Surface Area and Volumes of a Sphere – 21.1

1.

Sol:

(i) Given radius $= 10 \cdot 5\,cm$

$\boxed{Surface\ area = 4\pi r^2}$

$= 4 \times \frac{22}{7} \times (10 \cdot 5)^2$

$= 1386\,cm^2$

(ii) Given radius $= 5 \cdot 6cm$

Surface area $= 4\pi r^2 = 4 \times \frac{22}{7} \times (5 \cdot 6)^2 = 394 \cdot 24cm^2$

(iii) Given radius = 14cm

Surface area $= 4\pi r^2 = 4 \times \frac{22}{7} \times (14)^2 = 2464cm^2$

2.

Sol:

(i) Diameter = 14cm

Radius $= \frac{Diameter}{2} = \frac{14}{2} = 7cm$

$\therefore$ Surface area $= 4\pi r^2 = 4 \times \frac{22}{7} \times (7)^2 = 616cm^2$

(ii) Diameter = 21cm

Radius $= \frac{Diameter}{2} = \frac{21}{2} = 10 \cdot 5\,cm$

$\therefore$ Surface area $= 4\pi r^2 = 4\pi \times (10 \cdot 5)^2 = 4 \times \frac{22}{7} \times 10 \cdot 5^2 = 1386cm^2$

(iii) Diameter = $3 \cdot 5cm$

Radius $= 3 \cdot 5cm / 2 = 1 \cdot 75cm$

$\therefore$ Surface area $= 4\pi r^2 = 4 \times \frac{22}{7} \times \frac{3 \cdot 5}{2^2} = 38 \cdot 5cm^2$

3.

Sol:

The surface area of the hemisphere $= 2\pi r^2$

$= 2 \times 3 \cdot 14 \times (10)^2$

$= 628 cm^2$

The surface area of solid hemisphere $= 3\pi r^2$

$= 3 \times 3 \cdot 14 \times (10)^2$

$= 942 cm^2$

4.

Sol:

Surface area of a sphere is $5544 cm^2$

$\Rightarrow 4\pi r^2 = 5544$

$\Rightarrow \frac{4 \times 22}{7} \times r^2 = 5544$

$\Rightarrow r^2 = \frac{5544 \times 7}{88}$

$\Rightarrow r = \sqrt{21 cm \times 21 cm} = \sqrt{(21)^2} cm$

$\Rightarrow r = 21 cm.$

Diameter $= 2$ (radius)

$= 2(21 cm)$

$= 42 cm.$

5.

Sol:

Given

Inner diameter of hemisphere bowl $= 10 \cdot 5 cm$

Radius $= \frac{10 \cdot 5}{2} cm = 5 \cdot 25 cm.$

Surface area of hemispherical bowl $= 2\pi r$

$= 2\left[\frac{22}{7}\right] \times (5 \cdot 25)^2 \; cm^2$

$= 173 \cdot 25 cm^2.$

Cost of tin planning $100 cm^2$ area = Rs 4

Cost of tin planning $173 \cdot 25 cm^2$ area = $Rs\left(\frac{4 \times 173 \cdot 25}{100}\right)$

$= Rs \; 6 \cdot 93$

Thus, The cost of tin plating the inner side of se hemisphere bowl is $Rs \, 6 \cdot 93$

6.

Sol:

Dome Radius $= 63d\ m = 6\cdot 3m$

Inner $S\cdot A$ of dome $= 2\pi r^2 = 2\times\frac{22}{7}\times(6\cdot 3)^2 = 249\cdot 48m^2$

Now, cost of $1m^2 = Rs\ 2.$

$\therefore$ Cost of $249\cdot 48m^2 = Rs[2\times 249\cdot 48]$

$= Rs\ 498\cdot 96.$

7.

Sol:

$\frac{3}{4}^{th}$ of earth surface is covered by water

$\therefore \frac{1}{4}^{th}$ earth surface is covered by c and

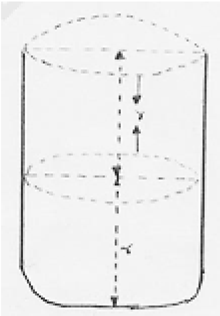
$\therefore$ Surface area covered by land $= \frac{1}{4}\times 4\pi r^2$

$= \frac{1}{4}\times 4\times\frac{22}{7}\times 6370^2$

$= 1275\cdot 27400\,km^2$

8.

