12 SURFACE AREA & VOLUMES

12.1 INTRODUCTION

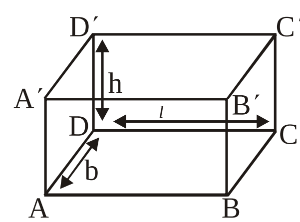
In our day-to-day life we come across various solids which are combinations of two or more such solids.

We shall discuss problems on finding surface areas and volumes of such solids.

12.2 FORMULA'S

Before we proceed further let us recall the formulae for surface area and volume of some of the basic solids:

1. **Cuboid:** Let l, b and h denote respectively the length, breadth & height of a cuboid. Then



(i) Total surface area of the cuboid = 2 (lb + bh + hl) sq units.

(ii) Volume of the cuboid = area of the base × height

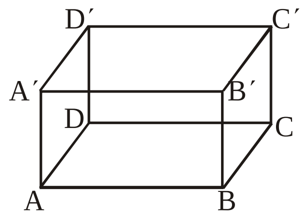
= lbh cubic units

(iii) Diagonal of the cuboid = $\sqrt{l^2 + b^2 + h^2}$ units

(iv) Area of four walls of a room = 2(l+b) h sq unit.

2. **Cube:** If the length of each edge of a cube is a units, then

(i) Total surface area of the cube = $6a^2$ sq units.

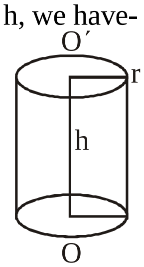


(ii) Volume of the cube = a^3 cubic units.

(iii) Diagonal of the cube = $\sqrt{3}$ a units.

(iv) Lateral surfaces area of cube = $4a^2$ sq. unit

3. Right circular cylinder: For a right circular cylinder of base radius r and height h, we have-



(i) Area of each end = area of base = πr^2

(ii) Curved surface area = $2\pi rh$

(iii) Total surface area = curved surface area + area of circular ends

$= 2\pi rh + 2\pi r^2$

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

4. Right circular hollow cylinder:

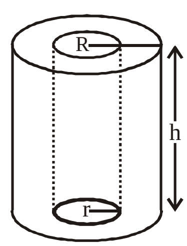
Let R and r be the external and internal radii of a hollow cylinder of height h, then

(i) Area of each end = $\pi (R^2 - r^2)$

(ii) Curved surface area of hollow cylinder

= External surface area + Internal surface area

$= 2\pi Rh + 2\pi rh = 2\pi h(R+r)$



(iii) Total surface area

$= 2\pi Rh + 2\pi rh + 2\pi(R^2 - r^2)$

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

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

(iv) Volume of material = External volume – Internal volume

$= \pi R^2 h - \pi r^2 h$

$= \pi h(R^2 - r^2)$

5. Right circular cone: For a right circular cone of height h, slant height l and radius of base r, we have,

(i) $l^2 = r^2 + h^2$

(ii) Curved surface area

$= \pi r l$ sq units

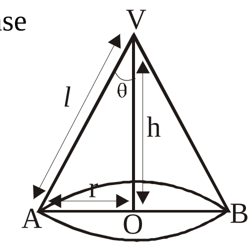
(iii) Total surface area

= Curved surface area + area of the base

$= \pi r l + \pi r^2$

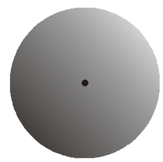
$= \pi r (l+r)$ sq units

(iv) Volume $= \frac{1}{3} \pi r^2 h$



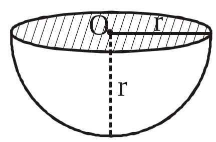
6. **Sphere:** For a sphere of radius r, we have

(i) Surface area $= 4 \pi r^2$



(ii) Volume $= \frac{4}{3} \pi r^3$

7. **Hemisphere:** For hemisphere of radius r, we have -



(i) Surface area $= 2 \pi r^2$

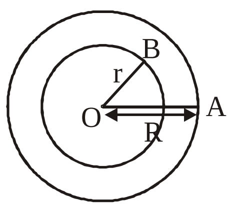
(ii) Total surface area $= 2 \pi r^2 + \pi r^2$

$= 3 \pi r^2$

(iii) Volume $= \frac{2}{3} \pi r^3$

8. **Spherical shell:** If R and r are respectively the outer and inner radii of a spherical shell, then,

(i) Outer surface area $= 4 \pi R^2$



(ii) Volume of material $= \frac{4}{3} \pi (R^3 - r^3)$

Illustration 1

The dimensions of a metallic cuboid are 100 cm × 80 cm × 64 cm. It is melted and recast into a cube. Find the surface area of the cube.

