21. Given that radius of conical tent

$r = 7$ m

and height $h = 10$ m

Let 'l' be slant height of conical tent

then W.K.T $l^2 = r^2 + h^2$

$= 7^2 + 10^2$

$= 49 + 100$

$= 149$

$l^2 = 149$

$\Rightarrow l = \sqrt{149} = 12.2\,m$

Now surface area of tent

$= \pi r l$

$= \frac{22}{7} \times 7 \times 12.2$

$= 268.4\,m^2$

Given that width of canvas = 2 m

Length of canvas used = $\frac{\text{Area}}{\text{Width}}$

$= \frac{268.4}{2}$

$= 134.2$ m

22. Given that the diameter of oil drum = 2m

$\Rightarrow 2r = 2$

$\Rightarrow r = 1$m

and height $h = 7$ m

Total surface Area of cylindrical drum = $2\pi r(h + r)$

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

$= 2 \times \frac{22}{7} \times 8$

$= \frac{352}{7}$

$= 50.28\,m^2$

Painting charges per $1m^2$ = Rs 3

Cost of painting of 10 drums

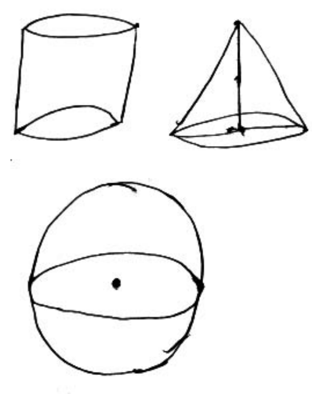
$= 10 \times 50.28 \times 3$

=Rs 1508.40

23. Let r be the common radius of a sphere, a cone and cylinder

Height of sphere = its diameter = 2r

Then, the height of the cone = height of cylinder = height of sphere



Let l be the slant height of cone = $\sqrt{r^2 + h^2}$

$= \sqrt{r^2 + (2r)^2}$

$= \sqrt{5}r$

S_1 = curved surface area of sphere = $4\pi r^2$

S_2 = curved surface area of cylinder, $2\pi rh = 2\pi r \times 2r$

$= 4\pi r^2$

S_3 = curved surface area of cone = $\pi r l$

$= \pi r \times \sqrt{5}r$

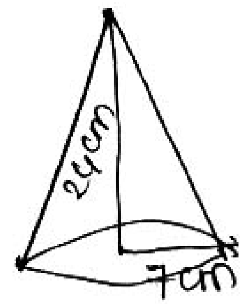
$= \sqrt{5}\pi r^2$

Ratio of curved surface area as

$\therefore S_1 : S_2 : S_3 = 4\pi r^2 : 4\pi r^2 : \sqrt{5}\pi r^2$

$= 4 : 4 : \sqrt{5}$

24. Given that Radius of Jocker cap (cone) r = 7 cm and height h = 24 cm



W.K.T $l = \sqrt{r^2 + h^2}$

$= \sqrt{49 + 576}$

$= \sqrt{625}$

$= 25$

Lateral surface of one cap = πrl

$= \frac{22}{7} \times 7 \times 25$

$= 550\, cm^2$

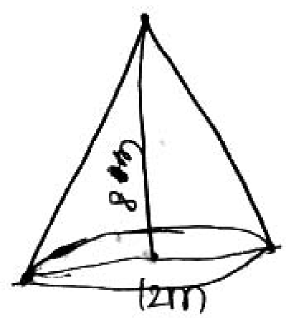
25. Diameter of Heap (conical) = 12 m

$2r = 12$

$r = 6m$

Height h = 8 m

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



$= \frac{1}{3} \times \frac{22}{7} \times 6^2 \times 8$

$= \frac{1}{3} \times \frac{22}{7} \times 36 \times 8$

$= \frac{2112}{7}$

$= 301.71 cm^3$

ii) let slant height = l cm

W.K.T $l^2 = r^2 + h^2$

$= 6^2 + 8^2$

$= 36 + 64$

$= 100$

$l^2 = 100 \Rightarrow l = \sqrt{100} \Rightarrow l = 10\, cm$

