Exercise 7.1

1. The radius and height of a cylinder are in the ratio 5:7 and its curved surface area is 5500 sq.cm. Find its radius and height.

Solution:

$$r : h = 5 : 7$$

$$\frac{r}{h} = \frac{5}{7}$$

$$\boxed{r = \frac{5}{7}h} \quad \text{-----(1)}$$

C.S.A of a cylinder = 5500 sq.cm

$$2\pi rh = 5500$$

$$2 \times \frac{22}{7} \times \frac{5}{7} \times h \times h = 5500$$

$$h^2 = \frac{5500 \times 7 \times 7}{2 \times 22 \times 5}$$

$$h^2 = 5^2 \times 7^2$$

$$= (5 \times 7)^2 = (35)^2$$

$$\boxed{h = 35\text{cm}} \quad \text{----(2)}$$

Use (2) in (1)

$$r = \frac{5}{7}h$$

$$r = \frac{5}{\cancel{7}} \times \cancel{35}$$

$$\boxed{r = 25\text{cm}}$$

2. A solid iron cylinder has total surface area of 1848 sq.m. Its curved surface area is five – sixth of its total surface area. Find the radius and height of the iron cylinder.

Solution:

Given T.S.A of a cylinder = 1848 sq. m

$$2\pi r(h+r) = 1848 \text{ sq. m}$$

$$2\pi rh+2\pi r^2 = 1848 \text{ sq.m} \text{ ----(1)}$$

C.S.A of a cylinder = $\frac{5}{6} \times$T.S.A

$$2\pi rh = \frac{5}{6} \times 1848$$

$$2\pi rh = 1540 \text{ -----(2)}$$

Use (2) in (1)

$$2\pi rh+2\pi r^2 = 1848$$

$$1540+ 2\pi r^2 = 1848$$

$$2\pi r^2 = 1848-1540$$

$$2\times\frac{22}{7}\times r^2 = 308$$

$$r^2 = \frac{308\times7}{2\times22}$$

$$r^2 = 7^2$$

$$\boxed{r = 7m} \text{ ----(3)}$$

Use (3) in (2)

$$2\pi rh = 1540$$

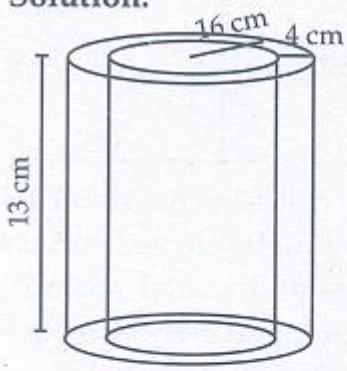
$$2\times\frac{22}{7}\times 7 \times h = 1540$$

$$h = \frac{1540}{2\times22}$$

$$\boxed{h = 35m}$$

3. The external radius and the length of a hollow wooden log are 16 cm and 13 cm respectively. If its thickness is 4 cm then find its T.S.A.

Solution:



Given R = 16 cm
r = 12 cm
h = 13 cm

R = r+w
r = R–w
=16–4 = 12cm

T.S.A of Hollow cylinder

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

$= 2\times\frac{22}{7}(16+12)\,(16-12+13)$

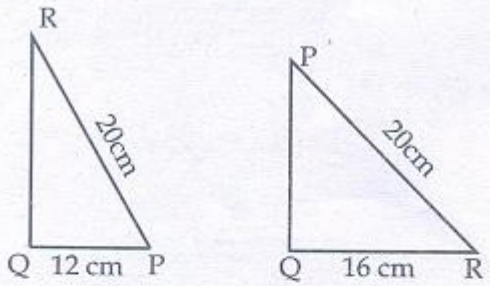
$= 2\times\frac{22}{\cancel{7}}\times\overset{4}{\cancel{28}}\times 17$

$= 88\times 34$

T.S.A = 2992 cm^2

4. A right angled triangle *PQR* where $\angle Q = 90$ is rotated about *QR* and *PQ*. If *QR*=16 cm and *PR*=20 cm, compare the curved surface areas of the right circular cones so formed by the triangle.

Solution:



Given Rotated about QR

radius r = 12cm

slant height l = 20cm

C.S.A = πrl sq. units

= $\pi \times 12 \times 20$

= 240π cm^2

Rotated about PQ

radius r = 16cm

slant height l = 20cm

C.S.A = πrl sq. units

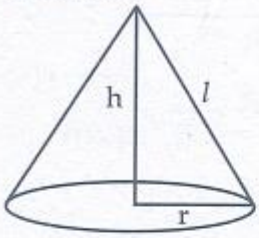
= $\pi \times 16 \times 20$

= 320π cm^2

C.S.A of the cone when rotated about PQ is larger.

5. 4 persons live in a conical tent whose slant height is 19 cm. If each person require 22 cm2 of the floor area, then find the height of the tent.

Solution:



Given slant height, $l = 19$ cm

$$\text{floor area } \pi r^2 = 22\text{cm}^2$$

$$\frac{22}{7} \times r^2 = 22$$

$$r^2 = \frac{22 \times 7}{22}$$

$$r^2 = 7$$

$$r = \sqrt{7}$$

$$h = \sqrt{l^2 - r^2}$$

$$= \sqrt{19^2 - (\sqrt{7})^2}$$

$$= \sqrt{361 - 7}$$

$$= \sqrt{354} = 18.81 \text{ cm}$$

$$\boxed{h = 18.81\text{cm}}$$

6. A girl wishes to prepare birthday caps in the form of right circular cones for her birthday party, using a sheet of paper whose area is 5720 cm2, how many caps can be made with radius 5 cm and height 12 cm.

Solution:

Given

radius r = 5cm

height h = 12cm

$$l = \sqrt{h^2 + r^2}$$

$$= \sqrt{12^2 + 5^2}$$

$$= \sqrt{144 + 25}$$

$$= \sqrt{169}$$

$$\boxed{l = 13 \text{ cm}}$$

C.S.A of cylinder = 5720 cm^2

$$\text{No. of caps} = \frac{\text{C.S.A of cylinder}}{\text{C.S.A of cone}}$$

$$= \frac{2\pi rh}{\pi rl}$$

$$= \frac{5720}{\frac{22}{7} \times 5 \times 13}$$

$$= \frac{5720 \times 7}{22 \times 5 \times 13}$$

= 28 caps.

7. The ratio of the radii of two right circular cones of same height is 1:3. Find the ratio of their curved surface area when the height of each cone is 3 times the radius of the smaller cone.

Solution:

Let the common radius of the cone be x unit.

$r_1 = x$ unit $\quad r_2 = 3x$ units $\quad \boxed{r_1 < r_2}$

$h_1 = 3x$ unit $\quad h_2 = 3x$ unit

$$l_1 = \sqrt{h_1^2 + r_1^2}$$
$$= \sqrt{(3x)^2 + x^2}$$
$$= \sqrt{9x^2 + x^2}$$
$$= \sqrt{10x^2}$$
$$l_1 = \sqrt{10}\,x \text{ unit}$$

$$l_2 = \sqrt{(3x)^2 + (3x)^2}$$
$$= \sqrt{9x^2 + 9x^2}$$
$$= \sqrt{18x^2}$$
$$l_2 = 3\sqrt{2}\,x \text{ unit}$$

$$\frac{C.S.A_1}{C.S.A_2} = \frac{\pi r_1 l_1}{\pi r_2 l_2}$$
$$= \frac{x \times \sqrt{10}\, x}{3x \times 3\sqrt{2}\, x}$$
$$= \frac{\sqrt{2} \times \sqrt{5}}{9\sqrt{2}}$$
$$= \frac{\sqrt{5}}{9}$$

$$C.S.A_1 : C.S.A_2 = \sqrt{5} : 9$$

8. The radius of a sphere increases by 25%. Find the percentage increase in its surface area.

Solution:

Original radius is r

T.S.A of original sphere = $4\pi r^2$ sq. units.

