
VOLUME AND SURFACE AREA OF SOLIDS - CHAPTER15

EXERCISE - 15A

Answer1.

(i) Given, $l = 12\text{cm}$, $b = 8\text{cm}$, $h = 4.5\text{cm}$.

Volume of cuboid = $(l \times b \times h)$ cubic units

$$= 12\text{cm} \times 8\text{cm} \times 4.5\text{cm}$$

$$= 432\text{cm}^3$$

Lateral surface area of cuboid

$$= [2(l + b) \times h] \text{ surface unit}$$

$$= [2(12+8) \times 4.5] \text{ cm}^2$$

$$= [2 \times 20 \times 4.5] \text{ cm}^2$$

$$= 180 \text{ cm}^2$$

Total surface area of cuboid

$$= 2(lb + bh + hl) \text{ square units}$$

$$= 2(12\text{cm} \times 8\text{cm} + 8\text{cm} \times 4.5\text{cm} + 4.5\text{cm} \times 12\text{cm})$$

$$= 2(96\text{cm}^2 + 36\text{cm}^2 + 54\text{cm}^2)$$

$$= 2 \times 186\text{cm}^2$$

$$= 372 \text{ cm}^2$$

(ii) Given, $l = 26\text{m}$, $b = 14\text{m}$, $h = 6.5\text{m}$

Volume of cuboid = $(l \times b \times h)$ cubic unit

$$= 26\text{m} \times 14\text{m} \times 6.5\text{m}$$

$$= 2366\text{m}^3$$

Lateral surface Area of cuboid

$$\begin{aligned} &= [2(l + b) \times h] \text{ surface unit} \\ &= [2(26+14) \times 6.5] \text{ m}^2 \\ &= [2 \times 40 \times 6.5] \text{ m}^2 \\ &= 520 \text{ m}^2. \end{aligned}$$

Total surface Area of cuboid

$$\begin{aligned} &= 2(lb + bh + hl) \text{ square units} \\ &= 2(26 \times 14 + 14 \times 6.5 + 6.5 \times 26) \\ &= 2(364+91+169) \\ &= 2 \times 624 \\ &= 1248\text{m}^2. \end{aligned}$$

(iii)

Given, $l = 15\text{m}$, $b = 6\text{m}$,

$h = 5\text{dm}$

$h = 5 \times 1/10\text{m}$ [1dm = 1/10m]

$h = 0.5\text{m}$

Volume of cuboid = (l×b×h)cubic unit

$$\begin{aligned} &= (15 \times 6 \times 0.5) \text{ m}^3 \\ &= 45\text{m}^3 \end{aligned}$$

Lateral surface Area of cuboid

$$\begin{aligned} &= [2(l + b) \times h] \text{ square unit} \\ &= [2(15+6) \times 0.5] \text{ m}^2 \\ &= [2 \times 21 \times 0.5] \text{ m}^2 \\ &= 21 \text{ m}^2. \end{aligned}$$

Total surface Area of cuboid

$$\begin{aligned} &= 2(lb + bh + hl) \text{ square units} \\ &= 2(15 \times 6 + 6 \times 0.5 + 15 \times 0.5) \text{ m}^2 \\ &= 2(90 + 3 + 7.5) \text{ m}^2 \\ &= 2 \times 100.5 \text{ m}^2 \\ &= 201 \text{ m}^2. \end{aligned}$$

(iv) Given,

$$l = 24 \text{ m}$$

$$b = 25 \text{ cm} = 0.25 \text{ m} [\because 1 \text{ cm} = 1/100 \text{ m}]$$

$$h = 6 \text{ m},$$

Volume of cuboid = $(l \times b \times h)$ cubic unit

$$= (24 \times 0.25 \times 6) \text{ m}^3$$

$$= 36 \text{ m}^3$$

Lateral surface area of cuboid

$$= [2(l + b) \times h] \text{ square unit}$$

$$= [2(24 + 0.25) \times 6] \text{ m}^2$$

$$= [2 \times 24.25 \times 6]$$

$$= 291 \text{ m}^2.$$

Total surface area of cuboid

$$= 2(lb + bh + hl) \text{ square units}$$

$$= 2(24 \times 0.25 + 0.25 \times 6 + 24 \times 6) \text{ m}^2$$

$$= 2(6 + 1.5 + 144) \text{ m}^2$$

$$= 2 \times 151.2$$

$$= 303 \text{ m}^2$$

Answer 2. Given,

A match box measure = $4\text{cm} \times 2.5\text{cm} \times 1.5\text{cm}$

$$\begin{aligned}\text{Volume of 1 match box} &= 4\text{cm} \times 2.5\text{cm} \times 1.5\text{cm} \\ &= 15\text{cm}^3\end{aligned}$$

$$\therefore \text{volume of one matchbox} = 15\text{cm}^3$$

$$\begin{aligned}\therefore \text{volume of 12 matchbox} &= 15 \times 12 \text{ cm}^3 \\ &= 180 \text{ cm}^3.\end{aligned}$$

Answer 3. Given,

Cuboid water tank

$$\text{Length (l)} = 6\text{m}$$

$$\text{Width (b)} = 5\text{m}$$

$$\text{Height (h)} = 4.5\text{m}$$

$$\text{Volume of cuboid water tank} = (l \times b \times h) = (6 \times 5 \times 4.5) \text{ m}^3 = 135 \text{ m}^3$$

$$\text{Given, } 1\text{m}^3 = 1000\text{litres}$$

$$\begin{aligned}\text{So, } 135\text{m}^3 &= 135 \times 1000\text{litres} \\ &= 135000 \text{ litre}\end{aligned}$$

$$\text{Litre of water hold by tank} = 135000 \text{ litre.}$$

Answer 4. Given,

Capacity of a cuboid tank = 50000 litre

$$\text{Length (l)} = 10\text{m}$$

$$\text{Depth (h)} = 2.5\text{m}$$

$$\text{Width (b)} = ?$$

$$\text{Volume of tank} = \text{length} \times \text{depth} \times \text{width}$$

$$\text{Capacity} = 50000 \text{ litre}$$

$$\therefore 1000 \text{ litre} = 1\text{m}^3 \text{ (given)}$$

$$\therefore 1 \text{ litre} = \frac{1}{1000}\text{m}^3$$

$$\therefore 50000 \text{ litre} = \frac{50000}{1000} \text{m}^3 = 50 \text{m}^3$$

$$50 = 10 \times b \times 2.5$$

$$50 = 25 \times b$$

$$b = \frac{50}{25} = 2 \text{m}$$

width of tank = 2m

Answer 5. Given,

Go down measures = 40m × 25m × 15m

Each wooden crates measures = 1.5m × 1.25m × 0.5m

$$\begin{aligned} \text{Maximum no. of wooden crates} &= \frac{\text{volume of godown}}{\text{volume of one wooden crates}} \\ &= \frac{40 \text{m} \times 25 \text{m} \times 15 \text{m}}{1.5 \text{m} \times 1.25 \text{m} \times 0.5 \text{m}} \\ &= \frac{15000 \text{m}^3}{0.9375 \text{m}^3} \end{aligned}$$

Maximum no. of wooden crates = 16000.

Answer 6. Given,

Dimensions of plank = 5m × 25m × 10cm (5m × 0.25m × 0.1m)

Length of pit(l) = 20m

Width of pit(b) = 6m

Deep of pit(h) = 80cm = 0.8m

$$\text{Total no. of planks stored in pit} = \frac{\text{volume of pit}}{\text{volume of one plank}}$$

$$\text{Volume of pit} = l \times b \times h$$

$$= 20 \times 6 \times 0.8 = 96\text{m}^3$$

$$\text{Volume of plank} = l \times b \times h$$

$$= 5 \times 0.25 \times 0.1 = 0.125\text{m}^3$$

$$\text{Total no. of plank stored in pit} = 96\text{m}^3 / 0.125\text{m}^3$$

$$= 768.$$

Answer 7. Given,

$$\text{Length of wall}(l) = 8\text{m} = 800\text{cm} \{ \because 1\text{m} = 100\text{cm} \}$$

$$\text{Height of wall}(h) = 6\text{m} = 600\text{cm}$$

$$\text{Thick of wall}(b) = 22.5\text{cm}$$

$$\text{Volume of wall} = l \times b \times h$$

$$= 800 \times 600 \times 22.5$$

$$= 10800000\text{cm}^3$$

$$\text{Dimension of each brick} = 25\text{cm} \times 11.25\text{cm} \times 6\text{cm}$$

$$\text{Volume of each brick} = l \times b \times h$$

$$= 1687.5\text{cm}^3$$

Let total required bricks to construct wall = x

$$x = \frac{\text{volume of wall}}{\text{volume of one brick}}$$

$$= \frac{10800000}{1687.5}$$

$$x = 6400$$

Answer 8. Given,

$$\text{Length of cistern} = 8\text{m}(l)$$

$$\text{Breadth of cistern} = 6\text{m}(b)$$

$$\text{Depth of cistern} = 2.5\text{m}$$

Let, capacity of closed rectangular cistern = x

$$x = l \times b \times h$$

$$= 8 \times 6 \times 2.5$$

$$= 120\text{m}^3$$

Area of the iron sheet require to make the cistern = surface area of cistern
surface area of cistern = $2(lb + bh + hl)$

$$= 2(8 \times 6 + 6 \times 2.5 + 2.5 \times 8)$$

$$= 2(48 + 15.0 + 20)$$

$$= 2 \times 83$$

$$= 166 \text{ m}^2$$

Answer 9. Given,

$$\text{Room dimensions} = (9\text{m} \times 8\text{m} \times 6.5\text{m})$$

Room has one door, two windows

$$\text{dimension of door} = 2\text{m} \times 1.5\text{m}$$

$$\text{dimensions of windows} = 1.5\text{m} \times 1\text{m}$$

cost of white washing the walls = 25 per sq. meter

area of wall = lateral surface area of wall

$$\text{lateral surface area of wall} = [2(l+b) \times h]$$

$$\text{let } l = 9, b = 8, h = 6.5(\text{given})$$

$$= [2(9+8) \times 6.5]\text{m}^2$$

$$= 2 \times 17 \times 6.5$$

$$\text{Area of wall} = 221\text{m}^2$$

Let area of wall which will be white washing = x

x = area of wall - [area of door + area of windows]

area of door = $2 \times 1.5 = 3\text{m}^2$

area of windows = $1.5 \times 1 = 1.5\text{m}^2$

but there are two windows then

$$= 1.5 \times 2$$

$$= 3\text{m}^2$$

$$x = 221 - (3+3) = 215\text{m}^2$$

\therefore per square meter cost = 25

$$\begin{aligned}\therefore 216 \text{ square meter cost} &= 25 \times 215 \\ &= 5375\end{aligned}$$