Sol:



Given length of the shape $= 7cm$

But length $= r + r$

$\Rightarrow 2r = 7cm$

$\Rightarrow r = \frac{7}{2}cm$

$\Rightarrow r = 3\cdot 5cm$

Also; $h = r$

Total S.A of shape $= 2\pi rh + 2\pi r^2 = 2\pi r^2 = 2\pi r\times r + 2\pi r^2$

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

$= 4\pi r^2$

$= 4\times\frac{22}{7}\times(3\cdot 5)^2$

$= 154cm^2$

9.

Sol:

Diameter of cone = 16cm.

$\therefore$ Radius of cone = 8cm.

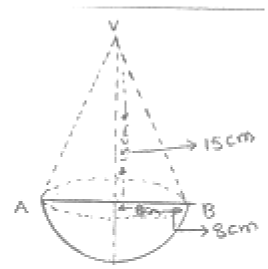
Height of cone = 15cm

Slant height of cone $=\sqrt{8^2+15^2}$

$=\sqrt{64+225}$

$=\sqrt{289}$

$=17cm$



$\therefore$ Total curved surface area of toy

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

$=\dfrac{22}{7}\times 8\times 17+2\times\dfrac{22}{7}\times 5^2$

$=\dfrac{5808}{7}cm^2$

Now, cost of $100cm^2 = Rs\,7$

$1cm^2 = Rs\dfrac{7}{100}$

Hence, cost of $\dfrac{5808}{7}cm^2 = Rs\left(\dfrac{5808}{7}\times\dfrac{7}{100}\right)$

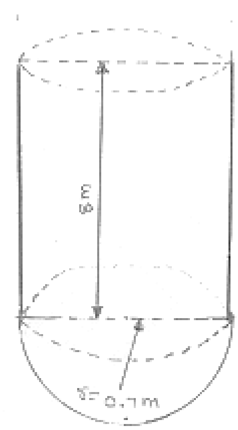
$=Rs\,58\cdot 08$

10.

Sol:

Diameter of cylinder $=1\cdot 4m$

$\therefore$ Radius of cylinder $=\dfrac{1\cdot 4}{2}=0\cdot 7m$



Height of cylinder = 8m.

$\therefore S\cdot A$ of tank $=2\pi rh+2\pi r^2$

$=2\times\dfrac{22}{7}\times 0\cdot 7\times 8+2\times\dfrac{22}{7}\times(0\cdot 7)^2$

$=\dfrac{176}{5}+\dfrac{77}{25}$

$=\dfrac{957}{25}=38\cdot 28cm^2$

Now, cost of $1m^2 = Rs$ 10.

$\therefore$ Cost of $38\cdot 28m^2 = Rs[10\times 38\cdot 28]$

$= Rs\ 382 \cdot 80$

11.

Sol:

Let the diameter of the earth is f then, diameter of moon will be $\frac{d}{4}$

Radius of earth $= \frac{d}{2}$

Radius of moon $= \frac{\frac{d}{2}}{4} = \frac{d}{8}$

$S \cdot A$ of moon $= 4\pi\left(\frac{d}{8}\right)^2$

Surface area of earth $= 4\pi\left(\frac{d}{2}\right)^2$

Required ratio $= \frac{4\pi\left(\frac{d}{8}\right)^2}{4\pi\left(\frac{d}{2}\right)^2} = \frac{4}{64} = \frac{1}{16}$

Thus, the required ratio of the surface areas is $\frac{1}{16}$.

12.

Sol:

Given that only the rounded surface of the dome to be painted, we would need to find the curved surface area of the hemisphere to know the extent of painting that needs to be done.

Now, circumference of the dome $= 17 \cdot 6m.$

Therefore, $17 \cdot 6 = 2\pi r.$

$2 \times \frac{22}{7} r = 17 \cdot 6m.$

So, the radius of the dome $= 17 \cdot 6 \times \frac{7}{2 \times 22} m = 2 \cdot 8m$

The curved surface area of the dome $= 2\pi r^2$

$= 2 \times \frac{22}{7} \times 2 \cdot 8 \times 2 \cdot 8 cm^2$

$= 49 \cdot 28 m^2$

Now, cost of painting $100 cm^2$ is Rs 5.

So, cost of painting $1m^2 = Rs\ 500$

Therefore, cost of painting the whole dome

$= Rs\ 500 \times 49 \cdot 28$

$= Rs\,24640$

13.