Increase radius

$$= r+\frac{25}{100}r = r+\frac{r}{4} = \frac{5r}{4} \text{ units}$$

New S.A = $4\pi r^2$ sq. units

$$= 4\pi r\left(\frac{5}{4}r\right)^2$$

$$= \cancel{4}\pi\times\frac{25}{\cancel{16}_{4}}r^2$$

$$= \frac{25\pi r^2}{4}$$

$$\text{Increase} = \frac{25\pi r^2}{4} - 4\pi r^2$$

$$= \frac{25\pi r^2 - 16\pi r^2}{4}$$

$$= \frac{9\pi r^2}{4}$$

$$\text{Increase \%} = \frac{\frac{9\cancel{\pi} r^2}{4}}{\cancel{4\pi} r^2}\times\overset{25}{\cancel{100}}$$

$$= \frac{225}{4}\%$$

$$= 56.25\%$$

9. The internal and external diameters of a hollow hemispherical vessel are 20 cm and 28 cm respectively. Find the cost to paint the vessel all over at ₹ 0.14 per cm^2 .

Solution:

Internal diameter = 20 cm

radius r = 10 cm

External diameter = 28 cm

radius R = 14 cm

T.S.A of Hollow Hemisphere

$= \pi(3R^2+r^2)$ sq. units.

$= \frac{22}{7}[3(14)^2+10^2]$

$= \frac{22}{7}[3\times196+100]$

$= \frac{22}{7}[588+100]$

$= \frac{22\times688}{7}$

$= \frac{15136}{7}$

$= 2162.29 \text{ cm}^2$

The cost of painting 1 cm^2 = Rs. 0.14

The cost of painting 2162.29 cm^2

$= 2162.29 \times 0.14$

= Rs. 302.72

10. The frustum shaped outer portion of the table lamp has to be painted including the top part. Find the total cost of painting the lamp if the cost of painting 1 sq.cm is ₹ 2.

Solution:

Given: R = 12m, r = 6m, h = 8m

$$l = \sqrt{h^2+(R-r)^2}$$

$$= \sqrt{8^2+(12-6)^2}$$

$$= \sqrt{8^2+6^2}$$

$$= \sqrt{64+36}$$

$$= \sqrt{100}$$

$$l = 10\text{m}$$

$$\text{C.S.A} = \pi (R+r)l \text{ sq. units}$$

$$= \frac{22}{7}(12+6)10$$

$$= \frac{22}{7}\times 18\times 10$$

$$= 565.71 \text{ cm}^2$$

$$\text{Painted area} = \text{C.S.A}+\pi r^2 \text{ sq. unit}$$

$$= 565.71+\frac{22}{7}\times 6^2$$

$$= 565.71+113.04$$

$$= 678.75 \text{ cm}^2$$

The cost of painting 1 sq. cm = Rs. 2

The cost of painting 678.75 cm^2

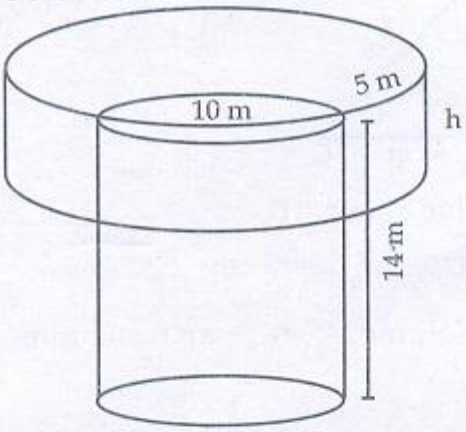
= Rs. 678.75×2

= Rs. 1357.5

Exercise 7.2

1. A 14 m deep well with inner diameter 10 m is dug and the earth taken out is evenly spread all around the well to form an embankment of width 5 m. Find the height of the embankment.

Solution:



Given: r = 5m, h = 14m, R = 10m

Volume of cylindrical well

$= \pi r^2 h$ cu. units

$= \pi \times 5 \times 5 \times 14$

$= 350\pi \text{ m}^3$

Volume of Embankment

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

$= \pi h(10^2 - 5^2)$

$= \pi h(100 - 25)$

$= 75\pi h$ cu. m.

Volume of Embankment

= Volume of cylindrical well

$75\pi h = 350\pi$

$h = \frac{350}{75} = 4.666 \ldots \text{ m}$

$\boxed{h = 4.67\text{m}}$

2. A cylindrical glass with diameter 20 cm has water to a height of 9 cm. A small cylindrical metal of radius 5 cm and height 4 cm is immersed it completely. Calculate the raise of the water in the glass?

Solution:

Given:

$h_1 = 9cm, \quad r_1 = 10\ cm$

$h_2 = 4cm, \quad r_2 = 5\ cm$

Volume of Cylinders

$$V_1+V_2 = \pi r_1^2 h + \pi r_2^2 h$$
$$= \pi(10\times10\times9+5\times5\times4)$$
$$= \pi(900\times100)$$
$$= 1000\pi\ cm^2$$

Height of the water level is h_3 cm

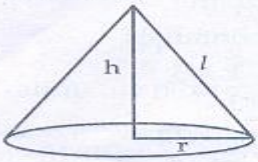
$$\pi r^2 h_3 = 1000\pi$$
$$\pi\times10\times10\times h_3 = 1000\pi$$
$$h_3 = \frac{1000\pi}{100\pi} = 10$$

Raise of the water in glass

$$= h_3 - h_1 = 10-9 = 1cm$$

3. If the circumference of a conical wooden piece is 484 cm then find its volume when its height is 105 cm.

Solution:



Given:

Circumference = 484 cm

$h = 105cm$

$$\text{Circumference} = 484\ cm$$
$$2\pi r = 484$$
$$2\times\frac{22}{7}\times r = 484$$
$$r = \frac{484\times7}{2\times22}$$

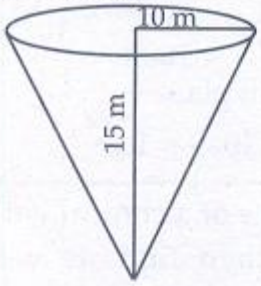
$\boxed{r = 77\ cm}$

$$\text{Volume} = \frac{1}{3}\pi r^2 h \text{ cu. units}$$
$$= \frac{1}{\cancel{3}}\times\frac{22}{\cancel{7}}\times\cancel{77}^{11}\times77\times\cancel{105}^{35}$$
$$= 652190\ cm^3$$

$\boxed{V = 652190\ cm^3}$

4. A conical container is fully filled with petrol. The radius is 10m and the height is 15 m. If the container can release the petrol through its bottom at the rate of 25 cu. meter per minute, in how many minutes the container will be emptied. Round off your answer to the nearest minute.