Answer 10. Given,

Length of the wall = 15m

Width of wall = 30cm = 0.3m

Height of wall = 4m

Volume of wall = lxbxh

$$= 15 \times 3 \times 4 = 180\text{m}^3$$

Brick dimension = 22cm \times 12.5cm \times 7.5cm

Volume of brick = 2062.5 cm³

\rightarrow 1/12 of the total volume of the wall consist mortar

So, volume of mortar = $1/12 \times 18 = 1.5\text{m}^3$

Volume of wall which is made of brick = $18.15 = 16.5\text{m}^3$

Let total brick require = x

$$x = \frac{\text{volume of wall}}{\text{volume of brick}}$$

volume of brick = 2062.5cm³

$$= \frac{2062.5}{100 \times 100 \times 100} \text{m}^3$$

$$x = 16.5 / \frac{2062.5}{100 \times 100 \times 100} = 8000$$

Answer 11. Given,

$$\text{External dimension of box} = 36\text{cm} \times 25 \times 16.5\text{cm}$$

$$\begin{aligned} \text{Total dimension of box} &= (36-3) \times (25-3) \times (16.5-1.5) \\ &= 33 \times 22 \times 15 \end{aligned}$$

Because box is 1.5cm throughout

$$\begin{aligned} \text{Volume of external box} &= 36 \times 25 \times 16.5 \\ &= 14850 \text{cm}^3 \end{aligned}$$

$$\begin{aligned} \text{Volume of internal box} &= 33 \times 22 \times 15 \\ &= 10890 \text{cm}^3 \end{aligned}$$

$$\begin{aligned} \text{Volume of iron in box} &= 14850 - 10890 \\ &= 3960 \text{cm}^3 \end{aligned}$$

$$\therefore 1 \text{ cm}^3 \text{ of iron weighs} = 15 \text{ gm}$$

$$\therefore 3960 \text{ cm}^3 \text{ of iron weighs is} = 15 \times 3960$$

$$= 59400 \text{ gm}$$

$$\therefore 1 \text{ kg} = 1000 \text{ gm}$$

$$\therefore 59400 \text{ gm} = 59400 / 1000 = 59.4 \text{ kg}$$

Answer 12. Given

$$\text{Sheet metal costs} = 6480$$

$$\text{Per square meter cost} = 120$$

$$\text{Area of sheet metal} = \frac{\text{total cost}}{\text{cost per square meter}}$$

$$= \frac{6480}{120} \text{ sqmeter}$$

$$\text{Area of sheet metal} = 54\text{m}^2$$

$$\text{Length}(l) = 5\text{m}$$

$$\text{Breadth}(b) = 3\text{m}$$

$$\text{Height}(h) = ?$$

$$\text{Area of sheet metal} = 2(lb + bh + hl)$$

$$54\text{m}^2 = 2(5 \times 3 + 3 \times h + 5 \times h)$$

$$54 = 2(15 + 3h + 5h)$$

$$54 = 2(15 + 8h)$$

$$2 \times 8h = 24$$

$$h = \frac{24}{16} = 1.5\text{m}$$

Answer 13. Given,

$$\text{Volume of cuboid} = 1596\text{m}^2$$

$$\text{Length} = 16\text{m}$$

$$\text{Ratio of breadth \& height} = 3:2$$

Let

$$\text{Breadth} = b$$

$$\text{Height} = h$$

$$\Rightarrow \frac{b}{h} = \frac{3}{2}$$

$$b = \frac{3}{2}h$$

$$\text{volume} = l \times b \times h$$

putting the values

$$\Rightarrow 1536 = 16 \times \frac{3}{2} h \times h$$

$$\Rightarrow 1536 = 8 \times 3 \times h^2$$

$$\Rightarrow h^2 = \frac{1536}{8 \times 3} = 64$$

$$\Rightarrow h = \sqrt{64}$$

$$\Rightarrow h = 8\text{m}$$

$$\Rightarrow b = 3/2h$$

$$b = 1.5 \times 8$$

$$b = 12\text{m}$$

$$\text{breadth} = 12\text{m}$$

$$\text{height} = 8\text{m}$$

Answer 14. Given,

Dining hall of dimension = $20\text{m} \times 16\text{m} \times 4.5\text{m}$

Volume of dining hall = 1440m^3

One person require 5m^3 of air

$$\begin{aligned} \text{Total no. of person accommodate in hall} &= \frac{\text{volume of hall}}{\text{volume of a person}} \\ &= \frac{1440}{5} = 288 \text{ persons} \end{aligned}$$

Answer 15. Given,

Length of classroom (l) = 10m

Width of classroom (b) = 6.4m

Height of classroom (h) = 5m

$$\begin{aligned}\text{Area of classroom floor} &= 10 \times 6.4 \\ &= 64\text{m}^2\end{aligned}$$

One student require area = 1.6m^2

$$\text{No. of students in classroom} = \frac{64}{1.6} = 40$$

Volume of air = volume of classroom

$$\begin{aligned}&= l \times b \times h \\ &= 10 \times 6.4 \times 5 \\ &= 320\text{m}^3\end{aligned}$$

Require cubic meters of air for each student

$$\begin{aligned}&= \frac{\text{volume of air}}{\text{total students}} \\ &= \frac{320}{40} = 8\text{m}^3\end{aligned}$$

Answer 16. Given,

Surface area of cuboid = 758cm^2

Length of cuboid = 14cm

Breadth of cuboid = 11cm

$$\text{Surface area of cuboid} = 2(lb + bh + hl)$$

Let h be the height of cuboid

$$\Rightarrow 758 = 2(14 \times 11 + 11 \times h + 14 \times h)$$

$$\Rightarrow 758 = 2(154 + 25h)$$

$$\Rightarrow 154 + 25h = 379$$

$$\Rightarrow 25h = 379 - 154$$

$$\Rightarrow 25h = 225$$

$$\Rightarrow h = \frac{225}{25} = 9 \text{ cm}$$

Height of cuboid is 9cm

Answer 17. Given,

Height of rain falls (h) = 5cm

Area of ground = 2 hectares

\therefore 1 hectares = 10000m²

\therefore 2 hectares = 20000m²

Volume of water falls on ground = *area* \times *depth*

$$\Rightarrow 2 \times 10000 \times \frac{5}{100} = 2 \times 100 \times 5 = 1000$$

Volume of water = 1000m³

Answer 18. Given,

Edge measure of cube (a) = 9m

Volume of cube = a³

Volume of cube = 9 \times 9 \times 9 = 729m³

Lateral surface area of cube = 4a²

$$\Rightarrow 4 \times 9 \times 9$$

$$\Rightarrow 4 \times 81$$

$$\Rightarrow 324\text{m}^2$$

$$\text{Total surface area of cube} = 6a^2$$

$$= 4 \times 9 \times 9$$

$$\Rightarrow 6 \times 81 = 486\text{m}^2$$

$$\text{A diagonal of a cube} = \sqrt{3} a$$

$$= \sqrt{3} \times 9$$

$$= 1.79 \times 9 = 15.57\text{m}.$$

Answer 19. Given,

$$\text{Total surface area of cube} = 1176\text{cm}^2$$

$$\text{Total surface area of cube} = 6a^2$$

$$6a^2 = 1176$$

$$a^2 = \frac{1176}{6} = 196$$

$$\Rightarrow a = \sqrt{196} = 14$$

$$a = 14\text{cm}$$

$$\text{volume of cube} = a^3$$

$$= 14 \times 14 \times 14$$

$$= 2744\text{cm}^3$$

Answer 20. Given,

$$\text{Lateral surface area of cube} = 900\text{cm}^2$$

$$\text{Lateral surface area of cube} = 4a^2$$

$$\Rightarrow 4a^2 = 900$$

$$\Rightarrow a^2 = \frac{900}{4} = 225$$

$$\Rightarrow a = \sqrt{225} = 15\text{cm}$$

volume of cube = a^3

$$\Rightarrow 15 \times 15 \times 15$$

$$\Rightarrow 3375\text{cm}^3$$

Answer 21. Given,

Volume of cube = 512 cm^3

$$a^3 = 512$$

$$a = 8\text{ cm}$$

surface area of cube = $6a^2$

$$= 6 \times 8 \times 8$$

$$= 6 \times 64$$

$$= 384\text{cm}^2$$

Answer 22. Given,

Size of cube = $3\text{cm} \times 4\text{cm} \times 5\text{cm}$

Volume of cube which is form by these three = $(3^3 \times 4^3 \times 5^3)\text{cm}^3$

$$= 27 \times 64 \times 125$$

$$= 216\text{cm}^3$$

Let side of new cube = a

$$\text{volume} = a^3$$

$$216 = a^3$$

$$a = \sqrt[3]{216} = 6\text{cm}$$

$$\text{lateral surface area of new cube} = 4a^2$$

$$= 4 \times 6 \times 6$$

$$= 144\text{cm}^2$$

Answer 23. Given,

Longest side in a cuboid = diagonal of cuboid

$$\text{Diagonal of cuboid} = \sqrt{l^2 + b^2 + h^2}$$

$$\text{Given, } l=10, b=10, h=5$$

$$\text{Length of longest pole in room} = \sqrt{100 + 100 + 25}$$

$$= \sqrt{225}$$

$$= 15 \text{ m}$$

Answer 24. Given,

$$\Rightarrow l + b + h = 19\text{cm} \dots\dots\dots(1)$$

$$\text{length of diagonal} = 11\text{cm}$$

$$\text{Diagonal of cuboid} = \sqrt{l^2 + b^2 + h^2}$$

$$\sqrt{l^2 + b^2 + h^2} = 11$$

$$l^2 + b^2 + h^2 = 121 \dots\dots\dots(2)$$

do square of equation of (1)

$$\Rightarrow (l + b + h)^2 = (19)^2$$

$$l^2 + b^2 + h^2 + 2(lb + bh + hl) = 361 \text{ ----- (3)}$$

put the values in equation (3)

$$\Rightarrow 121 + 2(lb + bh + hl) = 361$$

$$\Rightarrow 2(lb + bh + hl) = 361 - 121$$

$$\Rightarrow 2(lb + bh + hl) = 240$$

Surface area of cuboid = 240cm^2

Answer 25. Given,

Let edge of cube = a

Surface area of cube (a) = $6a^2$

edge is increased by 50% so,

$$\text{new edge } a' = a + \frac{a \times 50}{100}$$

$$\Rightarrow a + \frac{a}{2} = \frac{3a}{2}$$

Surface area of new cube = $6 \times a'^2$

$$a' = 6 \times \left(\frac{3a}{2}\right)^2$$

$$a' = \frac{27}{2} a^2$$

percentage increase in surface are = $\left(\frac{a' - a}{a}\right) \times 100$

$$= \frac{\left(\frac{27}{2}\right)a^2 - 6 \times a \times a}{6 \times a \times a} \times 100$$

$$= \frac{27a^2 - 12a^2}{6 \times a \times a} \times 100$$

$$= 125\%$$

Answer 26.