Solution

We have

Volume of the metallic cuboid = $100 \times 80 \times 64$ cm^3 = 512000 cm^3.

Since the metallic cuboid is melted and is recast into a cube.

Volume of the metallic cuboid = Volume of the cube.

Let the length of each edge of the recasted cube be a cm, then,

Volume of cube = Volume of the cuboid

$a^3 = 512000$

$a^3 = 8^3 \times 10^3$

$a = 8 \times 10$ cm

= 80 cm

$\therefore$ Surface area of the cube = $6a^2$ cm^2 = $6 \times (80)^2$ cm^2

= 38400 cm^2

Illustration 2

The radii of the bases of two right circular solid cones of same height are r_1 and r_2 respectively. The cones are melted and recast into a solid sphere of radius R.

Show that the height of each cone is given by $h = \dfrac{4R^3}{r_1^2 + r_2^2}$.

Solution

Let h be the height of each cone. Then

Sum of the volumes of two cones = Volumes of the sphere

$$\frac{1}{3}\pi r_1^2 h + \frac{1}{3}\pi r_2^2 h = \frac{4}{3}\pi R^3$$

$$(r_1^2 + r_2^2)h = 4R^2$$

$$h = \frac{4R^3}{r_1^2 + r_2^2}$$

Illustration 3

If the diameter of the cross section of a wire is decreased by 5%, how much percent will the length be increased so that the volume remains the same?

Solution

Ler radius of the cylindrical wire = r

$\therefore$ Reduction in diameter = $\dfrac{5}{100} \times 2r = \dfrac{r}{10}$

$\Rightarrow$ Diameter of the wire due to 5% reduction = $2r - \frac{r}{10} = \frac{19}{10}r$

$\Rightarrow$ New radius $(R) = \frac{19}{10}r$

Let h, H and r, $\frac{19}{10}r$ be the lengths and radii before and after reduction and the volume remains the same.

$\therefore$ $\pi r^2 h = \pi R^2 H$

$\pi r^2 h = \pi\left(\frac{19}{10}r\right)^2 H$

or $h = \frac{361}{400}H$

$\Rightarrow$ $H = \frac{400}{361}h$

$\therefore$ Increase in length (Height) = $\frac{400}{361}h - h = \frac{39}{361}h$

Increase of length in % $= \frac{39}{361}h \times \frac{1}{h} \times 100$

$= \frac{3900}{361}$ = 10.8%

Illustration 4

Water in a canal, 6m wide and 1.5m deep is flowing with a velocity of 10 km per hour. How much area will it irrigate in 30 minutes, if 8 cm of standing water is required for irrigation.

Solution

Width of canal = 6 m

Depth of canal = 1.5 m

Length of water column per hour = 10 km

$\therefore$ Length of water column in 30 min or ½ hour = ½ × 10 km = 5 km = 5000 m

Volume of water flown is 30 min = 6m × 1.5 m × 5000 m = 45,000 m^3

since, 8m = 8/100 m

i.e. 0.08 m standing water is direred

$\therefore$ Area irrigated in 30 min = $\frac{volume}{height} = \frac{45000}{0.08}$

\

$$= \frac{45000 \times 100}{8} = 562500 m^2$$

= 56.25 hectares

Illustration 5

Water is flowing at the rate of 7 metres per second through a circular pipe whose internal diameter is 2 cm into a cylindrical tank the radius of whose base is 40 cm. Determine the increase in the water level in ½ hour.