Solution:



Given: r = 10m, h = 15m,

Speed = 25 cu. m

Volume of conical container

$$= \frac{1}{3}\pi r^2 h \text{ cu. units}$$

$$= \frac{1}{3} \times \frac{22}{7} \times 10 \times 10 \times 15$$

$$= 1571.43 \text{ cu. m}$$

$$\text{Time} \times \text{speed} = \text{Volume}$$

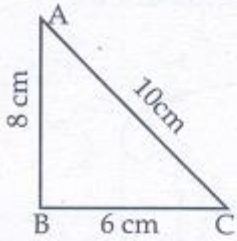
$$\text{Time} \times 25 = 1571.43$$

$$\text{Time} = \frac{1571.43}{25} = 62.85$$

$$\boxed{\text{Time} \approx 63 \text{ min}}$$

5. A right angled triangle whose sides are 6 cm, 8 cm and 10 cm is revolved about the sides containing the right angle in two ways. Find the difference in volumes of the two solids so formed.

Solution:



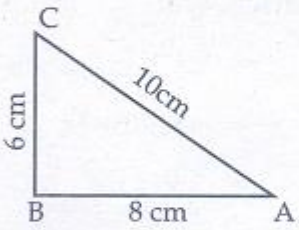
Revolve about AB.

r = 6 cm, h = 8 cm

$$\text{Volume } V_1 = \frac{1}{3}\pi r^2 h \text{ cu. units}$$

$$= \frac{1}{3} \times \frac{22}{7} \times 6 \times 6 \times 8$$

$$= 301.71 \text{ cu. cm}$$



Revolve about BC.

r = 8 cm, h = 6 cm

$$\text{Volume } V_2 = \frac{1}{3}\pi r^2 h \text{ cu. units}$$

$$= \frac{1}{3} \times \frac{22}{7} \times 8 \times 8 \times 6$$

$$= 402.29 \text{ cu. cm}$$

$$\text{Difference} = V_2 - V_1$$

$$= 402.29 - 301.71$$

$$= 100.58 \text{ cu. cm.}$$

6. The volumes of two cones of same base radius are 3600 cm3 and 5040 cm3. Find the ratio of heights.

Solution:

Given: $r_1 = r_2$

$$V_1 : V_2 = 3600 : 5040$$

$$\frac{\frac{1}{3}\pi r_1^2 h_1}{\frac{1}{3}\pi r_2^2 h_2} = \frac{360}{504}$$

$$\frac{h_1}{h_2} = \frac{60}{84}$$

$$\frac{h_1}{h_2} = \frac{5}{7}$$

$$\boxed{h_1 : h_2 = 5 : 7}$$

7. If the ratio of radii of two spheres is 4:7, find the ratio of their volumes.

Solution:

Given: $r_1 : r_2 = 4 : 7$

$$V_1 : V_2 = \frac{V_1}{V_2}$$

$$= \frac{\frac{4}{3}\pi r_1^3}{\frac{4}{3}\pi r_2^3}$$

$$= \frac{4\times4\times4}{7\times7\times7}$$

$$= \frac{64}{343}$$

$$\boxed{\frac{V_1}{V_2} = \frac{64}{343}}$$

8. A solid sphere and a solid hemisphere have equal total surface area. Prove that the ratio of their volume is $3\sqrt{3}:4$.

Solution:

T.S.A of solid sphere

= T.S.A of solid Hemisphere

$$4\pi R^2 = 3\pi r^2$$

$$r^2 = \frac{4}{3}R^2$$

$$r = \frac{2}{\sqrt{3}}R$$

$$V_1 : V_2 = \frac{\frac{4}{3}\pi R^3}{\frac{2}{3}\pi r^3}$$

$$= \frac{2R^3}{r^3}$$

$$= \frac{2R^3}{\left(\frac{2}{\sqrt{3}}R\right)^3}$$

$$= \frac{2R^3}{\frac{8}{3\sqrt{3}}R^3}$$

$$= \frac{3\sqrt{3}\times 2}{8_4}$$

$$\boxed{V_1 : V_2 = 3\sqrt{3} : 4}$$

9. The outer and the inner surface areas of a spherical copper shell are 576π cm2 and 324 π cm2 respectively. Find the volume of the material required to make the shell.

Solution:

Given:

Outer surface Area: $4\pi R^2 = 576\pi \text{ cm}^2$

inner surface Area: $4\pi r^2 = 324\pi \text{ cm}^2$

$$4\cancel{\pi}R^2 = 576\cancel{\pi} \qquad 4\cancel{\pi}r^2 = 324\cancel{\pi}$$

$$R^2 = \frac{576}{4} \qquad r^2 = \frac{324}{4}$$

$$= 144 \qquad = 81$$

$$\boxed{R = 12 \text{ cm}} \qquad \boxed{r = 9 \text{ cm}}$$

$$\text{Volume} = \frac{4}{3}\pi(R^3 - r^3) \text{ cu. units}$$

$$= \frac{4}{3} \times \frac{22}{7}(12^3 - 9^3)$$

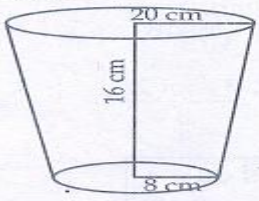
$$= \frac{4}{3} \times \frac{22}{7}(1728 - 729)$$

$$= \frac{4}{3} \times \frac{22}{7} \times 999$$

$$\boxed{\text{Volume} = 4186.29 \text{ cm}^3}$$

10. A container open at the top is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends are 8 cm and 20 cm respectively. Find the cost of milk which can completely fill a container at the rate of ₹40 per litre.

Solution:



Given: h = 16 cm, R = 20 cm, r = 8 cm

Volume of frustum

$$= \frac{1}{3}\pi h (R^2 + r + Rr) \text{ cu. unit}$$

$$= \frac{1}{3} \times \frac{22}{7} \times 16(20^2 + 8^2 + 20 \times 8)$$

$$= \frac{1}{3} \times \frac{22}{7} \times 16(400 + 64 + 160)$$

$$= \frac{1}{3} \times \frac{22}{7} \times 16 \times 624$$

$$= 10456.43 \text{ cm}^3$$

$$= \frac{10459.43}{1000} \; lt \quad [1000\text{cm}^3 =$$

$$\text{Volume} = 10.45943 \; lt$$

The cost of milk per litre = Rs. 40

The cost of milk per 10.45943 l

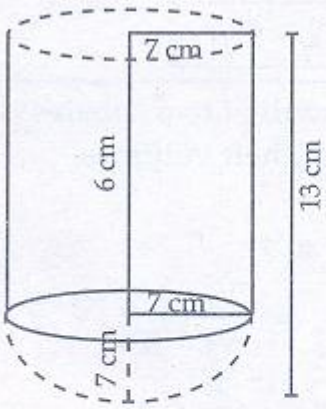
= Rs. 1045943×40

= Rs. 418.36

Exercise 7.3

1. A vessel is in the form of a hemispherical bowl mounted by a hollow cylinder. The diameter is 14 cm and the height of the vessel is 13 cm. Find the capacity of the vessel.