The canvas cloth is required to cover the heap = πrl

$= 3.14 \times 6 \times 10$

$= 188.40\, cm^2$

26. Radius of cone = $\frac{1}{2}$ edge of cube

$= \frac{1}{2} \times 7$

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

Height of cone = edge of cube = 7 cm

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

$= \frac{1}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 7$

$=\frac{1}{3}\times 22\times \frac{7}{2}\times \frac{7}{2}$

$=\frac{539}{6}$

$=89.833\,cm^3$

27. Given that radius of sphere r = 4.2 cm

Volume $v_1=\frac{4}{3}\pi r^3$

$=\frac{4}{3}\times \pi \times (4.2)^3$

$=\frac{4}{3}\times \pi \times 4.2\times 4.2\times 4.2$

$=4\pi \times 1.4\times 4.2\times 4.2\,cm^3$

also given radius of cylinder r = 6 cm

Let the height of cylinder = h cm

Volume of cylinder $v_2=\pi r^2 h$

$=\pi \times 6^2\times h$

$=\pi \times 6\times 6\times h\,cm^3$

From data $v_1=v_2$

$\Rightarrow 4\pi \times 1.4\times 4.2\times 4.2=\pi \times 6\times 6\times h$

$\Rightarrow 4\times 1.4\times 0.7\times 0.7=h$

$\Rightarrow 4\times 0.686=h$

$\Rightarrow 2.744=h$

$\therefore$ Height h = 2.744 cm

28. Given that Radii of 3 spheres be $r_1=6cm$ $r_2=8cm$ $r_3=10\,cm$

Volumes of spheres $v_1=\frac{4}{3}\pi r^3$

$=\frac{4}{3}\pi \times 6^3\;cm^3$

$v_2=\frac{4}{3}\pi \times 8^3\;cm^3$

$v_3=\frac{4}{3}\pi \times 10^3\;cm^3$

Total volume of 3 spheres $v^1=\frac{4}{3}\pi \times 6^3+\frac{4}{3}\pi \times 8^3+\frac{4}{3}\pi \times 10^3$

$=\frac{4}{3}\pi \left[6^3+8^3+10^3\right]$ ____________ (1)

Let radius of resulting sphere = r

Volume $v=\frac{4}{3}\pi r^3\;cm^3$ ________________ (2)

From data $v^1=r$ (1) = (2)

$=\frac{4}{3}\pi \left[6^3+8^3+10^3\right]=\frac{4}{3}\pi r^3$

$\Rightarrow 2^3\times 3^3+2^3\times 4^3+2^3\times 5^3=r^3$

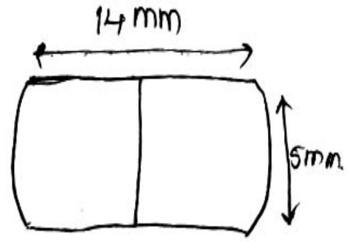
$\Rightarrow 2^3\left[3^3+4^3+5^3\right]=r^3$

$\Rightarrow 2^3\left[216\right]=r^3$

$\Rightarrow 2^3\times 6^3=r^3$

$\Rightarrow 12^3 = r^3$
$\Rightarrow r = 12\,cm$

29. Cylinder width of the capsule = 5 mm

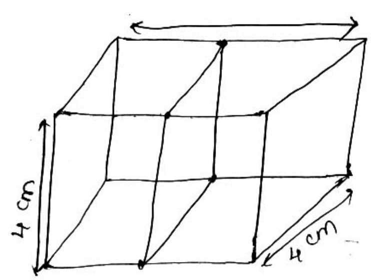


Radius of cylinder $r = \frac{5}{2} = 2.5\,mm$
Height of cylinder = 14 mm
Surface Area of cylinder $s_1 = 2\pi rh$
$= 2\pi \times 2.5 \times 14$
$= 70\pi\, mm^2$