Sol:

Wooden sphere radius $= \left(\frac{21}{2}\right) cm = 10 \cdot 5 cm.$

Surface area of a wooden sphere

$= 4\pi r^2 = 4\left[\frac{22}{7}\right][10 \cdot 5]^2\ cm^2 = 1386 cm^2$

Radius (r^1) of cylindrical support $= 1 \cdot 5 cm$

Height (h^1) of cylindrical support $= 7cm$

CSA of cylindrical support $= 2\pi r^1 h \left[2 \times \frac{22}{7} \times 1 \cdot 5 \times 7\right]$

$= 66 cm^2$

Area of circular end of cylindrical support $= \pi r^2 \left[\frac{22}{7}(1 \cdot 5)^2\right] = 7 \cdot 07 cm^2$

Area to be painted silver $= \left[8 \times (1386 - 7 \cdot 07)\right] cm^2$

$= 8(1378 \cdot 93) cm^2$

$= 11031 \cdot 44 cm^2$

Cost occurred in painting silver color

$= Rs\ (11031 \cdot 44 \times 0 \cdot 25) = Rs\ 2757 \cdot 86$

Area to painted black $= (8 \times 66) cm^2 = 528\ cm^2$

Cost occurred in painting black color $= Rs(528 \times 0 \cdot 05) = Rs\ 26 \cdot 40$

$\therefore$ Total cost occurred in painting $= Rs(2757 \cdot 86 + 26 \cdot 40) = Rs\,2789 \cdot 26$

Surface Area and Volumes of a Sphere-21.1

1.

Sol:

(i) Radius $(r) = 2cm$

$\therefore$ Volume $= \frac{4}{3}\pi r^3$

$= \frac{4}{3} \times \frac{22}{7} \times (2)^3 = 33 \cdot 52 cm^3$

(ii) Radius $(r) = 3 \cdot 5cm$

$\therefore$ Volume $= (3 \cdot 5)^3 \times \pi \times \frac{4}{3} = \frac{4}{3} \times \frac{22}{7} \times (3 \cdot 5)^3 = 179 \cdot 666 cm^3$

(iii) Radius $(r) = 10 \cdot 5cm$

Volume $= \frac{4}{3}\pi r^3 = \frac{4}{3} \times \frac{22}{7} \times (10 \cdot 5)^2 = 4851 cm^3$

2.

Sol:

(i) Diameter $= 14cm$, radius $= \frac{14}{2} = 7cm$

$\Rightarrow$ Volume $= \frac{4}{3}\pi r^3 = \frac{4}{3} \times \frac{22}{7} \times (7)^3 = 1437 \cdot 33 cm^3$

(ii) Diameter $= 3 \cdot 5d\,m$, radius $= \frac{3 \cdot 5}{2} dm = 1 \cdot 75 dm$

$\therefore$ Volume $= \frac{4}{3} \times \frac{22}{7} \times \left(\frac{3 \cdot 5}{2}\right)^3 = 22 \cdot 46 dm^3$

(iii) Diameter $= 2 \cdot 1m \Rightarrow r = \frac{2 \cdot 1}{2} m$

$\therefore$ Volume $= \frac{4}{3} \times \left(\frac{22}{7}\right) \times \left(\frac{2 \cdot 1}{2}\right)^3$

$= 4 \cdot 851 m^3.$

3.

Sol:

Radius of tank $= 2 \cdot 8m$

$\therefore$ Capacity $= \frac{2}{3} \times \frac{22}{7} \times (2 \cdot 8)^3$

$= 45 \cdot 994 m^3$

$\therefore$ Capacity in liters $= 45994$ liters $[1m^3 = 1000]$

4.

Sol:

Inner radius $= 5cm$

Outer radius $= 5 + 0 \cdot 25$

$= 5 \cdot 25$

Volume of steel used = outer volume – inner volume

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

$= \frac{2}{3} \times \frac{22}{7} [5 \cdot 25^3 - 5^3]$

$= 41 \cdot 282 cm^3$

5.

Sol:

Cube edge $= 22cm$

$\therefore$ Volume of cube $= (22)^3$

$= 10648 cm^3$

And,

Volume of each bullet $= \frac{4}{3} \pi r^3$

$= \frac{4}{3} \times \frac{22}{7} \times \left(\frac{2}{2}\right)^3$

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

$= \frac{88}{21} cm^3$

$\therefore$ No. of bullets $= \frac{Volume\ of\ cube}{Volume\ of\ bullet}$

$= \frac{10648}{\frac{88}{21}} = 2541$

6.