Solution:



Cylinder:	Hemisphere:
radius r = 7 cm	radius r = 7 cm
height h = 6 cm	

Volume of the vessel

= Volume of cylinder + volume of hemisphere cu. units.

$$= \pi r^2 h + \frac{2}{3}\pi r^3$$

$$= \pi r^2\left(h + \frac{2r}{3}\right)$$

$$= \frac{22}{\cancel{7}} \times \cancel{7} \times 7\left(6 + \frac{2}{3} \times 7\right)$$

$$= 154\left(6 + \frac{14}{3}\right)$$

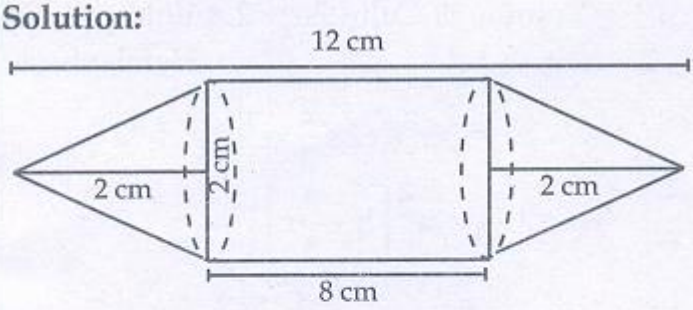
$$= 154\left(\frac{18+14}{3}\right)$$

$$= 154 \times \frac{32}{3}$$

$$\boxed{\text{Volume} = 1642.67 \text{ cm}^3}$$

2. Nathan, an engineering student was asked to make a model shaped like a cylinder with two cones attached at its two ends. The diameter of the model is 3 cm and its length is 12 cm. If each cone has a height of 2 cm, find the volume of the model that Nathan made.

Solution:



Cylinder:	Cone:
radius $R = \frac{3}{2}$ cm	radius $r = \frac{3}{2}$ cm
height $H = 8$ cm	height $h = 2$ cm

Volume of the model

= Volume of cylinder + 2 × volume of cone

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

$$= \pi \left[R^2 H + \frac{2}{3} r^2 h \right]$$

$$= \pi \left[\frac{3}{2} \times \frac{3}{2} \times 8 + \frac{2}{3} \times \frac{3}{2} \times \frac{3}{2} \times 2 \right]$$

$$= \frac{22}{7} [18+3]$$

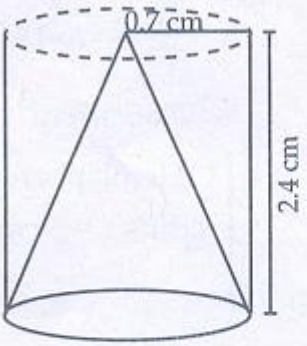
$$= \frac{22}{7} \times 21$$

$$= 22 \times 3$$

Volume = $66\ cm^3$

3. From a solid cylinder whose height is 2.4 cm and the diameter 1.4 cm, a cone of the same height and same diameter is carved out. Find the volume of the remaining solid to the nearest cm^3.

Solution:



Cylinder:

Diameter = 1.4 cm

$r = 0.7\ cm = \frac{7}{10}\ cm$

$h = 2.4\ cm = \frac{24}{10}\ cm$

Cone:

$r = \frac{7}{10}\ cm$

$h = \frac{24}{10}\ cm$

Remaining Solid

= Volume of cylinder – Volume of cone

$$= \pi r^2 h - \frac{1}{3}\pi r^2 h$$

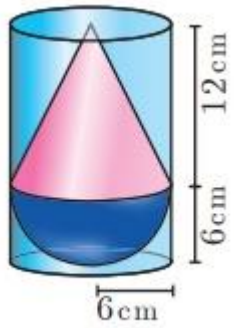
$$= \frac{3\pi r^2 h - \pi r^2 h}{3} = \frac{2}{3}\pi r^2 h$$

$$= \frac{2}{\cancel{3}} \times \frac{22}{\cancel{7}} \times \frac{\cancel{7}}{10} \times \frac{7}{10} \times \frac{\overset{8}{\cancel{24}}}{10}$$

$$= \frac{2464}{1000}$$

$$= 2.46\ cm^3$$

4. A solid consisting of a right circular cone of height 12 cm and radius cm standing on a hemisphere of radius 6 cm is placed upright in a right circular cylinder full of water such that it touches the bottom.



Find the volume of the water displaced out of the cylinder, if the radius of the cylinder is 6 cm and height is 18 cm.

Solution:

Given:

Cylinder: radius = 6cm, height = 18 cm

Volume of cylinder = $\pi r^2 h$ cu. units

$$= \frac{22}{7} \times 6 \times 6 \times 18$$

$$= 2036.57 \text{ cm}^3$$

Cone.	Hemisphere:
radius r = 6 cm	radius r = 6 cm
height h = 12 cm	

Volume of the Solid

= Volume of Cone + 2 × Volume of Hemisphere

$$= \frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3$$

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

$$= \frac{1}{3} \times \frac{22}{7} \times 6 \times 6\ (12+2\times 6)$$

$$= \frac{1}{\cancel{3}} \times \frac{22}{7} \times \frac{2}{\cancel{6}} \times 6(12+12)$$

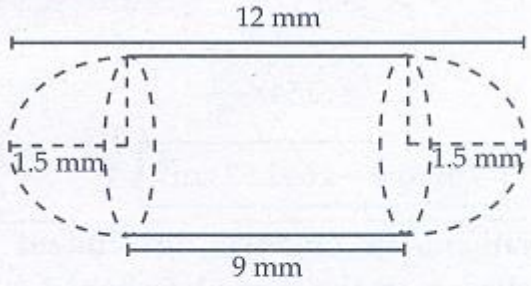
$$= \frac{44\times 6}{7} \times 24$$

$$= 905.14 \text{ cm}^3$$

Volume of water displaced out of the cylidner = Volume of solid = 905.14 cm^3

5. A capsule is in the shape of a cylinder with two hemisphere stuck to each of its ends. If the length of the entire capsule is 12 mm and the diameter of the capsule is 3 mm, how much medicine it can hold?

Solution:



Cylinder:	Hemisphere:
radius $r = \frac{3}{2}$ mm	radius $r = \frac{3}{2}$ cm
height $h = 9$ mm	

Volume of the Capsule

= Volume of Cylinder + 2 × Volume of Hemisphere

$$= \pi r^2 h + 2 \times \frac{2}{3} \pi r^2 h$$

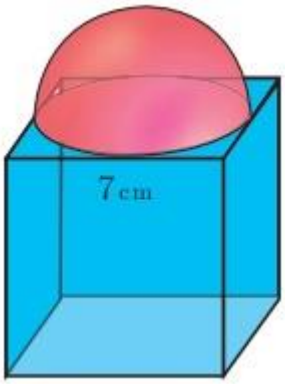
$$= \pi r^2 \left[h + \frac{4}{3} r \right]$$

$$= \frac{22}{7} \times \frac{3}{2} \times \frac{3}{2} \left[9 + \frac{\cancel{4}^{2}}{\cancel{3}} \times \frac{\cancel{3}}{\cancel{2}} \right]$$

$$= \frac{22}{7} \times \frac{9}{4} \times 11$$

$$= 77.715 \text{ cm}^3$$

6. As shown in figure a cubical block of side 7 cm is surmounted by a hemisphere. Find the surface area of the solid.



Solution:

Side of a cube = 7 cm, radius = $\frac{7}{2}$ cm.