Solution

We have,

Rate of flow of water = 7 m/sec = 700 cm/sec

Length of the water column is ½ hours = (700 × 30 × 60) cm

Internal radius of circular pipe = 1 cm

Clearly, water column forms a cylinder of radius 1 cm and length = (700 × 30 × 60) cm

∴ Volume of water that flows in the tank is ½ hour

$$\left(\frac{22}{7} \times 1 \times 1 \times 700 \times 30 \times 60\right) cm^3 \qquad \text{...... (i)}$$

Let h cm be the rise in the level of water in the tank, Then, volume of the water in the tank =

$$\frac{22}{7} \times 40 \times 40 \times h \times cm^3 \qquad \text{...... (ii)}$$

From (i) and (ii), we have

$$\frac{22}{7} \times 40 \times 40 \times h \times = \frac{22}{7} \times 1 \times 1 \times 700 \times 30 \times 60$$

$$\frac{700 \times 30 \times 60}{40 \times 40} cm = 787.5 cm$$

Hence, the rise in the level of water in the tank is ½ hr is 787.5 cm.

Illustration 6

Water is flowing at the rate of 3 km/hr through a circular pipe of 20 cm internal diameter into a circular cistern of diameter 10 m and depth 2 m. In how much time would the cistern be filled?

Solution

Suppose the cistern is filled in x hours. Since water is flowing at the rate of 3 km/hr. Therefore, length of the water column in x hours

= 3x km.

= 3000 x mts.

Clearly, the water column forms a cylinder of radius.

$$r = \frac{20}{2} \text{cm} = 10 \text{ cm} = \frac{1}{10} \text{m}$$

Since the cistern is filled in x hours

$\therefore$ Volume of the water that flows in the cistern in x hours = Volume of the cistern

$$= \frac{5}{3} \text{ hours} = 1 \text{ hr. } 40 \text{ min.}$$

12.3 SURFACE AREA AND VOLUMES OF COMBINATION OF SOLIDS

In this section we shall find the surface area and volume of solids which are combination of two or more solids.

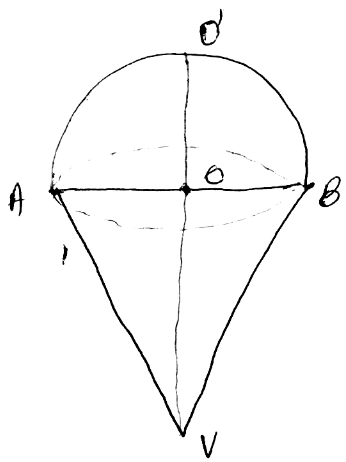
Illustration 7

A cylindrical container of radius 6 cm and height 15 cm is filled with ice-cream. The whole ice-cream has to be distributed to 10 children in equal cones with hemispherical tops. If the height of the conical portion is four times the radius of its base. Find the radius of the ice-cream are.

Solution

Let the radius of the base of the conical portion be r cm.

Then, height of the conical portion = 4 r cm



$\therefore$ Volume of cone with hemisphere top

= Volume of the cone + volume of the hemispherical top

$$= \left(\frac{1}{3}\pi r^2 \times 4r + \frac{2}{3}\pi r^3\right) cm^3$$

$$= \frac{6}{3}\pi r^3 \, cm^3$$

$$= 2\pi r^3 \, cm^3$$

Volume of 10 cones with hemispherical tops

$= (10 \times 2 \pi r^3) \text{ cm}^3$

$= 20 \pi r^3 \text{ cm}^3$

Volume of the cylindrical container $= (\pi \times 6^2 \times 15) \text{ cm}^3$

$= 540 \pi \text{ cm}^3$

Clearly,

Volume of 10 cones with hemispherical tops = Volume of the cylindrical container

$20\pi r^3 = 540 \pi$

$r^3 = 27$

$r = 3$ cm

Hence, radius of the ice-cream cone is 3 cm.

Illustration 8

The lower portion of a haystock is an inserted cone frustrum and upper part is a cone as in figure. Find total volume of the haystock, AB = 3 cm and CD = 2 cm.