Volume of cuboid = V

Dimension of cuboid = a, b, c

Surface area = S

$$V = abc, S = 2(ab + bc + ca)$$

To be proven

$$\frac{1}{v} = \frac{2}{s} \left(\frac{1}{a} \times \frac{1}{b} \times \frac{1}{c} \right)$$

$$\text{RHS} = \frac{2}{s} \left(\frac{1}{a} \times \frac{1}{b} \times \frac{1}{c} \right)$$

$$= \frac{2}{2(ab+bc+ca)} \times \left(\frac{1}{a} \times \frac{1}{b} \times \frac{1}{c} \right)$$

$$= \frac{bc+ab+ca}{(ab+bc+ca)abc}$$

$$= \frac{1}{abc}$$

$$= \frac{1}{v} \text{ LHS}$$

Answer 27 Given, canal dimension 30 dm wide and 12 dm deep, velocity 20km/hr.

Distance covered by in 30 min = velocity of water \times time

$$= \left(20000 \times \frac{30}{60} \right) m = 10000m$$

$$\text{Volume of water flow in 30 min} = (l \times b \times h) = \left(10000 \times \frac{30}{10} \times \frac{12}{10} \right) m^3 = 36000m^3$$

Let the area irrigated be $x m^2$

$$\text{Hence, } x \times \frac{9}{100} = 36000$$

$$\Rightarrow x = \left(36000 \times \frac{100}{9} \right) = 400000 m^2$$

Answer 28. dimension of cuboid = $9\text{m} \times 8\text{m} \times 2\text{m}$

$$\text{Volume} = 144\text{m}^3$$

Edge of cube = a^3

$$= (2)^3$$

$$= 8\text{m}^3$$

$$\text{Total cube} = \frac{\text{volume of cuboid}}{\text{volume of one cube}}$$

$$= \frac{144}{8} = 18 \text{ Cubes}$$



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EXERCISE – 15B

Answer 1:

Given :

$$\text{diameter} = 28 \text{ cm}$$

$$\text{so, radius (r)} = 14 \text{ cm} \quad \left(r = \frac{d}{2}\right)$$

$$\text{height (h)} = 40 \text{ cm}$$

Find

(i) Curved surface area of cylinder = ?

$$\text{Curved Surface area of cylinder} = 2\pi rh \text{ sq. Unit}$$

$$\begin{aligned} &= 2 \times \left(\frac{22}{7}\right) \times 14 \times 40 \\ &= 160 \times 22 \text{ cm}^2 \\ &= 3520 \text{ cm}^2 \end{aligned}$$

$$\text{(ii) Total Surface area of cylinder} = \{2\pi r(r+h)\} \text{ sq. Unit}$$

$$\begin{aligned} &= 2 \times \left(\frac{22}{7}\right) \times 14 \times (14 + 40) \\ &= 88 \times 54 \text{ cm}^2 \\ &= 4752 \text{ cm}^2 \end{aligned}$$

$$\text{(iii) Volume of cylinder} = \pi r^2 h \text{ cubic Unit}$$

$$\begin{aligned} &= \left(\frac{22}{7}\right) \times 14^2 \times 40 \\ &= 44 \times 560 \text{ cm}^3 \\ &= 24640 \text{ cm}^3 \end{aligned}$$

Answer 2: Given :

$$\text{diameter of bowl (d)} = 7 \text{ cm}$$

$$\text{so, radius (r)} = 3.5 \text{ cm} \quad \left(r = \frac{d}{2}\right)$$

$$\text{height (h) of bowl} = 4 \text{ cm}$$

Find

Amount of Soup in bowl = ?

Capacity of bowl = volume of bowl = Soup for 1 patient

$$= \pi r^2 h \text{ cubic Unit}$$

$$= \left(\frac{22}{7}\right) \times (3.5)^2 \times 4 \text{ cm}^3$$

$$= 154 \text{ cm}^3$$

$$= 0.154 \text{ litre} \quad (1 \text{ cm}^3 = 0.001 \text{ litre})$$

so, for 250 patient = $250 \times \text{Soup for 1 patient}$

$$= 250 \times 0.154 \text{ litre}$$

$$= 38.5 \text{ litre}$$

Answer 3:

Given :

$$\text{Radius of pillar (r)} = 20 \text{ cm} = 0.2 \text{ m} \quad (1 \text{ cm} = .1 \text{ m})$$

$$\text{Height (h)} = 10 \text{ m}$$

Concrete required for one pillar = Volume of pillar

$$= \pi r^2 h \text{ cubic Unit}$$

$$= \left(\frac{22}{7}\right) \times (0.2)^2 \times 10 \text{ m}^3$$

$$= 1.256 \text{ m}^3$$

so, Concrete required for 14 pillars = $14 \times \text{Concrete required for one pillar}$

$$= 14 \times 1.256\text{m}^3$$

$$= 17.6 \text{ m}^3$$

Answer 4:

(i)

Given: length (l) = 5 cm

breadth (b) = 4 cm

height (h) = 15 cm

Capacity of tin with rectangular base = Volume of Tin

$$= l \times b \times h \text{ cubic Unit}$$

$$= 5 \times 4 \times 15\text{cm}^3$$

$$= 300 \text{ cm}^3$$

(ii) Given:

dimeter (d) = 7 cm

so, radius (r) = 3.5 cm

height (h) = 10 cm

Capacity of plastic cylinder = volume of Cylinder

$$= \pi r^2 h \text{ cubic Unit}$$

$$= \left(\frac{22}{7}\right) \times (3.5)^2 \times 10\text{cm}^3$$

$$= 385 \text{ cm}^3$$

Capacity of Plastic Cylinder is greater by 85 cm^3 than Capacity of Tin

Answer 5:

Given:

No. Of pillars = 20

Diameter (d) = 50 cm = 0.5 m (1 cm = 0.1 m)

so, radius (r) = 0.25 m

$$\text{Height (h)} = 4 \text{ m}$$

$$\text{Cost of Cleaning} = 14 \text{ rs per m}^2$$

$$\text{Curved Surface area of one pillar} = 2\pi rh \text{ sq. Unit}$$

$$= 2 \times \left(\frac{22}{7}\right) \times (0.25) \times 4\text{m}^2$$

$$= 6.28 \text{ m}^2$$

$$\text{Cost of Cleaning for one Pillar} = \text{Cost of Cleaning} \times \text{Area of one pillar}$$

$$= 14 \times 6.28$$

$$= \text{Rs } 87.92$$

$$\text{Cost of Cleaning for 20 Pillar} = 20 \times 87.92$$

$$= \text{Rs } 1760 \text{ (approx)}$$

Answer 6:

Given:

$$\text{Curved Surface area} = 4.4 \text{ m}^2$$

$$\text{radius (r)} = 0.7 \text{ m}$$

height = ?

$$\text{Curved Surface area} = 2\pi rh = 4.4 \text{ m}^2$$

$$\Rightarrow 2 \times \left(\frac{22}{7}\right) \times (0.7) \times h = 4.4$$

$$\Rightarrow \quad \quad \quad \mathbf{h = 1 \text{ m}}$$

$$\text{Volume of Cylinder} = \pi r^2 h \text{ cubic Unit}$$

$$= \left(\frac{22}{7}\right) \times (0.7)^2 \times 1\text{m}^3$$

$$= 1.54 \text{ m}^3$$

Answer 7: Given:

$$\text{Curved Surface area} = 94.2 \text{ cm}^2$$

$$\text{height}(h) = 5 \text{ cm}$$

Find

(i) Radius of its base = ?

$$\text{Curved Surface area} = 2\pi rh = 94.2 \text{ cm}^2$$

$$\Rightarrow 2 \times 3.14 \times r \times 5 = 94.2 \quad (\pi = 3.14)$$

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

(ii) Volume of cylinder = $\pi r^2 h$ cubic unit

$$= 3.14 \times 3^2 \times 5 \text{ cm}^3$$

$$= 141.3 \text{ cm}^3$$

Answer 8: Given:

$$\text{Capacity of Closed Cylinder} = 15.4 \text{ litre}$$

$$= 15400 \text{ cm}^3 \quad (1 \text{ litre} = 1000 \text{ cm}^3)$$

$$\text{height}(h) = 1 \text{ m} = 100 \text{ cm}$$

$$\text{Area of metal sheet} = \text{total surface area of vessel} = 2\pi r(r+h)$$

let's find radius of vessel

$$\text{Volume of vessel} = \text{Capacity of vessel} = 15400 \text{ cm}^3$$

$$\Rightarrow \pi r^2 h = 15400$$

$$\left(\frac{22}{7}\right) \times (r)^2 \times 100 = 15400$$

$$r^2 = 49$$

$$\Rightarrow r = 7 \text{ cm}$$

$$\text{Area of metal sheet} = \text{total surface area of cylindrical vessel}$$

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

$$= 2 \times \left(\frac{22}{7}\right) \times 7 \times (7 + 100)\text{cm}^2$$
$$= 4708 \text{ cm}^2$$

Answer 9:

Given:

$$\text{Inner diameter (d)} = 24 \text{ cm}$$

$$\Rightarrow \text{Inner radius (r)} = 12 \text{ cm}$$

$$\text{Outer diameter (D)} = 28 \text{ cm}$$

$$\Rightarrow \text{Outer radius (R)} = 14 \text{ cm}$$

$$\text{length} = \text{height (h)} = 35 \text{ cm}$$

volume of wooden pipe in cm^3

$$= \pi(R^2 - r^2)h$$
$$= \left(\frac{22}{7}\right) \times (14^2 - 12^2) \times 35$$
$$= \frac{22}{7} \times (196 - 144) \times 35\text{cm}^3$$
$$= \frac{22}{7} \times (52) \times 35 \text{ cm}^3$$
$$= 5720 \text{ cm}^3$$

1 cm^3 of wood has a mass of 0.6 gm

\Rightarrow Mass of pipe

$$= 5720 \times 0.6\text{g}$$
$$= 3432 \text{ gm}$$
$$= 3.432 \text{ kg} \quad (1000 \text{ gm} = 1 \text{ kg})$$

Answer 10: Given:

$$\text{diameter (d)} = 5 \text{ cm}$$

$$\Rightarrow \text{radius (r)} = 2.5 \text{ cm}$$

$$\text{length (h)} = 28 \text{ m} = 280 \text{ cm}$$

Total radiating surface = curved surface area of pipe

$$\begin{aligned} &= 2\pi rh \text{ sq. Unit} \\ &= 2 \times \left(\frac{22}{7}\right) \times 2.5 \times 2800 \\ &= 44,000 \text{ cm}^2 \end{aligned}$$