T.S.A of a cube = $6a^2$ sq. units

$= 6 \times 7^2$

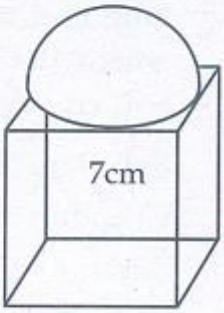
$= 294 \text{ cm}^2$

C.S.A of a Hemisphere

$= 2\pi r^2$ sq. units

$= 2 \times \frac{\overset{11}{\cancel{22}}}{\cancel{7}} \times \frac{\cancel{7}}{\cancel{2}} \times \frac{7}{\cancel{2}}$

$= 77 \text{ cm}^2$



Base area = πr^2 sq. units

$= \frac{\overset{11}{\cancel{22}}}{\cancel{7}} \times \frac{\cancel{7}}{\cancel{2}} \times \frac{7}{2}$

$= \frac{77}{2}$

$= 38.5 \text{ cm}^2$

T.S.A of solid = T.S.A of cube + C.S.A of Hemisphere – Base Area

$= 294 + 77 - 38.5$

$= 332.5 \text{ cm}^2$

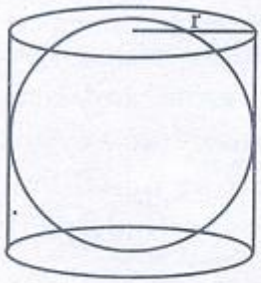
7. A right circular cylinder just enclose a sphere of radius *r* units. Calculate

(i) the surface area of the sphere

(ii) the curved surface area of the cylinder

(iii) the ratio of the areas obtained in

Solution:



Cylinder:	Sphere:
radius r = r units	radius r = r units
height h = 2r units	

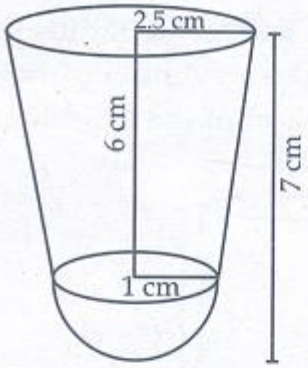
i) T.S.A of a sphere = $4\pi r^2$ sq. units

ii) C.S.A of a cylinder = $2\pi rh$ sq. units
$= 2\pi r \times 2r$
$= 4\pi r^2$ sq. units

iii) Ratio of T.S.A of sphere and C.S.A of cylinder = $4\pi r^2 : 4\pi r^2 = 1 : 1$

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

Solution:



Frustum	Sphere:
Internal radius r = 1 cm	radius r = 1 cm
External radius $R = \frac{5}{2}$ cm, h = 6 cm	

$$l = \sqrt{(R-r)^2+h^2}$$

$$= \sqrt{(1.5)^2+6^2}$$

$$= \sqrt{2.25+36}$$

$$= \sqrt{38.25}$$

$$l = 6.18 \text{ cm}$$

T.S.A of a shuttle cork

= C.S.A of frustum + C.S.A of Hemisphere

$= \pi(R+r)l + 2\pi r^2$

$= \pi[(R+r)l + 2r^2]$

$= \frac{22}{7}[(2.5+1)(6.18) + 2(1)^2]$

$= \frac{22}{7}[(3.5)(6.18) + 2\times1]$

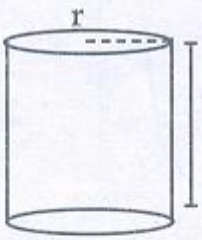
$= \frac{22}{7}[21.63 + 2]$

$= \frac{22\times23.63}{7}$

$= 74.27 \text{ cm}^2$

Exercise 7.4

1. An aluminium sphere of radius 12 cm is melted to make a cylinder of radius 8 cm. Find the height of the cylinder.



Solution:

Cylinder:	Hemisphere:
radius R = 8 cm	radius r = 12 cm
height H = ?	

Volume of cylinder = Volume of sphere

$$\pi R^2 H = \frac{4}{3}\pi r^3$$

$$8\times8\times H = \frac{4}{3}\times12\times12\times12$$

$$H = \frac{4\times12\times12\times12}{3\times8\times8}$$

$$H = 36 \text{ cm}$$

2. Water is flowing at the rate of 15 km per hour through a pipe of diameter 14 cm into a rectangular tank which is 50 m long and 44 m wide. Find the time in which the level of water in the tanks will rise by 21 cm.

Solution:

Cylinder:

radius r = 7 cm

hieght h = 1500000 cm

Cubical Tank:

length l = 50 m = 5000 cm

width b = 44 m = 4400 cm

height h = 21 cm

Volume of cylinder = $\pi r^2 h$ cu. units.

$= \frac{22}{7} \times 7 \times 7 \times 1500000$

$= 231000000 \text{ cm}^3$

Volume of cuboidal Tank

$= lbh$ cu. units.

$= 5000 \times 4400 \times 21$

$= 462000000$

$$\text{Time taken} = \frac{\text{Volume of cuboidal tank}}{\text{Volume of cylinder}}$$

$$= \frac{462000000}{231000000}$$

$= 2$ hrs.

3. A conical flask is full of water. The flask has base radius r units and height h units, the water poured into a cylindrical flask of base radius xr units. Find the height of water in the cylindrical flask.

Solution:

Cylinder:	Hemisphere:
radius is xr units	radius is r units
height = ?	height is h units

Volume of cylinder = Volume of cone

$$\pi R^2 H = \frac{1}{3} \pi r^2 h$$

$$(xr)^2 H = \frac{1}{3} r^2 h$$

$$x^2 r^2 H = \frac{1}{3} r^2 h$$

$$H = \frac{r^2 h}{3x^2 r^2}$$

$$\boxed{H = \frac{h}{3x^2} \text{ cm}^3}$$

4. A solid right circular cone of diameter 14 cm and height 8 cm is melted to form a hollow sphere. If the external diameter of the sphere is 10 cm, find the internal diameter.

Solution:

Hollow sphere:	Cone:
R = 5 cm	r = 7 cm
r = ?	h = 8 cm

Volume of Hollow sphere = Volume of cone

$$\frac{4}{3}\pi(R^3-r^3) = \frac{1}{3}\pi r^2 h$$

$$4(5^3-r^3) = \frac{7\times7\times8}{2}$$

$$(125-r^3) = \frac{7\times7\times8}{4}$$

$$125-r^3 = 98$$

$$-r^3 = 98-125$$

$$-r^3 = -27$$

$$r^3 = 27 = 3^3$$

$$\boxed{r = 3 \text{ cm}}$$

diameter = 2r = 2×3 = 6cm

5. Seenu's house has an overhead tank in the shape of a cylinder. This is filled by pumping water from a sump (underground tank) which is in the shape of a cuboid. The sump has dimensions 2 m ×1.5 m × 1 m. The overhead tank has its radius of 60 cm and height 105 cm. Find the volume of the water left in the sump after the overhead tank has been completely filled with water from the sump which has been full, initially.

Solution:

Cylinder:	Cuboidal Tank:
radius r = 60 cm	length l = 2 m = 200 cm
height h = 105 cm	width b = 1.5 m = 150 cm
	height h = 1 m = 100 cm

Volume of cylinder = $\pi r^2 h$ cu. units.

$$= \frac{22}{7}\times60\times60\times105$$

$$= 1188000 \text{ cm}^3$$

Volume of cuboid = lbh cu. units.

$$= 200 \times 150 \times 100$$

$$= 3000000 \text{ cm}^3$$

Volume of water left in the cuboidal sump after filling the tank

= Volume of cuboidal Tank – Volume of cylinder

= 3000000 – 1188000

= 1812000 cm^3

6. The internal and external diameter of a hollow hemispherical shell are 6 cm and 10 cm respectively. If it is melted and recast into a solid cylinder of diameter 14 cm, then find the height of the cylinder.