Solution

Here R = AB = 3 cm, r = CD = 2 cm, H = 7m, h = 10.5 - 5 = 3.5 m

The total volume of the haystock = Volume of the cone + Volume of frustrum

$$= \frac{1}{3}\pi R^2 H + \frac{\pi h}{3}(R^2 + r^2 + Rr)$$

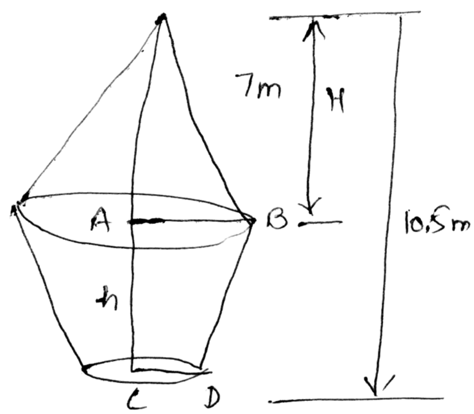
$$= \frac{1}{3}\times\pi\times 3^2 \times h + \frac{1}{7}\times\pi(3.5)[3^2 + 2^2 + 3\times 2]$$

$$= 2\pi + \frac{66.5}{3}\pi$$

$$= (63 + 66.5)\frac{\pi}{3}$$

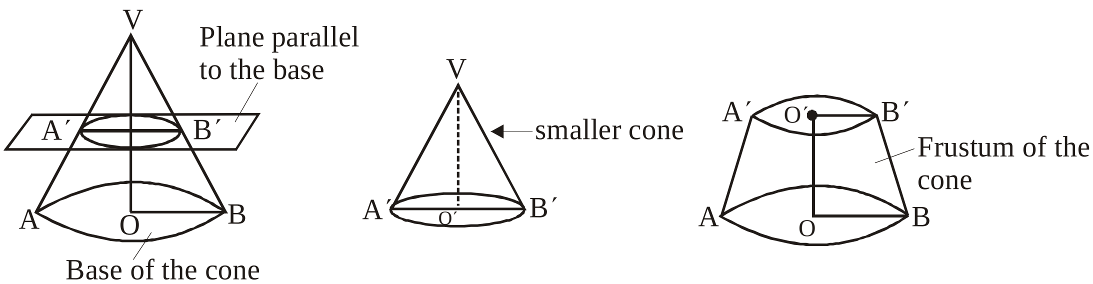
$$= \frac{1295}{10}\times\frac{22}{7}\times\frac{1}{3}$$

$$= \frac{407}{3}m^3$$



12.4 FRUSTUM OF A RIGHT CIRCULAR CONE

If we take a cone and cut it by a plane parallel to the base of the cone, then the portion between the plane and the base of the cone is called the frustum of the cone.



Height: The height or thickness of a frustum is the perpendicular distance between its two circular bases.

Here, OO′ is the height of the frustum.

OO′ = VO – VO′

The height of the frustum ABB′A′ is equal to the difference between the heights of the cones VAB and VA′B′.

Slant height: The slant height of a frustum of a right circular cone is the length of the line segment joining the extremities of two parallel radii, drawn in the same direction, of two circular bases.

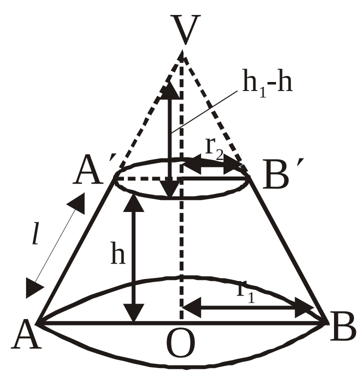
Slant height of the frustum ABA′B′ = AA′ = BB′

AA′ = VA – VA′ and BB′ = VB – VB′

Thus the slant height of the frustum equals the difference between the slant heights of the cones VAB and VA′ B′.

12.5 VOLUME AND SURFACE AREA OF A FRUSTUM OF A RIGHT CIRCULAR CONE

Let h be the height, l be the slant height and r_1 and r_2 the radii of the circular bases of the frustum AB B′ A′ such that $r_1 > r_2$. Let the height of the cone V AB be h_1 and its slant height be l_1 i.e. VO = h_1 and VA = VB = l_1.



VA′ = VA –AA′ = $l_1 - l$.
and VO′ = VO – OO′ = $h_1 - h$.