Answer 11: Given:

$$\text{radius (r)} = 10.5 \text{ cm}$$

$$\text{height (h)} = 60 \text{ cm}$$

volume of solid cylinder = $\pi r^2 h$ cubic unit

$$\begin{aligned} &= \frac{22}{7} \times (10.5)^2 \times 60 \text{ cm}^3 \\ &= 20790 \text{ cm}^3 \end{aligned}$$

thus, it is given that material of cylinder weighs 5 g per cm^3

so, weight of cylinder = $20790 \times 5g$

$$= 103950 \text{ gm}$$

$$= 103.95 \text{ kg}$$

$$(1 \text{ kg} = 1000 \text{ gm})$$

Answer 12: Given:

$$\text{Curved Surface area} = 1210 \text{ cm}^2$$

$$\text{diameter (d)} = 20 \text{ cm}$$

$$\Rightarrow \text{radius (r)} = 10 \text{ cm}$$

$$\text{height (h)} = ?$$

$$\text{Curved Surface area} = 2\pi rh \text{ sq. Unit} = 1210 \text{ cm}^2$$

$$\Rightarrow 2 \times \left(\frac{22}{7}\right) \times 10 \times h = 1210$$

$$h = 19.25 \text{ cm}$$

volume of cylinder = $\pi r^2 h$ cubic unit

$$= \frac{22}{7} \times (10)^2 \times 19.25 \text{ cm}^3$$

$$= 6050 \text{ cm}^3$$

Answer 13: Given:

$$\text{Curved Surface area} = 4400 \text{ cm}^2$$

$$\text{Circumference of base} = 110 \text{ cm}$$

let radius = r and height = h for the cylinder.

$$\text{Circumference of base} = 2\pi r = 110 \text{ cm}$$

$$\Rightarrow 2 \times \left(\frac{22}{7}\right) \times r = 110$$

$$r = 17.5 \text{ cm}$$

$$\text{Curved Surface area} = 2\pi r h = 4400 \text{ cm}^2$$

$$\Rightarrow 2 \times \left(\frac{22}{7}\right) \times 17.5 \times h = 4400$$

$$h = 40 \text{ cm}$$

Volume of Cylinder = $\pi r^2 h$ cubic unit

$$= \frac{22}{7} \times (17.5)^2 \times 40 \text{ cm}^3$$

$$= 38,500 \text{ cm}^3$$

Answer 14: Given:

$$\text{Volume of Cylinder} = 1617 \text{ cm}^3$$

$$\frac{\text{radius}(r)}{\text{height}(h)} = \frac{2}{3}$$

$$\Rightarrow r = \frac{2h}{3} \quad \dots \text{eq.(i)}$$

Total surface area = ?

Volume of Cylinder = $\pi r^2 h = 1617 \text{ cm}$

putting the value of r from eq.(i) in formula, we get

$$\frac{22}{7} \times \left(\frac{2h}{3}\right)^2 \times h = 1617$$

$$\frac{22}{7} \times \left(\frac{2h}{3}\right) \times \left(\frac{2h}{3}\right) \times h = 1617$$

$$h^3 = 1157.625$$

$$\Rightarrow h = \sqrt[3]{1157.625}$$

$$h = 10.5 \text{ cm}$$

thus, $r = \frac{2h}{3} = \frac{2 \times 10.5}{3}$

$$r = 7 \text{ cm}$$

Total Surface area of Cylinder = $2\pi r(r + h)$ sq. Unit

$$= 2 \times \left(\frac{22}{7}\right) \times 7 \times (7 + 10.5)$$

$$= 2 \times \left(\frac{22}{7}\right) \times 7 \times (17.5)$$

$$= 770 \text{ cm}^2$$

Answer 15: Given:

$$\text{Total Surface area} = 462 \text{ cm}^2$$

$$\text{Curved surface area} = \frac{1}{3}(\text{total surface area})$$

$$= \frac{1}{3}(462) \text{ cm}^2$$

$$= 154 \text{ cm}^2$$

Total Surface area =

$$2\pi r(r + h) = 462 \text{ cm}^2 \quad \dots\dots\dots \text{eq. (i)}$$

Curved surface area =

$$2\pi rh = 154 \text{ cm}^2 \quad \dots\dots\dots \text{eq.(ii)}$$

Divide eq.(i) by eq.(ii) , we get

$$\frac{r+h}{h} = 3$$

$$\Rightarrow r + h = 3h$$

$$r = 2h \quad \dots\dots\dots \text{eq.(iii)}$$

putting the value of r in eq.(ii) , we get

$$2 \times \left(\frac{22}{7}\right) \times 2h \times h = 154$$

$$\Rightarrow h^2 = \frac{49}{4}$$

$$h = \frac{7}{2} = 3.5 \text{ cm}$$

$$\text{thus, } r = 2h = 2 \times \frac{7}{2} = 7 \text{ cm}$$

volume of Cylinder = $\pi r^2 h$ cubic unit

$$= \frac{22}{7} \times 7^2 \times 3.5 \text{ cm}^3 = 539 \text{ cm}^3$$

Answer 16: Given:

$$\text{Total Surface area} = 231 \text{ cm}^2$$

$$\text{Curved surface area} = \frac{2}{3}(\text{total surface area})$$

$$= \frac{2}{3}(231) \text{ cm}^2$$

$$= 154 \text{ cm}^2$$

Total Surface area =

$$2\pi r(r+h) = 231 \text{ cm}^2 \quad \dots\dots\dots \text{eq. (i)}$$

Curved surface area =

$$2\pi rh = 154 \text{ cm}^2 \quad \dots\dots\dots \text{eq.(ii)}$$

Divide eq.(i) by eq.(ii) , we get

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

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

$$r = \frac{h}{2} \quad \dots\dots\dots \text{eq.(iii)}$$

putting the value of r in eq.(ii) , we get

$$2 \times \left(\frac{22}{7}\right) \times \left(\frac{h}{2}\right) \times h = 154$$

$$\Rightarrow h^2 = 49$$

$$h = \sqrt{49} = 7 \text{ cm}$$

$$\text{thus, } r = \frac{h}{2} = \frac{7}{2} = 3.5 \text{ cm}$$

volume of cylinder = $\pi r^2 h$ cubic unit

$$= \frac{22}{7} \times (3.5)^2 \times 7 \text{ cm}^3 = 269.5 \text{ cm}^3$$

Answer 17: Given:

$$\text{total surface area} = 616 \text{ cm}^2$$

$$\frac{\text{curved surface area}}{\text{total surface area}} = \frac{1}{2}$$

$$\Rightarrow \frac{2\pi rh}{2\pi r(r+h)} = \frac{1}{2}$$

$$\frac{h}{r+h} = \frac{1}{2}$$

$$\Rightarrow 2h = r+h$$

$$h = r \quad \text{..... eq.(i)}$$

total surface area = 616 cm^2

$$\Rightarrow 2\pi r(r+h) = 616$$

$$2 \times \left(\frac{22}{7}\right) \times r \times (r+r) = 616 \quad \{ h = r \text{ from eq.(i) } \}$$

$$r^2 = 49$$

$$r = \sqrt{49} = 7 \text{ cm}$$

$$\Rightarrow r = h = 7 \text{ cm}$$

Volume of Cylinder = $\pi r^2 h$ cubic unit

$$\begin{aligned} &= \frac{22}{7} \times 7^2 \times 7 \\ &= 1078 \text{ cm}^3 \end{aligned}$$

Answer 18: Given:

diameter of bucket = 28 cm

$$\Rightarrow \text{radius (r)} = 14 \text{ cm}$$

height of bucket (h_b) = 72 cm

length of rectangular tank (l) = 66 cm

breadth (b) = 28 cm

let height of rectangular tank = h_t

Volume of bucket = $\pi r^2 h$ cubic unit

$$\begin{aligned} &= \frac{22}{7} \times 14^2 \times 72 \text{ cm}^3 \\ &= 44352 \text{ cm}^3 \end{aligned}$$

Volume of rectangular tank = l . b . h

$$= 66 \times 28 \times h \text{ cm}^3$$

$$= 1848h_t \text{ cm}^3$$

Volume of bucket = Volume of rectangular tank

$$\Rightarrow 44352 = 1848h_t$$

$$h_t = 24 \text{ cm}$$

Answer 19: Given:

Height of barrel = 7 cm

diameter(d) = 5 mm

$$\Rightarrow \text{radius (r)} = 2.5 \text{ mm} = .25 \text{ cm} \quad (1 \text{ cm} = 10 \text{ mm})$$

Volume of barrel = $\pi r^2 h$ cubic unit

$$= \frac{22}{7} \times (0.25)^2 \times 7 \text{ cm}^3$$

$$= 1.375 \text{ cm}^3$$

1 full barrel is used to write 330 words

$\Rightarrow 1.375 \text{ cm}^3$ used to write 330 words

so, $\frac{1}{5}$ litre = 200 cm^3 can be used for

$$= \left(330 \times \frac{1}{1.375} \times 200 \right) = 48000 \text{ words}$$

Answer 20: Given:

Volume of gold = 1 cm^3

diameter = 0.1 mm

so, radius (r) = 0.05 mm = 0.005 cm (1 mm = 0.1 cm)

let the length of wire is l

$$\text{Volume of gold} = \pi r^2 l = 1 \text{ cm}^3$$

$$\Rightarrow \frac{22}{7} \times (0.005)^2 \times l = 1$$

$$l = 12727.27 \text{ cm}$$

$$= 127.27 \text{ m} \quad (1 \text{ m} = 100 \text{ cm})$$

Answer 21: Given:

Internal diameter = 3 cm

$$\therefore \text{radius (r)} = 1.5 \text{ cm}$$

$$\text{height (h)} = 1 \text{ m} = 100 \text{ cm}$$

$$\text{thickness (t)} = 1 \text{ cm}$$

external radius (R) = Internal radius (r) + thickness (t)

$$\Rightarrow r + t = 1.5 + 1$$

$$= 2.5 \text{ cm}$$

Volume of cast iron pipe = External volume - Internal Volume

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

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

$$= \frac{22}{7} \times ((2.5)^2 - (1.5)^2) \times 100$$

$$= \frac{22}{7} \times 4 \times 100$$

$$= \frac{8800}{7} \text{ cm}^3$$

$$\text{Weight of iron} = \frac{8800}{7} \times 21 \text{ gm} \quad (\text{Given } 1 \text{ cm}^3 = 21 \text{ gm})$$

$$= 26400 \text{ gm}$$

$$= 26.4 \text{ kg}$$

Answer 22: Given:

Internal diameter = 10.4 cm

$$\Rightarrow \text{Internal radius (r)} = 5.2 \text{ cm}$$

height (h) = 25 cm

thickness (t) = 8 mm = 0.8 cm

external radius (R) = Internal radius (r) + thickness (t)