Sol:

Volume of laddoo having radius $= 5cm$

i.e volume $(V_1) = \frac{4}{3}\pi r^3$

$V_1 = \frac{4}{3} \times \frac{22}{7} \times (5)^3$

$V_1 = \frac{11000}{21} cm^3$

Also volume of laddoo having radius $2 \cdot 5cm$

i.e., $V_2 = \frac{4}{3}\pi r^3$

$V_2 = \frac{4}{3} \times \frac{22}{7} \times (2 \cdot 5)^3$

$V_2 = \frac{1375}{21} cm^3$

$\therefore$ No. of laddoos $= \frac{V_1}{V_2} = \frac{11000}{1375} = 8.$

7.

Sol:

Volume of load ball $= \frac{4}{3}\pi r^3$

$= \frac{4}{3} \times \frac{22}{7} \times \left(\frac{3}{2}\right)^3$

$\therefore$ According to question,

Volume of lead ball $= \frac{4}{3} \times \pi \left(\frac{3}{4}\right)^3 + \frac{4}{3}\pi\left(\frac{2}{2}\right)^3 + \frac{4}{3}\pi\left(\frac{d}{2}\right)^3$

$\Rightarrow \frac{4}{3}\pi\left(\frac{3}{2}\right)^3 = \frac{4}{3}\pi\left(\frac{3}{4}\right)^3 + \frac{4}{3}\left[\pi\left(\frac{2}{2}\right)^3 + \left(\frac{d}{2}\right)^3\right]$

$\Rightarrow \frac{4}{3}\pi\left[\left(\frac{3}{2}\right)^3\right] = \frac{4}{3}\pi\left[\left(\frac{3}{4}\right)^3 + \left(\frac{2}{2}\right)^3 + \left(\frac{d}{2}\right)^3\right]$

$\Rightarrow \frac{27}{8} = \frac{27}{64} + \frac{8}{8} + \frac{d^3}{8}$

$\Rightarrow \left[\frac{27}{8} - \frac{27}{64} - 1\right]8 = d^3$

$$\Rightarrow \frac{d^3}{8} = \frac{125}{64}$$
$$\Rightarrow \frac{d}{2} = \frac{5}{4}$$
$$\Rightarrow d = \frac{10}{4}$$
$$\Rightarrow d = 2 \cdot 5cm$$

8.

Sol:

Volume of sphere $= \frac{4}{3}\pi r^3$

$$= \frac{4}{3}\pi(5)^3$$

$\therefore$ Volume of water rise in cylinder = Volume of sphere

Let r be the radius of the cylinder

$$\pi r^2 h = \frac{4}{3}\pi r^3$$
$$\Rightarrow r^{12} \times \frac{5}{3} = \frac{4}{3}(5)^3$$
$$\Rightarrow r^{12} = 20 \times 5$$
$$\Rightarrow r^{12} = 100$$
$$\Rightarrow r^1 = 10cm$$

9.

Sol:

Let V_1 *and* V_2 be the volumes of first sphere and second sphere respectively

Radius of 1st sphere = r

2nd sphere radius $= 2r$

$$\therefore \frac{Volume\ 1^{st}}{Volume\ 2^{nd}} = \frac{\frac{4}{3}\pi r^3}{\frac{4}{3}\pi(2r)^3} = \frac{1}{8}.$$

10.

Sol:

Given that

Volume of thee cone = Volume of the hemisphere

$$\Rightarrow \frac{1}{3}\pi r^2 h = \frac{2}{3}\pi r^3$$
$$\Rightarrow r^2 h = 2r^3$$
$$\Rightarrow h = 2r$$
$$\Rightarrow \frac{h}{r} = \frac{1}{1}\times 2 = \frac{2}{1}$$
$\therefore$ Ratio of the their height is $2:1$

11.

Sol:

Given that

Volume of water in the hemisphere bowl = Volume of water in the cylinder

Let n be the height to which water rises in the cylinder.

Inner radii of bowl $= 3\cdot 5cm = r_1$

Inner radii of bowl $= 7cm = r_2$

$$\Rightarrow \frac{2}{3}\pi r_1^3 = \pi r_2^2 h$$
$$\Rightarrow h = \frac{2r_1^3}{3r_2^2} = \frac{2(3\cdot 5)^3}{3(7)^2}$$
$$\Rightarrow h = \frac{7}{12}cm.$$

12.