Hemisphere
Radius of Hemisphere $r = \frac{5}{2} = 2.5\,mm$
Curved surface area of hemisphere $s_2 = 2\pi r^2$
$= 2\pi (2.5)^2$
$= 12.5\pi\, mm^2$
Surface Area of capsule = $s_1 + 2 \times s_2$
$= 70\pi + 2 \times 12.5\pi$
$= \pi(70 + 25)$
$= 95\pi$
$= 95 \times 3.14$
$= 298.3\,mm^2$

(OR)

Let side of a cube = a cm
Given that volume = 64 cm^3
$\Rightarrow a^3 = 4^3$
$\Rightarrow a = 4\,cm$
Length of cuboid *l* = 2a
$= 2 \times 4$
$= 8cm$
breadth b = a = 4 cm
height h = a = 4 cm
Total surface area of resulting cuboid = $2(lh + bh + lb)$

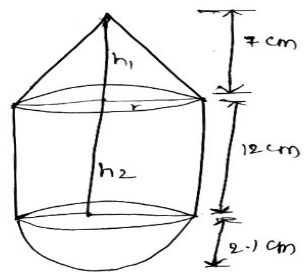


$= 2(2a \times a + a \times a + 2\,a \times a)$
$= 2(2a^2 + a^2 + 2a^2)$
$= 2 \times 5a^2$
$= 10a^2$
$= 10 \times 4^2$
$= 10 \times 16$
$= 160\,cm^2$

30. **<u>Hemisphere</u>**
Given common diameter = 4.2
$2r = 4.2$
$r = 2.1cm$
Let height of conical portion h_1 = 7 cm
Height of cylindrical portion h_2 = 12 cm
Hemisphere

Volume of hemisphere $v_1 = \frac{4}{3}\pi r^3$

$$= \frac{2}{3}\pi \times (2.1)^3\ cm^3$$



Cylinder

Volume of cylinder $v_2 = \pi r^2 h_2$

$$= \pi \times (2.1)^2 \times 12$$

$$= 12\pi (2.1)^2\ cm^3$$

Cone

Volume of cone $v_3 = \frac{1}{3}\pi r^2 h_1$

$$= \frac{1}{3}\pi \times (2.1)^2 \times 7\ cm^3$$

Volume of the solid toy = $v_1 + v_2 + v_3$

$$= \frac{2}{3}\pi (2.1)^3 + 12\pi (2.1)^2 + \frac{1}{3}\pi (2.1)^2 \times 7$$

$$= (2.1)^2\ \pi \left[\frac{2}{3} \times 2.1 + 12 + \frac{1}{3} \times 7\right]$$

$$= 2.1 \times 2.1 \times \frac{22}{7}[1.4 + 2 + 2.33]$$

$$= 0.3 \times 2.1 \times 22[17.13]$$

$$= 13.86 \times 15.73$$

$$= 218.0178\, cm^3$$

(OR)

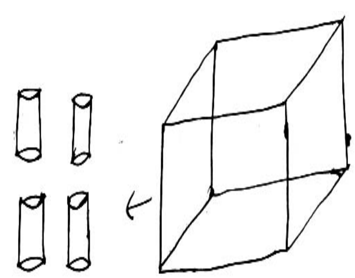
Volume of Wax in the rectangular solid (cuboid) $v_1 = lbh$

$$= 66 \times 42 \times 21 cm^3$$

Radius of cylinder candle $r = \frac{4.2}{2} = 2.1 cm$

Height of cylinder candle h = 2.8 cm

Volume of candle = $\pi r^2 h$



$$= \frac{22}{7} \times (2.1)^2 \times 2.8$$

$$= \frac{22}{7} \times 2.1 \times 2.1 \times 2.8$$

$$= 22 \times 2.1 \times 2.1 \times 2.1 \times 0.4\, cm^3$$

Let number of candles = n

Volume of n candles $v_2 = n \times 22 \times 2.1 \times 2.1 \times 0.4\, cm^3$

From data $v_1 = v_2$

$$\Rightarrow 66 \times 42 \times 21 = n \times 22 \times \frac{21}{10} \times \frac{21}{10} \times \frac{4}{10}$$