= r + t

= 5.2 + 0.8

= 6.0 cm

Volume of cylindrical tube = External volume - Internal Volume

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

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

= $\frac{22}{7} \times ((6)^2 - (5.2)^2) \times 25 \text{ cm}^3$

= 704 cm^3

Answer 23:

mc24

Given:

diameter of bucket = 140 cm

\therefore radius (r) = 70 cm

height of bucket (h_b) = 1 m = 100 cm

Total Surface area of Cylinder = $2\pi r(r + h)$ sq. Unit

= $2 \times \left(\frac{22}{7}\right) \times 70 \times (70 + 100)$

= $2 \times \left(\frac{22}{7}\right) \times 70 \times 170$

= 74800 cm^2

= 7.48 m^2 (1 $\text{cm}^2 = 0.0001 \text{ m}^2$)

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Answer 24:

Given:

$$\text{radius of large vessel}(R) = 15 \text{ cm}$$

$$\text{height}(H) = 32 \text{ cm}$$

$$\text{radius of glass}(r) = 3 \text{ cm}$$

$$\text{height}(h) = 8 \text{ cm}$$

$$\text{Price of one glass} = 15 \text{ rs}$$

$$\text{total no of glass filled by vessel} = \frac{\text{volume of large vessel}}{\text{volume of one glass}} = \frac{\pi R^2 H}{\pi r^2 h}$$

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

$$= \frac{15 \times 15 \times 32}{3 \times 3 \times 8}$$

$$= 100$$

$$\text{Total amount of money} = \text{price of one glass} \times \text{total no of glass}$$

$$= 15 \times 100$$

$$= 1500 \text{ rs}$$

Answer 25:

Given:

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

$$\Rightarrow \text{inner radius}(r) = 5 \text{ m}$$

$$\text{height}(h) = 8.4 \text{ m}$$

$$\text{width of embankment} = 7.5 \text{ m}$$

radius of embankment (R) = inner radius + width of embankment

$$= 5 \text{ m} + 7.5 \text{ m}$$

$$= 12.5 \text{ m}$$

let height of embankment is H

Volume dug out from well = volume of earth in embankment

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

$$5 \times 5 \times 8.4 = ((12.5)^2 - 5^2) \times H$$

$$H = 1.6 \text{ m}$$

Answer 26:

Given:

speed of water = 30 cm per sec

Area of cross section = 5 cm²

time = 1 minute

Volume of water flows in one sec = area of cross section x length of water flows in 1s

$$= 5 \times 30 = 150 \text{ cm}^3$$

water flows in one minute = water flows in one sec x 60

$$= 150 \times 60$$

$$= 9000 \text{ cm}^3$$

$$= 9 \text{ litre} \quad (1 \text{ cm}^3 = 0.001 \text{ litre})$$

Answer 27:

Given: diameter of tank = 1.4 m

$$\Rightarrow \text{radius (R)} = 0.7 \text{ m}$$

$$\text{height (H)} = 2.1 \text{ m}$$

$$\text{diameter of pipe} = 3.5 \text{ cm} = 0.35 \text{ m}$$

CLASS IX

RS Aggarwal solutions

$$\Rightarrow \text{radius (r)} = 0.175 \text{ m}$$

rate of flow = 2 m per sec

Volume of tank = $\pi R^2 H$ cubic unit

$$= \pi \times (0.7)^2 \times 2.1$$

$$= \frac{1029\pi}{1000} \text{ m}^3$$

volume of water flow in 1 s = area of cross section \times rate of flow per sec

$$= \pi r^2 \times 2$$

$$= \frac{22}{7} \times (0.175)^2 \times 2$$

$$= \frac{49\pi}{80000} \text{ m}^3$$

let the time required to fill the tank is t seconds

water flow in t sec by pipe = volume of tank

$$t \times \frac{49\pi}{80000} = \frac{1029\pi}{1000}$$

$$\Rightarrow t = 1680 \text{ s}$$

$$= 28 \text{ minutes}$$

Answer 28:

Given:

diameter of container = 56 cm

$$\Rightarrow \text{radius (r)} = 28 \text{ cm}$$

dimension of rectangular solid = (32 cm \times 22 cm \times 14 cm)

Volume of Solid = l.b.h

$$= 32 \times 22 \times 14 \text{ cm}^3$$

$$= 9856 \text{ cm}^3$$

let the rise in level of container is h cm.

Volume of container = $\pi r^2 h$ cubic unit

$$= \frac{22}{7} \times 28 \times 28 \times h$$

$$= 2474h$$

Volume of solid = volume of container with height h and base radius 28 cm

$$\Rightarrow 9856 = 2474h$$

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

Answer 29:

Given:

$$\text{height (h)} = 280 \text{ m}$$

$$\text{diameter} = 3 \text{ m}$$

$$\Rightarrow \text{radius (r)} = 1.5 \text{ m}$$

$$\text{rate} = 15 \text{ rs per m}^3$$

$$\text{rate of cementing} = 10 \text{ rs m}^2$$

volume of tube well = $\pi r^2 h$ cubic unit

$$= \frac{22}{7} \times 1.5 \times 1.5 \times 280 \text{ m}^3$$

$$= 1980 \text{ m}^3$$

(i) price for sinking 1 m^3 is 15 rs

so, for $1980 \text{ m}^3 = 1980 \times 15$

$$= 29700 \text{ rs}$$

(ii) Cost of cementing = ?

Curved Surface area = $2\pi rh$

$$= 2 \times \left(\frac{22}{7}\right) \times 1.5 \times 280$$
$$= 2640 \text{ m}^2$$

rate for cementing $1 \text{ m}^2 = 10 \text{ rs}$

so, for $2640 \text{ m}^2 = 2640 \times 10$

$$= 26400 \text{ rs}$$

Answer 30:

Given:

Weight of wire = 13.2 kg

diameter = 4 mm

\Rightarrow radius (r) = 2 mm = 0.2 cm

let the length of wire is h cm

Thus, volume of wire $\times 8.4 \text{ g} = (13.2 \times 1000) \text{ g}$

$$\pi r^2 h \times 8.4 = 13200$$

$$\frac{22}{7} \times 0.2 \times 0.2 \times h \times 8.4 = 13200$$

\Rightarrow $h = 12500 \text{ cm} = 125 \text{ m}$

Answer 31:

Given:

total cost for inner surface = 3300 rs

height (h) = 10 m

rate = 30 rs per m^2

(i) inner curved surface area of vessel = $\frac{\text{total cost}}{\text{rate}}$

$$= \frac{3300}{30} = 110 \text{ m}^2$$

(ii) let inner radius = r metre

$$\text{inner Curved Surface area} = 2\pi rh = 110 \text{ m}^2$$

$$2 \times \left(\frac{22}{7}\right) \times r \times 10 = 110$$

$$\Rightarrow h = 1.75 \text{ m}$$

(iii) capacity of vessel = volume of vessel = $\pi r^2 h$ cubic unit

$$= \frac{22}{7} \times 1.75 \times 1.75 \times 10$$

$$= 96.25 \text{ m}^3$$

mc24

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Answer 32:

Given:

$$\text{height (h)} = 14 \text{ cm}$$

$$\text{let inner radii} = r \text{ cm}$$

$$\text{and outer radii} = R \text{ cm}$$

$$\text{Difference between surfaces area} = 88 \text{ cm}^2$$

$$\Rightarrow (2\pi Rh - 2\pi rh) = 88$$

$$(R - r) = \frac{88}{2\pi h} = 1 \text{ cm} \quad \dots\dots\dots \text{eq(i)}$$

$$\text{Volume of the tube} = \pi R^2 h - \pi r^2 h = 176 \text{ cm}^3$$

$$\pi h(R^2 - r^2) = 176$$

$$\Rightarrow \frac{22}{7} \times 14 \times (R + r) \times (R - r) = 176$$

$$a^2 - b^2 = (a + b)(a - b)$$

putting value of eq(i) we get

$$\frac{22}{7} \times 14 \times 1 \times (R + r) = 176$$

$$\Rightarrow (R+r) = 4 \quad \dots\dots\dots \text{eq.(ii)}$$

thus, Solving eq.(i) and eq.(ii) we get

$$R = 2.5 \text{ cm}$$

$$r = 1.5 \text{ cm}$$

Answer 33:

Given:

Dimension = 30 cm x 18 cm

(i) Rolling by length

if we roll by length then breadth will be equal to height i.e,

$$h = 18 \text{ cm}$$

and length will be equal to circumference of cylinder i.e,

$$2\pi r = 30 \text{ cm}$$

$$\Rightarrow r = \frac{15}{\pi} \text{ cm}$$

Volume of Cylinder = $\pi r^2 h$ cubic unit

$$= \pi \times \left(\frac{15}{\pi}\right) \times \left(\frac{15}{\pi}\right) \times 18 \quad \text{cm}^3 = \frac{4050}{\pi} \text{cm}^3$$

(i) Rolling by breadth

if we roll by breadth then length will be equal to height i.e,

$$h = 30 \text{ cm}$$

and breadth will be equal to circumference of cylinder i.e,

$$2\pi r = 18 \text{ cm}$$

$$\Rightarrow r = \frac{9}{\pi} \text{ cm}$$

Volume of Cylinder = $\pi r^2 h$ cubic unit

$$\begin{aligned} &= \pi \times \left(\frac{9}{\pi}\right) \times \left(\frac{9}{\pi}\right) \times 30 \quad \text{cm}^3 \\ &= \frac{2430}{\pi} \text{cm}^3 \end{aligned}$$

$$\text{Ratio} = \frac{\text{Volume of Cylinder fold by length}}{\text{Volume of Cylinder fold by breadth}}$$

$$= \frac{\left(\frac{4050}{\pi}\right)}{\left(\frac{2430}{\pi}\right)} = \frac{405}{243} = \frac{5}{3}$$

$$= 5 : 3$$

mc²⁴

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EXERCISE-15C

Answer

1-: Base Radius (r) = 5.25 cm

Slant Height (l) = 10 cm

$$\text{Curved Surface Area of Cone} = \pi r l = \left(\frac{22}{7}\right) \times 5.25 \times 10 = 165 \text{ cm}^2$$

Answer 2-: Slant Height (l) = 21 m

Diameter of Base (d) = 24 m

Radius of base (r) = $\frac{d}{2} = \frac{24}{2} = 12 \text{ m}$

Total Surface Area of Cone = $\pi r l + \pi r^2$

$$= \left[\left(\frac{22}{7}\right) \times 12 \times 21\right] + \left[\left(\frac{22}{7}\right) \times 12 \times 12\right] = 1244.57 \text{ m}^2$$