Thus, the volume of the frustum of the cone is given by

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

Thus, **curved surface area of the frustum = $\pi(r_1+r_2)l$.**

Total surface area of the frustum = curved surface area + surface area of circular bases.

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

If h be the height & l be slant height of the frustum and R_1 & R_2 ($R_1 > R_2$) be radii of the two ends then

(a) Base area

Top base $= \pi R_2^2$

Bottom base $= \pi R_1^2$

(b) Slant height of the frustum

$$l=\sqrt{h^2+(R_1-R_2)^2}$$

(c) Curved surface area

$= \pi\, l\,(R_1+R_2)$

(d) Total surface area

$$=\pi l\left(R_1+R_2\right)+\pi R_1^2+\pi R_2^2$$

$$=\pi\left[l\left(R_1+R_2\right)+R_1^2+R_2^2\right]$$

(e) Volume of the frustum

$$=\frac{1}{3}\pi h\left(R_1^2+R_2^2+R_1R_2\right)$$

Illustration 9

A shuttle cock used for playing badminton has the shape of a frustrum of a cone mounted on a hemisphere as shown in figure. The external diameters of the frustrum are 5 cm and 2 cm, the height of the entire shuttle cock is 7 cm. Find its external surface area

Solution

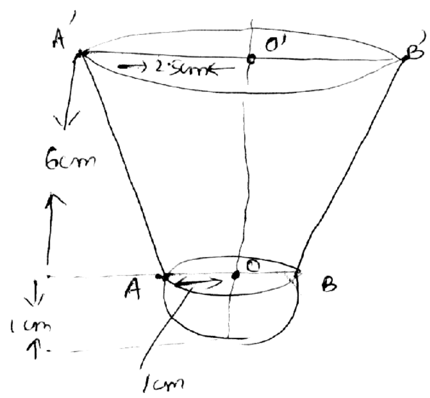
We have,

r_1 = Radius of the lower end of the frustrum = 1 cm

r_2 = Radius of the upper end of the frustrum = 2.5 cm

h = Height of the frustrum = 6 cm

l = Slant height of the frustrum



$\Rightarrow \quad l=\sqrt{h^2+(r_2-r_1)^2}$

$\Rightarrow \quad l=\sqrt{36+(2.5-1)^2}$

$= \quad l=\sqrt{38.25}\ cm$

$=$ 6.18 cm

$\therefore$ External surface area of shuttle cock

$=$ curved surface area of the frustrum + surface area of hemisphere

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

$= \quad \{\pi(1+2.5)\times 6.18+2\pi\times 1^2\}cm^2$

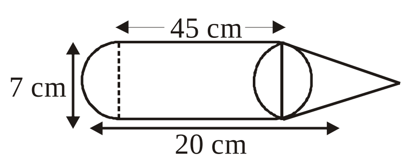
$= \quad \left\{\frac{22}{7}\times 3.5\times 6.18+2\times\frac{22}{7}\right\}cm^2$