Sol:

Given that,

Height of cylinder $= \frac{2}{3}$(diameter)

We know that,

Diameter $= 2$(radius)

$$h = \frac{2}{3}\times 2r = \frac{4}{3}r$$

Volume of the cylinder = volume of the sphere

$$\Rightarrow \cancel{\pi} r^2 \times \frac{\cancel{4}}{\cancel{3}}\cancel{r} = \frac{\cancel{4}}{\cancel{3}}\cancel{\pi}(4)^3$$
$$\Rightarrow r^3 = 4^3$$
$$\Rightarrow r = 4cm$$

13.

Sol:

It is given that,

Volume of water is hemisphere bowl = volume of cylinder

$$\Rightarrow \frac{2}{3}\pi(6)^3 = \pi(4)^2 h$$

$$\Rightarrow h = \frac{2}{3} \times \frac{6\times6\times6}{4\times4}$$

$$\Rightarrow h = 9cm$$

$\therefore$ Height of cylinder $= 9cm.$

14.

Sol:

Let r be the radius of the iron ball

Then, Volume of iron ball = Volume of water raised in the hub

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

$$\Rightarrow \frac{4}{3} r^3 = (16)^2 \times 9$$

$$\Rightarrow r^3 = \frac{27\times16\times16}{4}$$

$$\Rightarrow r^3 = 1728$$

$$\Rightarrow r = 12\,cm$$

Therefore, radius of the ball = 12cm.

15.

Sol:

Given that,

Radius of cylinder $= 12cm = r_1$

Raised in height $= 6\cdot75cm = r_2$

$\Rightarrow$ Volume of water raised = Volume of the sphere

$$\Rightarrow \pi r_1^2 h = \frac{4}{3}\pi r_2^3$$

$$\Rightarrow 12\times12\times6\cdot75 = \frac{4}{3} r_2^3$$

$$\Rightarrow \frac{12\times12\times6\cdot75\times3}{4} = r_2^3$$

$\Rightarrow r_2^3 = 729$

$\Rightarrow \boxed{r_2 = 9cm}$

Radius of sphere is 9cm.

16.

Sol:

Given that diameter of a coper sphere = 18cm.

Radius of the sphere = 9cm

Length of the wire = 108m

= 10,800cm

Volume of cylinder = volume of sphere

$\Rightarrow \pi r_1^2 h = \frac{4}{3}\pi r_2^3$

$\Rightarrow r_1^2 \times 10800 = \frac{4}{3}\times 9\times 9\times 9 \Rightarrow r_1^2 = 0\cdot 09$

$\therefore$ Diameter = $2\times 0\cdot 3 = 0\cdot 6cm$

17.

Sol:

Given that,

Radius of cylinder jar $= 6cm = r_1$

Level to be rised = 2cm.

Radius of each iron sphere $= 1\cdot 5cm = r_2$

Number of sphere $= \frac{Volume\ of\ \ cylinder}{Volume\ of\ \ sphere}$

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

$= \frac{r_1^2 h}{r_2^3 \times \frac{4}{3}} = \frac{6\times 6\times 2}{\frac{4}{3}\times 1\cdot 5\times 1\cdot 5\times 1\cdot 5}$

Number of sphere = 16.

18.

Sol:

Given that,

Diameter of jar = 10cm

Radius of jar = 5cm

Let the level of water raised by ‘h’
Diameter of spherical ball = 2cm
Radius of the ball =1cm
Volume of jar = 4(Volume of spherical)

$$\Rightarrow \pi r_1^2 h = 4\left(\frac{4}{3}\pi r_2^3\right)$$

$$\Rightarrow r_1^2 h = 4\times\frac{4}{3}r_2^2$$

$$\Rightarrow r_1^2 h = 4\times\frac{4}{3}\times 1\times 1\times 1$$

$$\Rightarrow h = \frac{4\times 4\times 1}{3\times 5\times 5}$$

$$\Rightarrow h = \frac{16}{75}cm.$$

$\therefore$ Height of water in jar $= \frac{16}{75}cm.$

19.