$$\Rightarrow 6 = n \times \frac{4^2}{1000}$$

$$\Rightarrow 2n = 3000$$

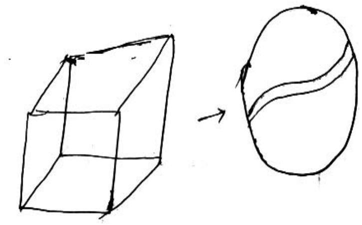
$$n = 1500$$

31. Cube

Given that side of lead cube, a=44 cm

Volume of lead cube $v_1 = a^3$

$$= (44)^3\, cm^3$$



<u>Spherical ball</u> (sphere)

Diameter of spherical ball = 4 cm

$$2r = 4$$
$$r = 2\,cm$$

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

$$= \frac{4}{3} \times \frac{22}{7} \times 2^3$$
$$= \frac{4}{3} \times \frac{22}{7} \times 8\,cm^3$$

Let number of balls = n

Volume of n balls $v_2 = n \times \frac{4}{3} \times \frac{22}{7} \times 8\,cm^3$

From data $v_1 = v_2$

$\Rightarrow (44)^3 = n \times \frac{4}{3} \times \frac{22}{7} \times 8$

$\Rightarrow 44 \times 44 \times 44 = n \times \frac{4}{3} \times \frac{22}{7} \times 8$

$\Rightarrow 121 = n \times \frac{1}{3} \times \frac{1}{7}$

$\Rightarrow n = 21 \times 121$

$\Rightarrow n = 2541$

$\therefore$ no.of spherical balls can be made = 2541

(OR)

<u>Cylinder</u>

Given that diameter of well (cylinder) = 7 m

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

Height h = 20 m

Volume of well (cylinder) $v_1 = \pi r^2 h$

$$= \frac{22}{7} \times \left(\frac{7}{2}\right)^2 \times 20\, m^3$$

<u>Cuboid</u> (plat form)

length l = 22 m

breadth b = 14 m

let height = hm

Volume of platform (cuboid) $v_2 = lbh$

$$= 22 \times 14 \times hm^3$$

From data $v_1 = v_2$

$\Rightarrow \frac{22}{7} \times \left(\frac{7}{2}\right)^2 \times 20 = 22 \times 14 \times h$

$\Rightarrow \frac{1}{7} \times \frac{7}{2} \times \frac{7}{2} \times 20 = 14 \times h$

$\Rightarrow 5 = 2h$

$\Rightarrow h = \frac{5}{2}$

$\Rightarrow h = 2.5m$

32. **Cylinder**

Diameter of well (cylinder) = 14 m

$\Rightarrow 2r = 14$

$\Rightarrow r = 7m$

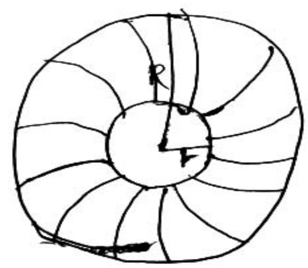
Height h = 15m

Volume of well $v_1 = \pi r^2 h$

$= \frac{22}{7} \times (7)^2 \times 15 m^3$

$= 22 \times 7 \times 15 m^3$

Embank



Width of Embank w = 7m

Inner radius r = radius of well

= 7m

Outer radius of Embank $R = r + w$

$= 7 + 7$

$= 14m$

Area of base of Embank = $\pi R^2 - \pi r^2$

$= \pi\left(R^2 - r^2\right)$

$= \pi\left[(14)^2 - (7)^2\right]$

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

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

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

$= 22 \times 7 \times 3 m^2$

Let height of Embank = h

Volume of Embank v_2 = Area of base × height

$= 22 \times 7 \times 3 \times h m^3$

From data $v_1 = v_2$

$\Rightarrow 22 \times 7 \times 15 = 22 \times 7 \times 3 \times h$

$\Rightarrow 5 = h$

$\therefore$ height h = 5m

(OR)