$=$ (67.98 + 6.28) cm^2

$=$ 74.26 cm^2

EXERCISE-I

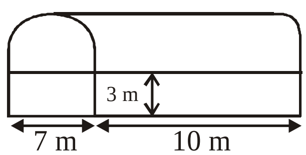
1. The diameter of a metallic sphere is 6 cm. The sphere is melted and drawn into a wire of uniform cross section. If the length of the wire is 36 m, find its radius.
2. The ratio between the curved surface area and the total surface area of a right circular cylinder is 1 : 2. Find the volume of the cylinder, if its total surface area is 616 cm^2.
3. A cylindrical tube open at both ends is made of iron 1 cm thick. If its external diameter be 22 cm and its length 50 cm, find the volume of iron contained in the cube.
4. A well, whose diameter is 7 m, has been dug 22.5 m deep and the earth dugout is used to form an embankment around it. If the height of the embankment is 1.5 m. Find the width of the embankement.
5. Water is flowing at the rate of 7 metres per second through a circular pipe whose internal diameter is 2 cm into a cylindrical tank, the radius of whose base is 40 cm. Determine the increase in the water level in 1/2 hour.
6. The cost of painting the total outside surface of a closed cylindrical oil tank at 60 paise per dm^2 is Rs 237.60. The height of the tank is 6 times the radius of the base of the tank. Find the volume correct to two decimal places.
7. Find the volume of the largest right circular cone that can be cut out of a cube whose edge is 9 cm.
8. The diameters of the internal and external surfaces of a hollow spherical shell are 6 cm and 10 cm respectively. If it is melted and recast into a solid cylinder of diameter 14 cm, find the height of the cylinder
9. A cylindrical tub of radius 12 cm contains water to a depth of 20 cm. A spherical ball of radius 9 cm is dropped into the tub and thus the level of water is raised by h cm. What is the value of h?
10. How many coins 1.75 cm in diameter and 2 mm thick must be melted to form a cuboid 11 cm × 10 cm × 7 cm?
11. A tent of height 77 dm is in the form a right circular cylinder of diameter 36 m and height 44 dm surmounted by a right circular cone. Find the cost of the canvas at Rs. 3.50 per m^2.
12. The interior of a building is in the form of a cylinder of diameter 4.3 m and height 3.8 m surmounted by a cone whose vertical angle is 90^o. Find the surface area of the interior of the building.
13. Figure shows a solid consisting of a cylinder with a cone at one end and a hemisphere at the other end. The total length of the solid is 20 cm and the common diameter is 7 cm. If the cylindrical portion has height 4.5 cm, find the total surface area of the solid.



14. If a cone of radius 10 cm is divided into two parts by drawing a plane through the mid point of its axis, parallel to its base. Compare the volumes of the two parts.

EXERCISE-II

1. By melting a solid cylindrical metal, a few conical materials are to be made. If three times the radius of the cone is equal to twice the radius of the cylinder and the ratio of the height of the cylinder and the height of the cone is 4:3, find the number of cones which can be made.
2. A cylindrical boiler, 2 m high is 3.5 m in diameter. It has a hemispherical lid. Find the volume of its interior, including the part covered by the lid.
3. An ice cream cone consists of a right circular cone of height 14 cm and the diameter of the circular top is 5 cm. It has a hemispherical scoop of ice-cream on the top with the same diameter as of the circular top of the cone. Find the volume of ice cream in the cone.
4. A godown building is in the form as shown in figure. The vertical cross section parallel to the width side of the building is a rectangle of size 7 m × 3 m mounted by a semicircle of radius 3.5 m. The inner measurements of the cuboidal portion are 10 m × 7 m × 3 m. Find the (i) Volume of the godown & (ii) Total internal surface area excluding the floor.



5. The diameter of a copper sphere is 18 cm. The sphere is melted & is drawn into a long wire of uniform circular croos section. If the length of the wire is 108 m. Find its diameter.
6. The height of a cone is 30 cm. A small cone is cut off at the top by a plane parallel to the base. If its volume be $\frac{1}{27}$ of the volume of the given cone, at what height above the base the section has been made?
7. A bucket of height 8 cm and made up of copper sheet is in the form of frustum of a right circular cone with radii of its lower and upper ends as 3 cm and 9 cm respectively. Calculate-

   (i) The height of the cone of which the bucket is a part.

   (ii) The volume of water which can be filled in the bucket.

   (iii) The area of the copper sheet required to make the bucket (Answer in terms of π)
8. A cylindrical tub of radius 5 cm and length 9.8 cm is full of water. A solid in the form of a right circular cone mounted on a hemisphere is immersed into the tub. If the radius of the hemisphere is 3.5 cm and height of the cone outside the hemisphere is 5 cm. Find the volume of water left in the tub.
9. A sector of a circle of radius 15 cm has the angle 120°. It is rolled up so that two bounding radii are joined together to form a cone. Find the volume of the cone.
10. The internal and external radii of a hollow sphere are 3 cm and 5 cm respectively. The sphere is melted to form a solid cylinder of height $2\frac{2}{3}$ cm. Find the diameter & curved surface area of the cylinder.

EXERCISE-III

SECTION-A

- **Fill in the blanks**

1. A right circular cylinder is a solid generated by the ________ of a rectangle about ________ of its sides.
2. If a right angled triangle is revolved about one of its sides containing the right angle the solid thus generated is called ________.
3. When a cone is cut by a plane parallel to ________, the portion between the plane and base is called ________.
4. The ratio of volumes of two cones with same height is ________.