Solution:

Cylinder:	Hollow hemisphere
radius R = 7 cm	Internal radius r = 3 cm
height H = ?	External radius R = 5 cm

Volume of cylinder = Volume of hemisphere

$$\pi R^2 H = \frac{2}{3}\pi (R^3 - r^3)$$

$$7 \times 7 \times H = \frac{2}{3}(5^3 - 3^3)$$

$$H = \frac{2(125-27)}{3 \times 7 \times 7}$$

$$H = \frac{2 \times 98}{3 \times 7 \times 7}$$

$$H = \frac{4}{3}$$

$$\boxed{H = 1.33 \text{ cm}}$$

7. A solid sphere of radius 6 cm is melted into a hollow cylinder of uniform thickness. If the external radius of the base of the cylinder is 5 cm and its height is 32 cm, then find the thickness of the cylinder.

Solution:

Hollow cylinder:	Sphere:
External radius R = 5 cm	r = 6 cm
Internal radius r = ?	
Hieght h = 32 cm	

Volume of Hollow Cylinder = Volume of Sphere

$$\pi(R^2-r^2)h = \frac{4}{3}\pi r^3$$

$$(5^2-r^2)32 = \frac{4}{3}\times 6\times 6\times 6)$$

$$(25-r^2) = \frac{4\times 2\times 6\times 6}{32}$$

$$25-r^2 = 9$$

$$r^2 = 25-9 = 16$$

$$\boxed{r = 4 \text{ cm}}$$

Thickness = R–r = 5–4 cm = 1 cm

8. A hemispherical bowl is filled to the brim with juice. The juice is poured into a cylindrical vessel whose radius is 50% more than its height. If the diameter is same for both the bowl and the cylinder then find the percentage of juice that can be transferred from the bowl into the cylindrical vessel.

Solution:

Volume of Hemispherical Bowl $= \frac{2}{3}\pi r^3$ cu. units

Height of the cylindrical Vessel = h unit

$$r = h + h\times\frac{50}{100} = h(1+\frac{1}{2}) = \frac{3h}{2}$$

$$r = \frac{3h}{2} \Rightarrow \boxed{h = \frac{2r}{3}} \text{ unit}$$

Volume of cylindrical vessel

$= \pi r^2 h$ cu. units

$= \pi r^2 \times \frac{2r}{3} = \frac{2\pi r^3}{3}$ cu. unit

Percentage of the volume juice in the cylindrical vessel

$$= \frac{\frac{2}{3}\pi r^3}{\frac{2}{3}\pi r^3}\times 100\%$$

$= 100\%$

Multiple choice questions

1. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is

(1) 60π cm2

(2) 68π cm2

(3) 120π cm2

(4) 136π cm2

Solution:

$$\begin{aligned} l &= \sqrt{15^2+8^2} \\ &= \sqrt{225+64} \\ &= \sqrt{289} \\ l &= 17 \text{ cm} \\ \text{C.S.A} &= \pi r l \text{ sq. units} \\ &= \pi \times 8 \times 17 \\ &= 136\pi \text{ cm}^2 \end{aligned}$$

2. If two solid hemispheres of same base radius r units are joined together along their bases, then curved surface area of this new solid is

(1) $4\pi r^2$ sq. units

(2) $6\pi r^2$ sq. units

(3) $3\pi r^2$ sq. units

(4) $8\pi r^2$ sq. units

Solution:

$2\pi r^2+2\pi r^2 = 4\pi r^2$ sq. units

3. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be

(1) 12 cm

(2) 10 cm

(3) 13 cm

(4) 5 cm

Solution:

$$h = \sqrt{l^2 - r^2}$$
$$= \sqrt{13^2 \quad 5^2}$$
$$= \sqrt{169 - 25}$$
$$= \sqrt{144}$$
$$h = 12 \text{ cm}$$

4. If the radius of the base of a right circular cylinder is halved keeping the same height, then the ratio of the volume of the cylinder thus obtained to the volume of original cylinder is

(1) 1:2

(2) 1:4

(3) 1:6

(4) 1:8

Solution:

$$\frac{C.S.A_1}{C.S.A_2} = \frac{\pi r_1^2 h_1}{\pi r_2^2 h_2}$$
$$= \frac{r^2 \times \frac{h}{2}}{r^2 \times h}$$
$$= \frac{1}{2 \times 1}$$
$$= \frac{1}{2} = 1:2$$

5. The total surface area of a cylinder whose radius is 1/3 of its height is

(1) $\frac{9\pi h^2}{8}$ sq.units (2) $24\pi h^2$ sq.units

(3) $\frac{8\pi h^2}{9}$ sq.units (4) $\frac{56\pi h^2}{9}$ sq.units

Ans: (3)

Solution:

$r = \frac{1}{3}h, \quad h = h$

$T.S.A = 2\pi r(h+r)$ sq. units

$= 2\pi \times \frac{h}{3}\left(h + \frac{h}{3}\right)$

$= \frac{2\pi h}{3}\left(\frac{4h}{3}\right)$

$= \frac{8\pi h^2}{9}$

6. In a hollow cylinder, the sum of the external and internal radii is 14 cm and the width is 4 cm. If its height is 20 cm, the volume of the material in it is

(1) 5600π cm3

(2) 11200π cm3

(3) 56π cm3

(4) 3600π cm3

Solution:

$R+r = 14 \qquad w = R - r$

$R-r = 4$

$2R = 18$

$R = 9$ cm

$r = 5$ cm

$V = \pi(R^2-r^2)h$ cu. units

$= \pi(9^2-5^2)20$

$= \pi(56)20$

$= 1120\pi$ cm^3

7. If the radius of the base of a cone is tripled and the height is doubled then the volume is

(1) made 6 times

(2) made 18 times

(3) made 12 times

(4) unchanged

Solution:

$r = 3r, \quad h = 2h$

$$V = \frac{1}{3}\pi r^2 h \text{ cu. units}$$

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

$$= \frac{1}{3}\pi\, 9r^2 \times 2h$$

$$= \frac{18}{3}\pi r^2 h$$

$$= 6 \times \frac{1}{3}\pi r^2 h$$

$$= 6 \times \text{Volume of cone}$$

8. The total surface area of a hemi-sphere is how much times the square of its radius.

(1) π

(2) 4π

(3) 3π

(4) 2π

Solution:

$T.S.A = 3\pi r^2$

3π times square of its radius.

9. A solid sphere of radius x cm is melted and cast into a shape of a solid cone of same radius. The height of the cone is

(1) $3x$ cm

(2) x cm

(3) $4x$ cm

(4) $2x$ cm

Solution:

$r = x$ cm

Volume of cone = Volume of sphere

$$\frac{1}{3}\pi r^2 h = \frac{4}{3}\pi r^3$$

$$x^2 h = 4x^3$$

$$h = \frac{4x^3}{x^2}$$

$$\boxed{h = 4x \text{ cm}}$$

10. A frustum of a right circular cone is of height 16cm with radii of its ends as 8cm and 20cm. Then, the volume of the frustum is

(1) 3328π cm^3

(2) 3228π cm^3

(3) 3240π cm^3

(4) 3340π cm^3

Solution:

$$V = \frac{1}{3}\pi h (R^2+r^2+Rr) \text{ cu. units}$$

$$= \frac{1}{3}\pi \times 16 (20^2+8^2+20\times 8)$$

$$V = \frac{16\pi}{3}(400+64+160)$$

$$= \frac{16\pi}{3} \times 624$$

$$V = 3328\pi \text{ cm}^3$$

11. A shuttle cock used for playing badminton has the shape of the combination of

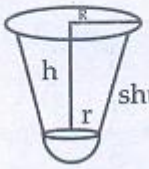
(1) a cylinder and a sphere

(2) a hemisphere and a cone

(3) a sphere and a cone

(4) frustum of a cone and a hemisphere

Solution:



12. A spherical ball of radius r_1 units is melted to make 8 new identical balls each of radius r_2 units. Then $r_1 : r_2$ is

(1) 2:1

(2) 1:2

(3) 4:1

(4) 1:4

Solution:

$$\text{Volume of sphere} = 8 \times \text{Volume of balls}$$

$$\frac{4}{3}\pi r_1^3 = 8 \times \frac{4}{3}\pi r_2^3$$

$$r_1^3 = 8r_2^3$$

$$\frac{r_1^3}{r_2^3} = \frac{8}{1}$$

$$\frac{r_1}{r_2} = \frac{2}{1}$$

$$r_1 : r_2 = 2:1$$

13. The volume (in cm^3) of the greatest sphere that can be cut off from a cylindrical log of wood of base radius 1 cm and height 5 cm is

(1) 4/3 π

(2) 10/3 π

(3) 5 π

(4) 20/3 π

Solution:

$$\text{Volume} = \pi r^2 h$$
$$= \pi \times 1 \times 5$$
$$= 5\pi \text{ cm}^2$$
$$\text{Volume of Sphere} = \frac{4}{3}\pi r^3$$
$$= \frac{4}{3}\pi(1)^3 = \frac{4}{3}\pi$$

14. The height and radius of the cone of which the frustum is a part are h_1 units and r_1 units respectively. Height of the frustum is h_2 units and radius of the smaller base is r_2 units. If $h_2 : h_1 = 1 : 2$ then $r_2 : r_1$ is

(1) 1 : 3

(2) 1 : 2

(3) 2 : 1

(4) 3 : 1

Solution:

$$h_2 : h_1 = 1 : 2 \Rightarrow r_2 : r_1 = 1 : 2$$

15. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is

(1) 1:2:3

(2) 2:1:3

(3) 1:3:2

(4) 3:1:2

Solution:

$$\pi r^2 h : \frac{1}{3}\pi r^2 h : \frac{2}{3}\pi r^2 h$$

$$3 : 1 : 2$$

Unit Exercise

1. The barrel of a fountain-pen cylindrical in shape, is 7 cm long and 5 mm in diameter. A full barrel of ink in the pen will be used for writing 330 words on an average. How many words can be written using a bottle of ink containing one fifth of a litre?

Solution:

$h = 7$ cm, $r = \frac{5}{2}$ mm $= \frac{5}{2\times10}$ cm $= \frac{1}{4}$ cm

$r = 0.25$ cm

Volume of Barrel $= \pi r^2 h$ cu. units.

$= \frac{22}{7}\times(0.25)^2\times7$

$= 1.375$ cm^3

Volume of ink bottle $= \frac{1}{5}$ of litre

$= \frac{1}{5}\times1000 = 200$ cm^3

1.375 cm^3 ink is used for writing no. of words = 330

1 cm^3 ink is used for writing no. of words

$= \frac{330}{1.375}$

200cm^3 ink is used for writing no. of

words $= \frac{330\times200}{1.375} = 48000$ words.

2. A hemi-spherical tank of radius 1.75 m is full of water. It is connected with a pipe which empties the tank at the rate of 7 litre per second. How much time will it take to empty the tank completely?

Solution:

$r = 1.75 \text{ m} = 175 \text{ cm}$

$$\text{Volume} = \frac{2}{3}\pi r^3 \text{ cu. units.}$$

$$= \frac{2}{3} \times \frac{22}{7} \times 175 \times 175 \times 175$$

$$= 11229166.667 \text{ cm}^3$$

$1000 \text{ cm}_3 = 1 \text{ lt}$

$$= 11229.16 \ldots$$

$$= 11229.2 \text{ lt}$$

$$\text{Time} = \frac{V}{7} \text{ cu. units.}$$

$$= \frac{11229.2}{7} \times \frac{1}{60} \text{ (in min)}$$

$$= \frac{11229.2}{420}$$

$$= 26.737$$

$$\approx 27 \text{ min (approx)}$$

3. Find the maximum volume of a cone that can be carved out of a solid hemisphere of radius *r* units.

Solution:

Radius of Hemisphere = r

Radius of cone = r, height of a cone = r

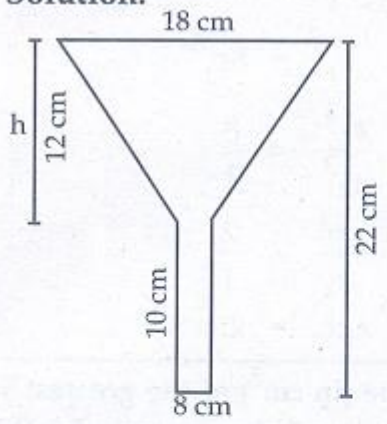
$$\text{Volume of cone} = \frac{1}{3}\pi r^2 h \text{ cu. units.}$$

$$= \frac{1}{3}\pi r^2 \times r = \frac{1}{3}\pi r^3$$

$$\text{Volume} = \frac{1}{3}\pi r^3 \text{ cm units}$$

4. An oil funnel of tin sheet consists of a cylindrical portion 10 cm long attached to a frustum of a cone. If the total height is 22 cm, the diameter of the cylindrical portion be 8cm and the diameter of the top of the funnel be 18 cm, then find the area of the tin sheet required to make the funnel.

Solution:



Cylinder:

$r = \frac{8}{2} = 4$ cm

$h = 10$ cm

Frustum:

$h = 22 - 10 = 12$cm

$R = \frac{18}{2} = 9$ cm

$r = \frac{8}{2} = 4$ cm

$$l = \sqrt{h^2 + (R-r)^2}$$

$$= \sqrt{12^2 + (9-4)^2}$$

$$= \sqrt{144 + 25}$$

$$= \sqrt{169}$$

$$l = 13 \text{ cm}$$

Area of Funnel = C.S.A of cylinder + C.S.A of Frustum

$= 2\pi rh + \pi(R+r)l$

$= 2 \times \pi \times 4 \times 10 + \pi \times 13(9+4)$

$= 80\pi + 169\pi$

$= 249\pi$

$= 249 \times \frac{22}{7}$

$= 782.57 \text{ cm}^2$

5. Find the number of coins, 1.5 cm in diameter and 2 mm thick, to be melted to form a right circular cylinder of height 10 cm and diameter 4.5 cm.

Solution:

Coin Cylinder:	Frustum:
diameter $= 1.5\text{ cm} = \frac{15}{10}\text{ cm}$	diameter $= 4.5\text{ cm} = \frac{45}{10}\text{ cm}$
$R = \frac{15}{20}\text{ cm}$	radius $= \frac{45}{20}\text{ cm}$
$H = 2\text{ mm} = \frac{2}{10}\text{ cm}$	height $= 10\text{ cm}$

no. of cons × Volume of coin = Volume of cylinder

$$\text{No. of coins} = \frac{\text{Volume of cylinder}}{\text{Volume of coin}}$$

$$= \frac{\pi r^2 h}{\pi R^2 H}$$

$$= \frac{\frac{\overset{3}{\cancel{45}}}{\cancel{20}} \times \frac{\overset{3}{\cancel{45}}}{\cancel{20}} \times 10}{\frac{\cancel{15}}{\cancel{20}} \times \frac{\cancel{15}}{\cancel{20}} \times \frac{2}{10}}$$

$$= \frac{3 \times 3 \times \overset{5}{\cancel{10}} \times 10}{\cancel{2}}$$

$$= 450 \text{ coins.}$$

6. A hollow metallic cylinder whose external radius is 4.3 cm and internal radius is 1.1 cm and whole length is 4 cm is melted and recast into a solid cylinder of 12 cm long. Find the diameter of solid cylinder.