Answer 3-: Base Radius (r) = 7 cm

Height (h) = 24 cm

Slant Height (l) = $\sqrt{(h^2 + r^2)} = \sqrt{(24^2 + 7^2)} = 25 \text{ cm}$

Area of Sheet required to make one Cap = Curved Surface Area of cone = $\pi r l$

$$= \left(\frac{22}{7}\right) \times 7 \times 25 = 550 \text{ cm}^2$$

For 10 Caps required Sheet = $550 \times 10 = 5500 \text{ cm}^2$

Answer 4-: Curved Surface Area of Cone = 308 cm^2

Slant Height (l) = 14 cm

Let Radius of cone (r) = $r \text{ cm}$

$\pi r l = 308$

$$\left(\frac{22}{7}\right) \times r \times 14 = 308$$

$$r = 7 \text{ cm}$$

Total Surface Area of Cone = $\pi r l + \pi r^2 = \pi r (l + r)$

$$= \left(\frac{22}{7}\right) \times 7 \times (14 + 7) = 462 \text{ cm}^2$$

Answer 5-: Slant Height (l) = 25 m

Base Diameter (d) = 14m

Base Radius (r) = $\frac{d}{2} = \frac{14}{2} = 7 \text{ m}$

Curved Surface Area of Cone = $\pi r l = \left(\frac{22}{7}\right) \times 7 \times 25 = 550 \text{ m}^2$

Given $1 \text{ m}^2 \text{ cost} = ₹12$

$\therefore 550 \text{ m}^2 \text{ cost} = 12 \times 550 = ₹6600$

Answer 6-: Conical Tent Height (h) = 10 m

Base Radius (r) = 24 m

$$\text{Slant Height } (l) = \sqrt{(h^2 + r^2)} = \sqrt{10^2 + 24^2} = 26 \text{ m}$$

$$\text{Area of Canvas required for Tent} = \text{Curved Surface Area of Cone} = \pi r l$$

$$= \left(\frac{22}{7}\right) \times 24 \times 26 \text{ m}^2$$

Given 1 m² cost = ₹70

$$\therefore \left(\frac{22}{7}\right) \times 24 \times 26 \text{ m}^2 \text{ cost} = \left(\frac{22}{7}\right) \times 24 \times 26 \times 70 = ₹137280$$

Answer 7:- Total Numbers of Hollow Cones = 50

Base Diameter of Cone (d) = 40 cm

$$\text{Base Radius } (r) = \frac{d}{2} = 20 \text{ cm} = 0.2 \text{ m}$$

Height (h) = 1 m

$$\text{Slant Height } (l) = \sqrt{(h^2 + r^2)} = \sqrt{(1^2 + (0.2)^2)} = \sqrt{1.04} = 1.02 \text{ m}$$

$$\text{Curved Surface Area of one cone} = \pi r l = \left(\frac{22}{7}\right) \times 0.2 \times 1.02 = 0.64056 \text{ m}^2$$

Total Curved Surface Area = 50 × 0.640565 = 32.028 m²

Given 1 m² cost = ₹25

$$\therefore 32.028 \text{ m}^2 \text{ cost} = 25 \times 32.028 = ₹800.7$$

Answer 8:- Base Radius (r) = 35 cm

Height (h) = 12 cm

$$\text{Slant Height } (l) = \sqrt{(h^2 + r^2)} = \sqrt{12^2 + 35^2} = \sqrt{1369} = 37 \text{ cm}$$

$$\text{Volume of Cone} = \left(\frac{1}{3}\right) \pi r^2 h = \left(\frac{1}{3}\right) \times \left(\frac{22}{7}\right) \times 35 \times 35 \times 12 = 15400 \text{ cm}^3$$

$$\text{Curved Surface Area} = \pi r l = \left(\frac{22}{7}\right) \times 35 \times 37 = 4070 \text{ cm}^2$$

$$\text{Total Surface Area of Cone} = \pi r l + \pi r^2 = \pi r (l + r)$$

$$= \left(\frac{22}{7}\right) \times 35(37 + 35) = 7920 \text{ cm}^2$$

Answer 9:- Height (h) = 6 cm

Slant Height (l) = 10 cm

Let radius = r

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

$$l^2 = h^2 + r^2$$

$$r^2 = 10^2 - 6^2 = 64$$

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

$$\text{Volume of Cone} = \left(\frac{1}{3}\right) \pi r^2 h = \left(\frac{1}{3}\right) \times 3.14 \times 8 \times 8 \times 6 = 401.92 \text{ cm}^3$$

$$\text{Curved Surface Area} = \pi r l = 3.14 \times 8 \times 10 = 251.2 \text{ cm}^2$$

$$\text{Total Surface Area of Cone} = \pi r l + \pi r^2$$

$$= \pi r (l + r) = 3.14 \times 8 \times (10 + 8) = 452.16 \text{ cm}^2$$

Answer 10:- Diameter of conical pit (d) = 3.5 m

$$\text{Radius } (r) = \frac{d}{2} = \frac{3.5}{2} = 1.75 \text{ m}$$

Height of pit (h) = 12 m

$$\text{Capacity of pit} = \text{Volume of pit} = \left(\frac{1}{3}\right) \pi r^2 h = \left(\frac{1}{3}\right) \times \left(\frac{22}{7}\right) \times 1.75 \times 1.75 \times 12 = 38.5 \text{ m}^3$$

Given 1 m^3 capacity = 1 kilolitre

$\therefore 38.5 \text{ m}^3$ capacity = 38.5 kilolitres

Answer 11:- Diameter (d) = 9 m

$$\text{Radius (r)} = \frac{d}{2} = \frac{9}{2} = 4.5 \text{ m}$$

Height (h) = 3.5 m

Given heap of wheat is conical

\therefore Canvas Required for cover the heap = Curved Surface area of cone

$$\text{Curved Surface Area} = \pi r l = 3.14 \times 4.5 \times \sqrt{\{(4.5)^2 + (3.5)^2\}} = 80.54 \text{ m}$$
$$\{l = \sqrt{(h^2 + r^2)}\}$$

$$\text{Volume} = \frac{1}{3} \times \pi \times r^2 \times h = \frac{1}{3} \times 3.14 \times 4.5 \times 4.5 \times 3.5 = 74.1825 \text{ m}^3$$

Answer 12:- Area of canvas = 551 m^2

Base Radius of conical tent = 7 m

But 1 m^2 canvas is waste so, area of canvas to make tent = 550 m^2

$$\pi \times r \times l = 550$$

$$\frac{22}{7} \times 7 \times l = 550$$

$$l = 25 \text{ m}$$

$$\text{Height of tent} = \sqrt{(l^2 - r^2)} = 24 \text{ m}$$

$$\text{Volume of tent} = \frac{1}{3} \times \pi \times r^2 \times h = \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 24 = 1232 \text{ m}^3$$

Answer 13:- Base Radius (r) = 7 m

Tent Height (h) = 24 m

$$\text{Slant Height (l)} = \sqrt{(h^2 + r^2)} = \sqrt{24^2 + 7^2} = 25 \text{ m}$$

$$\text{Area of cloth required to make tent} = \pi \times r \times l = \frac{22}{7} \times 7 \times 25 = 550 \text{ m}^2$$

Let total meters of cloth = l m

Width = 2.5 m

$$\text{Area} = l \times 2.5$$

$$550 = l \times 2.5$$

$$l = 220 \text{ m}$$

Answer 14:- let, Heights of cones h_1 & h_2 , base radius r_1 & r_2

$$\frac{h_1}{h_2} = \frac{1}{3} \quad \text{and} \quad \frac{r_1}{r_2} = \frac{3}{1}$$

$$\text{Volume of first cone } V_1 = \frac{1}{3} \times \pi \times (r_1)^2 \times h_1$$

$$\text{Volume of first cone } V_2 = \frac{1}{3} \times \pi \times (r_2)^2 \times h_2$$

$$\frac{V1}{V2} = \frac{\left(\frac{1}{3} \times \pi \times (r1)^2 \times h1\right)}{\frac{1}{3} \times \pi \times (r2)^2 \times h2}$$

$$\frac{V1}{V2} = \left(\frac{r1}{r2}\right)^2 \times \left(\frac{h1}{h2}\right)$$

$$\frac{V1}{V2} = \frac{3}{1}$$

$$V1:V2 = 3:1$$

Answer 15:- Cylinder and cone have equal Radii and Heights

Let Height = h

Base Radius = r

Curved Surface Area of cone C2 = $\pi r l = \pi r \sqrt{(h^2 + r^2)}$

Curved Surface Area of cylinder C1 = $2\pi r h$

Given,

$$\frac{C1}{C2} = \frac{8}{5}$$

$$\frac{2\pi r h}{\pi r \sqrt{(h^2 + r^2)}} = \frac{8}{5}$$

$$\frac{2h}{\sqrt{h^2 + r^2}} = \frac{4}{5}$$

$$25h^2 = 16h^2 + 16r^2$$

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

$$r:h = 3:4$$

Answer 16:- Height of circular cone (h) = 3.6 cm

Base Radius (r) = 1.6 cm

Volume of cone = $\frac{1}{3} \pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times 1.6 \times 1.6 \times 3.6 = 9.65 \text{ m}^3$

Base Radius of new cone (R) = 1.2 cm

Volume of new cone = volume of old cone

Let Height of new cone = H

$$\frac{1}{3} \times \frac{22}{7} \times 1.2 \times 1.2 \times H = \frac{1}{3} \times \frac{22}{7} \times 1.6 \times 1.6 \times 3.6$$

H = 6.4 cm

Answer 17:- Height of cylinder (H) = 3m

Base Diameter (D) = 105 m

Base Radius (R) = $\frac{D}{2} = 52.5 \text{ m}$

Slant Height (l) = 53 m

Area of canvas require to cover the tent = Curved surface area of cylinder + Curved Surface area of cone

$$= 2\pi rh + \pi r l = \pi r(2h + l) = \frac{22}{7} \times 52.5 \times (2 \times 3 + 53) = 9735 \text{ m}^2$$

$$\text{Length of Canvas} = \frac{\text{Area of Canvas}}{\text{width}} = \frac{9735}{5} = 1947 \text{ m}$$

Answer 18:- For Cylinder

Height (H) = 2.8 m

Diameter = 20 cm 0.2 m

Radius (R) = $\frac{0.2}{2} = 0.1 \text{ m}$

For Cone

Height (h) = 42 cm = 0.42 m

Diameter = 20 cm = 0.2 m

Radius (r) = 0.1 m

Weight of pillar = Total Volume of Pillar

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

(For Cone) (For Cylinder)

$$= \pi r^2 \left(\frac{1}{3} \times h + H \right) \quad \{r=H\}$$

$$= \frac{22}{7} \times 0.1 \times 0.1 \left(\frac{1}{3} \times 0.42 + 2.8 \right) = 0.092400 \text{ m}^3$$

$$1 \text{ m}^3 = 1000000 \text{ cm}^3$$

$$\therefore 0.092400 \text{ m}^3 = 92400 \text{ cm}^3$$

$$1 \text{ cm}^3 \text{ weight} = 7.5 \text{ gm}$$

$$\therefore 92400 \text{ cm}^3 = 92400 \times 7.5 = 693000 \text{ gm} = 693 \text{ kg}$$

Answer 19:- Height of cone = Height of Cylinder = h = 10 cm

Radius of cone = Radius of Cylinder = r = 6 cm

Volume of remaining part = Volume of cylinder - Volume of cone

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

$$= \frac{2}{3} \times \frac{22}{7} \times 6 \times 6 \times 10 = 753.6 \text{ cm}^3$$

