the frustum.

ANS:-48cm^2, 76.63cm^2.

[4] A farmer connects a pipe of internal diameter 25cm from a canal into a cylindrical tank in his field, which is 12m in diameter and 2.5m deep. If water flows through the pipe at the rate of 3.6km/hr, in how much time will the tank be filled? Also find the cost of water, if the canal department charges at the rate of Rs0.07/m^3?

ANS:-96min, Rs19.80

[5] A spherical glass vessel has a cylindrical neck 7cm long and 4cm in diameter . The diameter of the spherical part is 21cm Find the quantity of water it can hold.

ANS:-4939cm^3.

[6] The surface area of a solid metallic sphere is 616cm^2. It is melted and recast into a cone of height 28cm. Find the diameter of the base of the cone so formed.

ANS:-14cm.

SELF EVALUTION/HOTS QUESTIONS

[1] A spherical copper shell , of external diameter 18cm,is melted and recast into a solid cone of base radius 14cm and height 4cm. Find the inner diameter of the shell.

ANS:-16cm.

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[2] A bucket is in the form of a frustum of a cone with a capacity of 12308.8cm^3. The radii of the top and bottom circular ends of the bucket are 20cm and 12cm respectively. Findthe height of the bucket and also the area of metal sheet used in making it [take π 3.14]?

ANS:- $l = 14cm$, $AREA = 2160.32cm2$.

[3] The volume of a solid metallic sphere is 616cm^3.its is melted and recast into a cone of height 28cm. Find the diameter of the base of the cone so formed?

ANS:-21cm.

[4] From a solid cylinder whose height is 8cm and radius 6cm , a conical cavity of height 8cm and of base radius 6cm , is hollowed out. Find the volume of the remaning solid correct to two places of decimals. Also find the total surface area of the remaining solid [take π=3.14] ?

ANS:-603.19cm^3, 603.19cm^2 .

[5] A cylindrical vessel, with internal diameter10cm and height 10.5 cm is full of water. A solid cone of base diameter 7cm and height 6cm is completely immersed in water. Find the volume of :-

(i) water displaced out of the cylindrical vessel.

(ii) water left in the cylindrical vessel.

ANS:- (i): 77cm^3 , (ii) 748cm^3.

[6] A wooden article was made by scooping out a hemisphere from each ends of a solid cylinder. If the height of the cylinder is 20cm, and radius of the base is 3.5cm , find the total surface area of the article.

ANS:-544cm^2.

[7] A building is in the form of a cylinder surmounted by a hemishperical vaulted dome and contains $41\frac{19}{21}$ m^{3}of air. If the internal diameter of the building is equal to its total height above the floor, find the height of the building?

ANS:-4m .

[8] A shuttle cock used for playing badminton has the shape of a frustum of a cone mounted on a hemisphere. The external diameters of the frustum are 5cm and 2cm , the height of the entire shuttle cock is 7cm . Find the external surface area.

ANS:-74.38cm^2.

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