Solution:

Cylinder:	Hollow cylinder
r = ?	R = 4.3 cm
h = 12 cm	r = 1.1 cm
	h = 4 cm

Volume of cylinder = Volume of Hollow cylinder

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

$$r^2 \times 12 = (4.3^2 - 1.1^2)4$$

$$r^2 = \frac{(4.3+1.1)(4.3-1.1)\cancel{4}}{\cancel{12}\ 3}$$

$$= \frac{5.4 \times 3.2}{3}$$

$$r^2 = 5.76 = (2.4)^2$$

$$r = 2.4 \text{ cm}$$

Diameter = $2r = 2 \times 2.4 = 4.8$ cm

7. The slant height of a frustum of a cone is 4 m and the perimeter of circular ends are 18 m and 16 m. Find the cost of painting its curved surface area at ₹100 per sq. m.

Solution:

$l = 4$ cm

$2\pi R = 18$

$2 \times \frac{22}{7} \times R = 18$

$R = \frac{18 \times 7}{2 \times 22}$

$R = 2.86$ cm

$2\pi r = 16$

$2 \times \frac{22}{7} \times r = 16$

$r = \frac{16 \times 7}{2 \times 22}$

$r = 2.55$ cm

C.S.A = $\pi(R+r)l$ sq. units.

$= \pi(2.86+2.55)4$

$= \pi(5.41)4$

$= 67.95 \text{ m}^2$

$\approx 68 \text{ m}^2$

The cost of painting 1 m^2 = Rs. 100

The cost of painting 68 m^2 = Rs. 68 × 100

= Rs. 6800

8. A hemi-spherical hollow bowl has material of volume $436\pi/3$ cubic cm. Its external diameter is 14 cm. Find its thickness.

Solution:

R = 7 cm

Volume of Hollow Hemisphere = $\frac{436\pi}{3}$

$$\frac{2}{3}\pi(R^3-r^3) = \frac{436\pi}{3}$$

$$7^3-3^3 = \frac{436}{2} = 218$$

$$343-r^3 = 218$$

$$r^3 = 343-218$$

$$r^3 = 218$$

$$r^3 = 125$$

$$\boxed{r = 5 \text{ cm}}$$

Thickness = R–r

= 7–5 = 2 cm

9. The volume of a cone is 1005 (5/7) cu. cm. The area of its base is 201 (1/7) sq. cm. Find the slant height of the cone.

Solution:

Base area = $201\frac{1}{7}$ sq. cm

$$\pi r^2 = \frac{1408}{7}$$

Volume of cone = $1005\frac{5}{7}$ cu. cm.

$$\frac{1}{3}\pi r^2 h = \frac{7040}{7}$$

$$\frac{1}{3}\times\frac{1408}{7}\times h = 7040$$

$$h = \frac{7040\times3\times7}{7\times1408}$$

$$\boxed{h = 15 \text{ cm}}$$

$$\pi r^2 = \frac{1408}{7}$$

$$\frac{22}{7}\times r^2 = \frac{1408}{7}$$

$$r^2 = \frac{1408\times7}{7\times22} = 64$$

$$\boxed{r = 8 \text{ cm}}$$

$$l = \sqrt{h^2+r^2}$$

$$= \sqrt{15^2+8^2}$$

$$= \sqrt{225+64}$$

$$= \sqrt{289}$$

$$\boxed{l = 17 \text{ cm}}$$

10. A metallic sheet in the form of a sector of a circle of radius 21 cm has central angle of 216°. The sector is made into a cone by bringing the bounding radii together. Find the volume of the cone formed.

Solution:

$$\text{Arc length} = \frac{\theta}{360} \times 2\pi r$$

$$= \frac{216}{360} \times 2 \times \frac{22}{7} \times 21$$

$$2\pi r = 79.2 \text{ cm}$$

$$2 \times \frac{22}{7} \times r = 79.2$$

$$r = \frac{79.2 \times 7}{2 \times 22}$$

$$\boxed{r = 12.6 \text{ cm}}$$

$l = 21$ cm, $r = 12.6$ cm

$$h = \sqrt{l^2 - r^2}$$

$$= \sqrt{21^2 - (12.6)^2}$$

$$= \sqrt{441 - 158.76}$$

$$= \sqrt{282.24}$$

$$\boxed{h = 16.8 \text{ cm}}$$

$$\text{Volume} = \frac{1}{3}\pi r^2 h \text{ cu. units}$$

$$= \frac{1}{3}\pi (12.6)^2 (16.8)$$

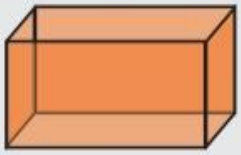
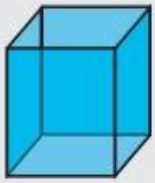
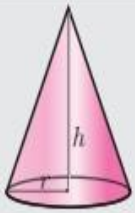
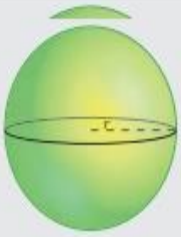
$$= \frac{8374.91}{3}$$

$$= 2791.64 \text{ cm}^3$$

வழிகாட்டி அகாடமி VAZHIKATTI ACADEMY

Points to Remember

Points to Remember

Solid	Figure	Curved surface Area / Lateral surface Area (in sq. units)	Total surface Area (in sq. units)	Volume (in cubic units)
Cuboid		$2h(l+b)$	$2(lb+bh+lh)$	$l \times b \times h$
Cube		$4a^2$	$6a^2$	a^3
Right Circular Cylinder		$2\pi rh$	$2\pi r(h+r)$	$\pi r^2 h$
Right Circular Cone		πrl $l = \sqrt{r^2+h^2}$ l = slant height	$\pi rl + \pi r^2$ $= \pi r(l+r)$	$\frac{1}{3}\pi r^2 h$
Sphere		$4\pi r^2$	$4\pi r^2$	$\frac{4}{3}\pi r^3$

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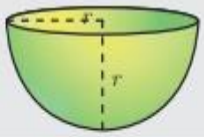
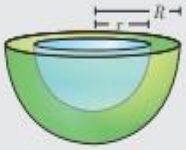
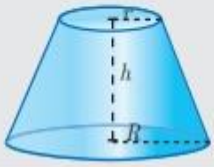
Hemisphere		$2\pi r^2$	$3\pi r^2$	$\frac{2}{3}\pi r^3$
Hollow cylinder		$2\pi(R+r)h$	$2\pi(R+r)$ $(R-r+h)$	$\pi(R^2-r^2)h$
Hollow sphere		$4\pi R^2$ = outer surface area	$4\pi(R^2+r^2)$	$\frac{4}{3}\pi(R^3-r^3)$
Hollow hemisphere		$2\pi(R^2+r^2)$	$\pi(3R^2+r^2)$	$\frac{2}{3}\pi(R^3-r^3)$
Frustum of right circular cone.		$\pi(R+r)l$ where $l=\sqrt{h^2+(R-r)^2}$	$\pi(R+r)l+\pi R^2$ $+\pi r^2$	$\frac{1}{3}\pi h\left[R^2+r^2+Rr\right]$