Answer 20:- Rate of flow of water = 10m/min

Pipe is cylindrical

So, volume of water flow in 1 min. = Base Area of cylinder * 10

$$= \pi \times r^2 \times 10 \text{ m}$$

Diameter of pipe (d) = 5 mm = 0.5 cm

Radius of pipe (r) = $\frac{0.5}{2} = 0.25 \text{ cm}$

Diameter of cone = 40 cm

Radius (R) = $\frac{40}{2} = 20 \text{ cm}$

Height (h) = 24 cm

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

$$\text{Require time to fill the cone} = \frac{\text{Volume of cone}}{\text{Volume of Water flow per min}}$$

$$= \frac{\frac{1}{3} \times \pi \times R^2 \times h}{\pi \times r^2} = \frac{153.6}{3} = 51.2 \text{ min.}$$

$$1 \text{ min} = 60 \text{ sec}$$

$$\therefore 0.2 \text{ min} = 60 \times 0.2 = 12 \text{ sec}$$

$$= 51 \text{ min } 12 \text{ seconds}$$

Answer 21:- Area of cloth = 165 m²

Conical tent Radius = 5 m

(i) One Student Occupies = $\frac{5}{7} \text{ m}^2$

$$\text{Area of base of cone} = \pi r^2 = \frac{22}{7} \times 5 \times 5$$

$$\text{No. of Students} = \frac{\frac{22}{7} \times 5 \times 5}{\frac{5}{7}} = 110$$

(ii) Volume of cone = $\frac{1}{3} \pi R^2 h$

$$\text{Curved Surface Area of cone} = \pi r l$$

$$165 = \frac{22}{7} \times 5 \times l$$

$$l = 10.5 \text{ m}$$

$$\text{Volume} = \frac{1}{3} \times \frac{22}{7} \times 5 \times 5 \times \sqrt{((10.5)^2 - 5^2)} = 241.8 \text{ m}^3 \quad \{h = \sqrt{(l^2 - r^2)}\}$$

EXERCISE 15D

Answer 1:

(i)

radius (r) = 3.5 cm

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

$$\begin{aligned} &= \frac{4}{3} \times \left(\frac{22}{7}\right) \times (3.5)^3 \text{cm}^3 \\ &= 179.67 \text{ cm}^3 \end{aligned}$$

Surface area of Sphere = $4\pi r^2$ sq. Unit

$$\begin{aligned} &= 4 \times \left(\frac{22}{7}\right) \times (3.5)^2 \text{cm}^2 \\ &= 154 \text{ cm}^2 \end{aligned}$$

(ii)

radius (r) = 4.2 cm

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

$$\begin{aligned} &= \frac{4}{3} \times \left(\frac{22}{7}\right) \times (4.2)^3 \text{cm}^3 \\ &= 310.464 \text{ cm}^3 \end{aligned}$$

Surface area of Sphere = $4\pi r^2$ sq. Unit

$$\begin{aligned} &= 4 \times \left(\frac{22}{7}\right) \times (4.2)^2 \text{cm}^2 \\ &= 221.76 \text{ cm}^2 \end{aligned}$$

(iii)

radius (r) = 5 cm

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

$$\begin{aligned} &= \frac{4}{3} \times \left(\frac{22}{7}\right) \times (5)^3 \text{ cm}^3 \\ &= 523.81 \text{ cm}^3 \end{aligned}$$

Surface area of Sphere = $4\pi r^2$ sq. Unit

$$\begin{aligned} &= 4 \times \left(\frac{22}{7}\right) \times (5)^2 \text{ cm}^2 \\ &= 314.28 \text{ cm}^2 \end{aligned}$$

Answer 2:

Volume of sphere = $\frac{4}{3}\pi r^3 = 38808 \text{ cm}^3$ (Given $V = 38808 \text{ cm}^3$)

$$\Rightarrow \frac{4}{3} \times \left(\frac{22}{7}\right) \times (r)^3 = 38808$$

$$r^3 = 9261$$

$$\Rightarrow r = \sqrt[3]{9261}$$

$$r = 21 \text{ cm}$$

Surface area of Sphere = $4\pi r^2$ sq. Unit

$$\begin{aligned} &= 4 \times \left(\frac{22}{7}\right) \times (21)^2 \text{ cm}^2 \\ &= 5544 \text{ cm}^2 \end{aligned}$$

Answer 3:

Volume of sphere = $\frac{4}{3}\pi r^3 = 606.375 \text{ m}^3$ (Given $V = 606.375 \text{ m}^3$)

$$\Rightarrow \frac{4}{3} \times \left(\frac{22}{7}\right) \times (r)^3 = 606.375$$

$$r^3 = 144.703125$$

$$\Rightarrow r = \sqrt[3]{144.703125}$$
$$r = 5.25 \text{ m}$$

Surface area of Sphere = $4\pi r^2$ sq. Unit

$$= 4 \times \left(\frac{22}{7}\right) \times (5.25)^2 \text{ m}^2$$
$$= 346.5 \text{ m}^2$$

Answer 4:

let radius of sphere = r cm

Surface area of Sphere = $4\pi r^2 = 154 \text{ cm}^2$ (Given $S = 154 \text{ cm}^2$)

$$4 \times \left(\frac{22}{7}\right) \times (r)^2 = 154$$

$$r = \frac{7}{2} \text{ cm} = 3.5 \text{ cm}$$

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

$$\Rightarrow \frac{4}{3} \times \left(\frac{22}{7}\right) \times (3.5)^3 \text{ cm}^3$$

$$\Rightarrow = 179.67 \text{ cm}^3$$

Answer 5:

let radius of sphere = r cm

Surface area of Sphere = $4\pi r^2 = 576\pi \text{ cm}^2$ (Given $S = 576\pi \text{ cm}^2$)

$$4 \times \pi \times (r)^2 = 576\pi$$

$$r^2 = 144$$

$$r = 12 \text{ cm}$$

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

$$\Rightarrow \frac{4}{3} \times \pi \times (12)^3 \text{ cm}^3 = 2304\pi \text{ cm}^3$$

Answer 6:

Given :

diameter of leadshot = 3 mm

\Rightarrow radius (r) = 1.5 mm = 0.15 cm

dimension of cuboid = 12 cm x 11 cm x 9 cm

Volume of Cuboid = no of lead shots x volume of 1 lead shot

$$\Rightarrow \text{no of lead shots} = \frac{\text{Volume of Cuboid}}{\text{volume of 1 leadshot}}$$

$$= \frac{(12 \times 11 \times 9)}{\left(\frac{4}{3}\right) \times \left(\frac{22}{7}\right) \times (0.15)^3}$$

$$= \frac{(12 \times 11 \times 9 \times 3 \times 7)}{4 \times 22 \times (0.15) \times (0.15) \times (0.15)}$$

$$= 84000$$

Answer 7:

Given :

radius (r) of one lead ball = 1 cm

radius (R) of sphere = 8 cm

Volume of Sphere = no of lead balls x volume of 1 lead ball

$$\Rightarrow \text{no of lead balls} = \frac{\text{Volume of Sphere}}{\text{volume of 1 lead ball}}$$

$$= \frac{\left(\frac{4}{3}\right) \times \pi \times R^3}{\left(\frac{4}{3}\right) \times \pi \times r^3}$$

$$\Rightarrow \frac{R^3}{r^3} = \frac{8^3}{1^3} = 512$$

Answer 8:

Given :

radius (R) of sphere = 3 cm

diameter of balls = 0.6 cm

\therefore radius (r) of balls = 0.3 cm

Volume of Solid Sphere = no of small balls casted x volume of 1 small ball

$$\Rightarrow \text{no of small balls} = \frac{\text{Volume of Sphere}}{\text{volume of 1 lead ball}}$$

$$= \frac{\left(\frac{4}{3}\right) \times \pi \times R^3}{\left(\frac{4}{3}\right) \times \pi \times r^3}$$

$$\Rightarrow \frac{R^3}{r^3} = \frac{3^3}{(0.3)^3} = 1000$$

Answer 9:

Given :

radius (R) of sphere = 10.5 cm

radius (r) of cones = 3.5 cm

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height of cone (h) = 3 cm

Volume of Sphere = no of cones casted x volume of 1 small cone

$$\Rightarrow \text{no of cones} = \frac{\text{Volume of Sphere}}{\text{volume of 1 small cone}}$$

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

$$= \frac{4 \times R^3}{r^2 \times h} = \frac{4 \times (10.5)^3}{(3.5)^2 \times 3} = 126$$

Answer 10:

Given :

Diameter of sphere = 12 cm

\Rightarrow radius (r) of sphere = 6 cm

Diameter of cylinder = 8 cm

\Rightarrow radius of cylinder (R) = 4 cm

height of cylinder (H) = 90 cm

Volume of Cylinder = no of sphere x volume of onesphere

$$\Rightarrow \text{no of sphere} = \frac{\text{Volume of Cylinder}}{\text{volume of 1 sphere}}$$

$$= \frac{\pi \times R^2 \times H}{\left(\frac{4}{3}\right) \times \pi \times r^3}$$

$$= \frac{3 \times R^2 \times H}{4 \times r^3} = \frac{3 \times (4)^2 \times 90}{4 \times (6)^3} = 5$$

Answer 11:

Given :

Diameter of sphere = 6 cm

⇒ radius of sphere (R) = 3 cm

Diameter of wire = 2mm

⇒ radius of wire (r) = 1mm = 0.1 cm

let the length of wire is h cm

Volume of Wire = volume of Sphere

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

$$\Rightarrow h = \frac{\left(\frac{4}{3}\right) \times \pi \times R^3}{\pi \times r^2}$$

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

$$= \frac{4 \times 3^3}{3 \times (0.1)^2} = \frac{36}{0.01}$$

$$= 3600 \text{ cm} = 36 \text{ m}$$

Answer 12:

Given :

Diameter of sphere = 18 cm

⇒ radius of sphere (R) = 9 cm

length of wire (h) = 108 m = 10800 cm

let the radius of wire is r cm

Volume of Wire = volume of Sphere

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

$$\Rightarrow r^2 = \frac{\left(\frac{4}{3}\right) \times \pi \times R^3}{\pi \times h}$$

$$= \frac{4 \times R^3}{3 \times h}$$

$$= \frac{4 \times 9^3}{3 \times 10800}$$

$$r^2 = \frac{9}{100}$$

$$\Rightarrow r = \sqrt{\frac{9}{100}} = \frac{3}{10} = 0.3 \text{ cm}$$

diameter of wire = 2 x radius of wire

$$= 2 \times r = 2 \times 0.3$$

$$= 0.6 \text{ cm}$$

Answer 13:

Given :