Sol:

Given that,
Diameter of sphere = 6cm

Radius of sphere $= \frac{d}{2} = \frac{6}{2}cm = 3cm = r_1$

Diameter of the wire $= 0\cdot 2cm$

Radius of the wire $= 0\cdot 1cm = r_2$

Volume of sphere = Volume of wire

$$\Rightarrow \frac{4}{3}\pi r_1^3 = \pi r_2^2 h$$

$$\Rightarrow \frac{4}{3}\times 3\times 3\times 3 = 0\cdot 1\times 0\cdot 1\times h$$

$$\Rightarrow \frac{4\times 3\times 3}{0\cdot 1\times 0\cdot 1} = h$$

$$\Rightarrow h = 3600$$

$$\Rightarrow h = 36m.$$

$\therefore$ Length of wire = 36m.

20.

Sol:

Given that,

Internal radius of the sphere $= 3cm = r_1$

External radius of the sphere $= 5cm = r_2$

Height of cylinder $= 2\frac{2}{3}cm = \frac{8}{3}cm = h$

Volume of spherical shell = Volume of the cylinder

$\Rightarrow \frac{4}{3}\pi\left(r_2^3 - r_1^3\right) = \pi r_3^2 h$

$\Rightarrow \frac{4}{3}\left(5^3 - 3^3\right) = \frac{8}{3}r_3^2$

$\Rightarrow \frac{4\times 98\times 3}{3\times 8} = r_3^2$

$\Rightarrow r_3^2 = \sqrt{49}$

$\Rightarrow r_3 = 7cm$

$\therefore$ Diameter of the cylinder = 2 (radius) = 14cm

21.

Sol:

Given radius of hemisphere = 7cm = r_1

Height of cone $h = 49cm$

Volume of hemisphere = Volume of cone

$\Rightarrow \frac{2}{3}\pi r_1^3 = \frac{1}{3}\pi r_2^2 h$

$\Rightarrow \frac{2}{3}\times 7^3 = \frac{1}{3}r_2^2 \times 49$

$\Rightarrow \frac{2\times 7\times 7\times 7\times 3}{3\times 49} = r_2^2$

$\Rightarrow r_2^2 = 3\cdot 74cm$

$\therefore$ Radius of the base $= 3\cdot 74cm.$

22.

Sol:

Given that

Hollow sphere external radii $= 4cm = r_2$

Internal radii $\left(r_1\right) = 2cm$

Cone base radius $\left(R\right) = 4cm$

Height = ?

Volume of cone = Volume of sphere

$\Rightarrow \frac{1}{3}\pi r^2 H = \frac{4}{3}\pi\left(R_2^3 - R_1^3\right)$

$\Rightarrow 4^2 H = 4\left(4^3 - 2^3\right)$

$\Rightarrow H = H = \frac{4\times 56}{16} = 14cm$

Slant height $= \sqrt{R^2 + H^2} = \sqrt{4^2 + 14^2}$

$\Rightarrow l = \sqrt{16+196} = \sqrt{212}$

$= 14\cdot 56cm.$

23.

Sol:

Given that

Metallic sphere of radius $= 10\cdot 5cm$

Cone radius $= 3\cdot 5cm$

Height of radius $= 3cm$

Let the number of cones obtained be x

$V_s = x \times v$ cone

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

$\Rightarrow \frac{4\times 10\cdot 5\times 10\cdot 5\times 10\cdot 5}{3\cdot 5\times 3\cdot 5\times 3} = x$

$\Rightarrow x = 126$

$\therefore$ Number of cones $= 126$

24.

Sol:

Given that

A cone and a hemisphere have equal bases and volumes

$V_{cone} = V_{hemisphere}$

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

$\Rightarrow r^2 h = 2r^3$

$\Rightarrow h = 2r$

$\Rightarrow h : r - 2r : r - 2 : 1$

25.

Sol:

Given that,

A cone, hemisphere and a cylinder stand one equal bases and have the same weight

We know that

$V_{cone} : V_{hemisphere} : V_{cylinder}$

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

Multiplying by 3

$\Rightarrow \pi r^2 h : 2\pi r^3 : 3\pi r^2 h$ or

$\pi r^3 : 2\pi r^3 : 3\pi r^3 \left[\therefore r = h \because r^2 h = r^3\right]$

Or $1:2:3$

26.

Sol:

A cylindrical tub of radius $= 12cm$

Depth $= 20cm.$

Let $r\,cm$ be the radius of the ball

Then, volume of ball = volume of water raised

$= \frac{4}{3}\pi r^3 = H\left(12\right)^2 \times 6\cdot 75$

$\Rightarrow r^3 = \frac{144 \times 6\cdot 75 \times 3}{4}$

$\Rightarrow r^3 = 729$

$\Rightarrow r = 9cm$

Thus, radius of the ball $= 9cm.$

27.