SECTION-B

- **Multiple choice question with one correct answers**

1. How many spherical bullet can be made out of lead whose edge measures 44 cm, each bullet being 4 cm in diameter.

   (A) 2462 (B) 2000 (C) 1682 (D) 2541

2. Solid cylinder of brass 8 m high and 4 m diameter is melted and recast into a cone of diameter 3 m. Find the height of the cone.

   (A) 40.86m (B) 42.66 m (C) 12 m (D) 28 m

3. A glass cylinder with diameter 20 cm has water to a height of 9 cm. A metal cube of 8 cm edge is immersed in it completely. Calculate the height by which water will rise in the cylinder.

   (A) 4.3 cm (B) 2.4 cm (C) 1.6 cm (D) 3 cm

4. The difference between outside and inside surface areas of cylindrical metallic pipe 14 m long is 44 cm^2. If the pipe is made of 99 cm^3 of metal. find the outer and inner radii of the pipe.

   (A) 2.5 cm & 2 cm (B) 5 cm and 7 cm (C) 9 cm & 7 cm (D) 11 cm & 9 cm

5. A cubic cm of gold is drawn into a wire 0.1 mm is diameter, find the length of the wire.

   (A) 1273 mm (B) 127.3 mm (C) 12.73 cm (D) 100 cm

6. The radii of the ends of a bucket of height 24 cm are 15 cm and 5 cm. Find its capacity.

   (A) 4216.36 cm^3 (B) 3196 cm^3 (C) 8171.42 cm^3 (D) 7563 cm^3

7. A hemisphere and a cone have equal bases. If their height are also equal, then what is the ratio of their curved surfaces :

   (A) 1 : 3 (B) 2 : 3 (C) 1 : 4 (D) None of these

8. A cylinder, a cone and a hemisphere are of equal base and have the same height. What is the ratio of their volumes?

   (A) 3 : 1 : 2 (B) 1 : 2 : 3 (C) 4 : 5 : 6 (D) 2 : 3 : 1

9. If r_1 and r_2 denote the radii of the circular bases of the frustrum of a cone such that $r_1 > r_2$, then write the ratio of the height of the cone of which the frustrum is a part to the height of the frustrum.

   (A) $\frac{r_1}{r_1 + r_2}$ (B) $\frac{r_1}{r_1 - r_2}$ (C) $\sqrt{2}:1$ (D) $\sqrt{r_1}/r_2$

10. A metallic hemisphere is melted and recast in the shape of a cone with the same base radius R as that of the hemisphere. If H is the height of the cone, then the value of the H/R is:

(A) 1/2 (B) 4/6 (C) 1/3 (D) 2/1

SECTION-C

- **Match the following (one to one)**

Column-I and **column-II** contains **four** entries each. Entries of column-I are to be matched with some entries of column-II. Only One entries of column-I may have the matching with the same entries of column-II and one entry of column-II Only one matching with entries of column-I

1. For the figure shown below match the column:

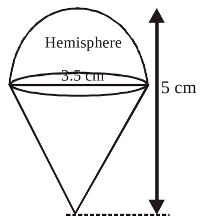


Figure: Top (Lattu)

	Column I		Column II
(A)	Curved area of hemisphere	(P)	3.25
(B)	Height of the cone	(Q)	77/4
(C)	Slant height of cone	(R)	3.7
(D)	Surface area of top	(S)	39.6

EXERCISE-IV

SECTION-A

- **Multiple choice question with one correct answers**

1. There is a cylinder circumscribing the hemisphere such that their bases are common. The ratio of their volume is

(A) 1 : 3 (B) 1 : 2 (C) 2 : 3 (D) 3 : 4

2. The total surface area of a cube is numerically equal to the surface area of a sphere then the ratio of their volume is

(A) $\frac{\pi}{6}$ (B) $\sqrt{\frac{\pi}{6}}$ (C) $\frac{\pi}{216}$ (D) $\sqrt{\frac{6}{\pi}}$

3. If length, breadth and height of a cuboid is increased by x %, y % and z % respectively. Then its volume is increased by:

(A) $\left[x+y+z+\frac{xy+xz+yz}{100}+\frac{xyz}{(100)^2}\right]\%$ (B) $\left[x+y+z+\frac{xy+xz+yz}{100}\right]\%$

(C) $\left[x+y+z+\frac{xyz}{(100)^2}\right]\%$ (D) None of these

4. Find the volume of a frustum of a cone whose height is 14 cm and the diameters of the circular base and top are 12 cm and 6 cm respectively
(A) 896 cm^3 (B) 1028 cm^3 (C) 924 cm^3 (D) 1236 cm^3

5. 748 cubic cm of metal is used to make a metallic cylindrical pipe of length 14 cm and external radius 9 cm. Find its thickness
(A) 2 cm (B) 2.5 cm (C) 1.5 cm (D) 1 cm

6. A hollow sphere of internal and external diameters 4 cm and 8 cm respectively is melted into a cone of base diameter 8 cm. Find the height of the cone
(A) 14 cm (B) 12 cm (C) 16 cm (D) None of these

SECTION-B

- **Comprehension**

Passage-1

A tent is made in the shape of a cone of diameter 24 m at the base and the height of 16 m. Then answer the following questions.

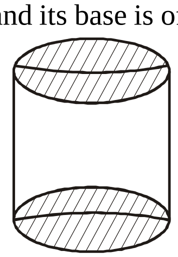
1. The slant height of the tent:
(A) 40 m (B) 20 m (C) 26 m (D) None of these

2. The canvas required to make the tent
(A) 745.29 m^2 (B) 452.92 m^2 (C) 754.29 m^2 (D) 755.87 m^2

3. The number of persons the tent can accommodate at most, if each person requires 54 m^3 of air (approx)
(A) 44 persons (B) 45 persons (C) 49 person (D) 48 person

Passage-2

A wooden article was made by scooping out a hemisphere from each end of a solid cylinder as shown in fig. If the height of the cylinder is 10 cm and its base is of radius 3.5 cm, then answer the questions



1. The volume of the cylinder is
(A) 122.5 πcm^3 (B) 105.6 πcm^3 (C) 176.8 πcm^3 (D) 325.8 πcm^3

2. Total surface area of the article
(A) 344 cm^2 (B) 379 cm^2 (C) 374 cm^2 (D) 342 cm^2

3. Volume of the scoops
(A) $\frac{162.5}{3\pi}cm^3$ (B) $\frac{171.5}{3\pi}cm^3$ (C) $\frac{143.9}{3\pi}cm^3$ (D) $\frac{176.8}{3\pi}cm^3$

Answers

Exercise-I

1. $\frac{1}{10}$ cm or 1 mm.
2. 1078 cm^3
3. 3300 cm^3
4. 10.5 m
5. 787.5 cm
6. 509.14 dm^2
7. 191 cm^2 (approx.)
8. $\frac{8}{3}$ cm
9. 6.75 cm.
10. 400
11. Rs. 5365.80
12. 71.8 m^2
13. 313.5 cm^2
14. 1 : 7

Exercise-II

1. 9
2. 30.48 m^3.
3. 124.4 cm^3
4. (i) 402.5 m^3 (ii) 250.5 m^2
5. 0.6 cm
6. 20 cm
7. (i) 12 cm (ii) 312 cm^3 (iii) 210 π cm^2
8. 616 cm^3
9. 370.33 cm^3
10. 14 cm. 117.33 cm^2

Exercise-III

SECTION-A

1. Revolution, One
2. Right circular cone.
3. Base, Frustum of cone
4. $r_1^2 : r_2^2$

SECTION-B

1.	(A)	2.	(B)	3.	(A)	4.	(B)	5.	(C)
6.	(A)	7.	(C)	8.	(A)	9.	(C)	10.	(C)

SECTION-C

1. (A)-(Q), (B)-(P), (C)-(R), (D)-(S)

Exercise-IV

SECTION-A

1.	(C)	2.	(B)	3.	(A)	4.	(C)	5.	(D)
6.	(A)								

SECTION-B

Passage-1	1.	(B)	2.	(C)	3.	(A)
Passage-2	1.	(A)	2.	(C)	3.	(B)