Cylinder

Given that the diameters of silver coin (cylinder) = 1.75 cm

$\Rightarrow 2r = 1.75$

$\Rightarrow r = \frac{1.75}{2} cm$

Thickness (height) h = 2 mm

$= \frac{2}{10} cm$

Volume of silver coin = $\pi r^2 h$

$$= \pi\left(\frac{1.45}{2}\right)^2 \times \frac{2}{10} cm^3$$

Let number of silver coins = n

Volume of n silver coins = $n \times \pi\left(\frac{1.75}{2}\right)^2 \times \frac{2}{10} cm^3$

Cuboid

length l = 5.5 cm

breadth b = 10 cm

height h = 3.5 cm

Volume of cuboid $v_2 = lbh$

$= 5.5 \times 10 \times 3.5 cm^3$

From data

$v_1 = v_2$

$n \times \pi \times \left(\frac{1.75}{2}\right)^2 \times \frac{2}{10} = 5.5 \times 10 \times 3.5 cm^3$

$\Rightarrow n \times \frac{22}{7} \times \frac{1.75}{2} \times \frac{1.75}{2} \times \frac{2}{10} = 5.5 \times 10 \times 3.5$

$\Rightarrow n \times \frac{22}{100} \times \frac{1}{10} = 10$

$\Rightarrow n = 40 \times 10$

$\Rightarrow n = 400$

$\therefore$ number of silver coins = 400

Sphere :

Given that diameter of sphere = 28 cm

$$\Rightarrow 2r = 28$$

$$\Rightarrow r = 14 cm$$

Volume of sphere $v_1 = \frac{4}{3}\pi r^3 \Rightarrow \frac{4}{3}\pi(14)^3 m^3$

Cone

Diameter of cone = $4\frac{2}{3} cm$

$\Rightarrow 2r = \frac{14}{3}$

$\Rightarrow r = \frac{7}{3} cm$

Height h = 3 cm

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

$$= \frac{1}{3}\pi\left(\frac{7}{3}\right)^2 \times 3m^3$$

Let number of cones = n

Volume of 'n' cones $v_2 = n\times\frac{1}{3}\times\pi\times\left(\frac{7}{3}\right)^2\times 3m^3$

From data $v_1 = v_2$

$\Rightarrow \frac{4}{3}\pi(14)^3 = n\times\frac{1}{3}\times\pi\times\left(\frac{7}{3}\right)^2\times 3$

$\Rightarrow 4\times 14\times 14\times 14 = n\times\frac{7}{3}\times\frac{7}{3}\times 3$

$\Rightarrow 16\times 14 = \frac{n}{3}$

$\Rightarrow n = 3\times 16\times 14$

$= 672$

$\therefore$ number of cones formed = 672

(OR)

Hemisphere

Given that radius of hemispherical bowl r = 15 cm

Volume $v_1 = \frac{2}{3}\pi r^3$

$= \frac{2}{3}\times\pi\times(15)^3\ cm^3$

Cylinderical bottle :

Diameter = 5 cm

$\Rightarrow 2r = 5cm$

$\Rightarrow r = \frac{5}{2}cm$

height h = 6 cm

volume of a bottle = $\pi r^2 h$

$$= \pi\times\left(\frac{5}{2}\right)^2\times 6cm^3$$

Let number of bottles required = n

Volume of n bottles $v_2 = n\times\pi\times\left(\frac{5}{2}\right)^2\times 6$

From data $v_1 = v_2$

$\frac{2}{3}\times\pi\times(15)^3 = n\times\pi\times\left(\frac{5}{2}\right)^2\times 6cm^3$

$\Rightarrow \frac{22}{3}\times 15\times 15\times 15 = n\times\frac{5}{2}\times\frac{5}{2}\times 6$

$\Rightarrow 2\times 15 = \frac{n}{2}$

$\Rightarrow n = 2\times 2\times 15$

$n = 60$

$\therefore$ number of bottles required = 60