Sol:

Given that,

The largest sphere is carved out of a cube of side $= 10\cdot 5cm$

Volume of the sphere = ?

We have,

Diameter of the largest sphere $= 10\cdot 5cm$

$2r = 10\cdot 5$

$\Rightarrow r = 5\cdot 25cm$

Volume of sphere $= \frac{4}{3} \times \frac{22}{7} \times 5\cdot 25^3 = \frac{4}{3} \times \frac{22}{7} \times 5\cdot 25 \times 5\cdot 25 \times 5\cdot 25$

$\Rightarrow$ Volume $= \frac{11 \times 441}{8} cm^3 = 606 \cdot 37 cm^3.$

28.

Sol:
Let r be the common radius thus,
$h =$ height of the cone = height of the cylinder = 2r
Let

$V_1 =$ Volume of sphere $= \frac{4}{3}\pi r^3$

$V_2 =$ Volume of cylinder $= \pi r^2 \times 2r = 2\pi r^3$

$V_3 =$ Volume of the cone $= \frac{1}{3}\pi r^2 \times 2v = \frac{2}{3}\pi r^3$

Now,

$V_1 : V_2 : V_3 = \frac{4}{3}\pi r^3 : 2\pi r^3 : \frac{2}{3}\pi r^3$

$= 4 : 6 : 2$

$= 2 : 3 : 1$

29.

Sol:
It is given that
Cube side = 4cm
Volume of cube $= (4cm)^3 = 64cm^3$
Diameter of the sphere = Length of the side of the cube = 4cm
$\therefore$ Radius of sphere = 2cm

Volume of the sphere $= \frac{4}{3}\pi r^3 = \frac{4}{3} \times \frac{22}{7} \times (2)^3 = 33 \cdot 52 cm^3$

$\therefore$ Volume of gap $=$ Volume of gap – Volume of sphere

$= 64cm^2 - 33 \cdot 52cm^3 = 30 \cdot 48cm^3.$

30.

Sol:
Given that,
Inner radius (r_1) of hemispherical tank $= 1m = r_1$

Thickness of hemispherical tank $= 1cm = 0 \cdot 01m$

Outer radius (r_2) of the hemispherical $= (1 + 0 \cdot 01m) = 1 \cdot 01m = r_2$

Volume of iron used to make the tank $= \frac{2}{3}\pi\left(r_2^3 - r_1^3\right)$

$= \frac{2}{3} \times \frac{22}{7}\left[(1 \cdot 01)^3 - 1^3\right]$

$= \frac{44}{21}[1 \cdot 030301 - 1]m^3$

$= 0 \cdot 06348 m^3$ (Approximately)

31.

Sol:

Given that,

Diameter of capsule $= 3 \cdot 5\,mm$

Radius $= \frac{3 \cdot 5}{2} = 1 \cdot 75 mm$

Volume of spherical capsule $= \frac{4}{3}\pi r^3$

$= \frac{4}{3} \times \frac{22}{7} \times (1 \cdot 75)^3\ mm^3$

$= 22 \cdot 458 mm^3$

$\therefore 22 \cdot 46\, mm^3$ of medicine is required.

32.

Sol:

Given that,

The diameter of the moon is approximately one fourth of the diameter of the earth.

Let diameter of earth bed. So radius $= \frac{d}{2}$

Then, diameter of moon $= \frac{d}{4}$, radius $= \frac{\frac{d}{2}}{4} = \frac{d}{8}$

Volume of moon $= \frac{4}{3}\pi r^3 = \frac{4}{3}\pi\left(\frac{d}{8}\right)^3 = \frac{4}{3} \times \frac{1}{512} 11 d^3$

Volume of earth $= \frac{4}{3}\pi r^3 = \frac{4}{3}\pi\left(\frac{d}{2}\right)^3 = \frac{1}{8} \times \frac{4}{3} 11 d^3$

$$\frac{Volume\ of\ \ moon}{Volume\ of\ \ earth}=\frac{\frac{1}{512}\times\frac{4}{3}\pi d^3}{\frac{1}{8}\times\frac{4}{3}\pi d^3}=\frac{1}{64}.$$

Thus, the volume of moon is $\frac{1}{64}$ of volume of earth.