Diameter of sphere = 15.6 cm

\Rightarrow radius of sphere (R) = 7.8 cm

length of cone (h) = 31.2 cm

let the radius of base of cone is r cm

Volume of Cone = volume of Sphere

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

$$\Rightarrow r^2 = \frac{\left(\frac{4}{3}\right) \times \pi \times R^3}{\left(\frac{1}{3}\right) \times \pi \times h}$$

$$= \frac{4 \times R^3}{h}$$

$$= \frac{4 \times (7.8)^3}{31.2}$$

$$r^2 = 60.84$$

$$\Rightarrow r = \sqrt{60.84} = 7.8 \text{ cm}$$

diameter of base of Cone = 2 x radius of base of Cone

$$= 2 \times r = 2 \times 7.8$$

$$= 15.6 \text{ cm}$$

Answer 14:

Given :

Diameter of sphere = 28 cm

\Rightarrow radius of sphere (R) = 14 cm

Diameter of cone = 35cm

\Rightarrow radius of cone (r) = 17.5cm

let the height of cone is h cm

Volume of Cone = Volume of Sphere

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

$$\Rightarrow h = \frac{\left(\frac{4}{3}\right) \times \pi \times R^3}{\left(\frac{1}{3}\right) \times \pi \times r^2}$$

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

$$= \frac{4 \times 14^3}{(17.5)^2} = \frac{10976}{306.25} \text{ cm}$$

$$= 35.84 \text{ cm}$$

Answer 15:

Given :

radius of big ball (R) = 3 cm

radius of first ball (r_1) = 1.5 cm

radius of second ball (r_2) = 2 cm

let radius of third ball is r_3 cm

Volume of Big Ball = Volume of first ball + Volume of Second ball + Volume of third ball

$$\frac{4}{3}\pi R^3 = \frac{4}{3}\pi r_1^3 + \frac{4}{3}\pi r_2^3 + \frac{4}{3}\pi r_3^3$$

$$\frac{4}{3}\pi R^3 = \frac{4}{3}\pi(r_1^3 + r_2^3 + r_3^3)$$

$$R^3 = (r_1^3 + r_2^3 + r_3^3)$$

$$3^3 = \{(1.5)^3 + (2)^3 + r_3^3\}$$

$$27 = 3.375 + 8 + r_3^3$$

$$r_3^3 = 27 - 11.375$$

$$r_3^3 = 15.625$$

$$r_3 = \sqrt[3]{15.625} = 2.5 \text{ cm}$$

radius of third ball = 2.5 cm

Answer 16:

let the radii of first sphere is x cm and second sphere is y cm and Surface area is S_1 and S_2 .

$$\frac{x}{y} = \frac{1}{2}$$

(Given)

$$\Rightarrow y = 2x$$

..... eq.(i)

$$\text{so, } \frac{S_1}{S_2} = \frac{x}{y}$$

$$= \frac{x^2}{y^2} = \frac{x^2}{(2x)^2}$$

[From eq(i)]

$$= \frac{1}{4}$$

$$\Rightarrow S_1 : S_2 = 1 : 4$$

Answer 17:

let the radii of two sphere is r and R, Volume is V_1 and V_2 respectively

then,

$$\frac{4\pi r^2}{4\pi R^2} = \frac{1}{4} \quad (\text{Given})$$

$$\Rightarrow \frac{r^2}{R^2} = \frac{1}{4}$$

$$\Rightarrow \frac{r}{R} = \frac{1}{2} \quad \dots\dots\dots \text{eq(i)}$$

$$\text{SO, } \frac{V_1}{V_2} = \frac{\left(\frac{4}{3}\right) \times \pi \times r^3}{\left(\frac{4}{3}\right) \times \pi \times R^3}$$

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

$$= \left(\frac{1}{2}\right)^3 \\ = \frac{1}{8}$$

[From eq(i)]

$$\Rightarrow V_1 : V_2 = 1 : 8$$

Answer 18:

Given:

radius of cylindrical tub (R) = 12 cm

depth of tub = 20 cm

level of water raise (h) = 6.75 cm

let the radius of ball is r

Volume of iron ball = volume of water raised

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

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

$$= \frac{4}{3} = \frac{2916}{4}$$

$$r^3 = 729$$

$$\Rightarrow r = 9 \text{ cm}$$

Answer 19:

Given:

radius of cylindrical bucket (R) = 15 cm

height of bucket = 20 cm

radius of ball (r) = 9 cm

let the increase in water level is x

Volume of water raised = volume of spherical ball

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

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

$$\Rightarrow = \frac{4 \times 9^3}{3 \times 15^2}$$

$$= \frac{2916}{675}$$

$$x = 4.32 \text{ cm}$$

Answer 20:

Given:

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$$\text{Outer Diameter of shell} = 12 \text{ cm}$$

$$\Rightarrow \text{Outer radius of shell (R)} = 6 \text{ cm}$$

$$\text{Inner Diameter of shell} = 8 \text{ cm}$$

$$\Rightarrow \text{Inner radius of shell (r)} = 4 \text{ cm}$$

$$\text{Volume of outer Shell} = \frac{4}{3}\pi R^3$$

$$= \frac{4}{3} \times \left(\frac{22}{7}\right) \times 6^3$$

$$= 905.15 \text{ cm}^3$$

$$\text{Volume of inner Shell} = \frac{4}{3}\pi r^3$$

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

$$= 268.20 \text{ cm}^3$$

so, Volume of metal contained in shell = (Volume of outer Shell) - (Volume of inner Shell)

$$= (905.15) - (268.20) \text{ cm}^3$$

$$= 636.95 \text{ cm}^3$$

$$\text{Outer Surface area} = 4\pi R^2 \text{ sq. unit}$$

$$= 4 \times \left(\frac{22}{7}\right) \times 6^2 \text{ cm}^2$$

$$= 452.57 \text{ cm}^2$$

Answer 21:

Given:

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$$\text{External radii of shell (R)} = 9 \text{ cm}$$

$$\text{Internal radii of shell (r)} = 8 \text{ cm}$$

$$\text{density of metal (d)} = 4.5 \text{ gm per cm}^3$$

$$\begin{aligned}\text{Volume of hollow shell} &= \frac{4}{3} \times \pi \times (R^3 - r^3) \\ &= \frac{4}{3} \times \left(\frac{22}{7}\right) \times (9^3 - 8^3) \text{ cm}^3 \\ &= \frac{4}{3} \times \left(\frac{22}{7}\right) \times 6^3 \text{ cm}^3 \\ &= \frac{4}{3} \times \left(\frac{22}{7}\right) \times 217 \text{ cm}^3 \\ &= 909.33 \text{ cm}^3\end{aligned}$$

$$\text{Density} = \frac{\text{Weight}}{\text{Volume}}$$

$$\therefore \text{Weight} = \text{Volume} \times \text{Density}$$

$$= 909.33 \times 4.5 \text{ g}$$

$$= 4092 \text{ g}$$

$$= 4.092 \text{ kg}$$

$$(1 \text{ kg} = 1000 \text{ g})$$

Answer 22:

Given:

$$\text{radius of hemisphere (R)} = 9 \text{ cm}$$

$$\text{Height of cone (h)} = 72 \text{ cm}$$

let the base radius of cone is r.

Volume of Cone = volume of hemisphere

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

$$\left(\frac{1}{3}\right) \times \pi \times r^2 \times 72 = \left(\frac{2}{3}\right) \times \pi \times 9^3$$

$$\Rightarrow r^2 = \frac{2 \times 9 \times 9 \times 9}{72}$$

$$= \frac{1458}{72}$$

$$r^2 = 20.25$$

$$\Rightarrow r = 4.5 \text{ cm}$$

base radius of cone = 4.5 cm

Answer 23:

Given:

Radius of hemispherical bowl (R) = 9 cm

diameter of bottle = 3 cm

\Rightarrow radius of bottle (r) = 1.5 cm

Height of bottle(h) = 4 cm

$$\text{No. Of bottles} = \frac{\text{Volume of bowl}}{\text{Volume of one bottle}}$$

$$= \frac{\left(\frac{2}{3}\right) \times \pi \times (9)^3}{\pi \times (1.5)^2 \times 4}$$

$$= \left(\frac{2 \times 3 \times 81}{9}\right)$$

$$= 54$$

Answer 24:

Given:

$$\text{internalRadius of bowl (r) = 4 cm}$$

$$\text{thickness of bowl(t) = 0.5 cm}$$

⇒ External radius of bowl (R) = Internal radius + thickness

$$=(r + t) \text{ cm}$$

$$=(4+0.5) \text{ cm} =$$

4.5 cm

Volume of steel used = Volume of outer hemisphere - Volume of Inner hemisphere

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

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

$$= \left(\frac{2}{3}\right) \times \pi \times ((4.5)^3 - (4)^3)$$

$$= \left(\frac{2}{3}\right) \times \left(\frac{22}{7}\right) \times 27.125$$

$$= 56.83 \text{ cm}^3$$

Answer 25:

Given:

$$\text{innerRadius of bowl (r) = 5 cm}$$

$$\text{thickness of bowl(t) = 0.25 cm}$$

⇒ Outer radius of bowl (R) = Internal radius + thickness

$$=(r + t) \text{ cm}$$

$$=(5+0.25) \text{ cm} =$$

5.25 cm

Outer Curved surface = $2\pi R^2$ sq. Unit

$$= 2 \times \left(\frac{22}{7}\right) \times (5.25)^2$$

$$= 173.25 \text{ cm}^2$$

Answer 26:

Given:

inner diameter of bowl = 10.5 cm

\Rightarrow inner Radius of bowl (r) = 5.25 cm

Inner Curved surface area of bowl = $2\pi r^2$

$$= 2 \times \left(\frac{22}{7}\right) \times (5.25)^2$$

$$= 173.25 \text{ cm}^2$$

Cost of painting 100 cm^2 = Rs. 32

\Rightarrow for 173.25 cm^2 = Rs. $\left(\frac{32 \times 173.25}{100}\right)$

= Rs. 55.44

Answer 27: let the diameter of earth is d

\Rightarrow radius = $\frac{d}{2}$

thus, diameter of moon will be $\frac{2}{3}$

\Rightarrow radius of moon = $\frac{d}{8}$

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

$$= \frac{\left(\frac{d^3}{8}\right)}{\left(\frac{d^3}{512}\right)} = \frac{d}{8}$$

$$= 64$$

$$\Rightarrow \text{Volume of moon} = \frac{1}{64} \times \text{Volume of Earth}$$

Answer 28:

Volume of Solid hemisphere = Surface area of solid hemisphere (Given)

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

$$r = \frac{9}{2} \text{ unit}$$

$$\Rightarrow \text{diameter} = 2 \times r = 2 \times \frac{9}{2} = 9 \text{ unit}$$

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MULTIPLE CHOICE QUESTIONS

Answer 1-(c)

$$\text{Volume of Cuboid} = l \times b \times h = 15 \times 12 \times 4.5 = 810 \text{ cm}^3$$

Answer 2-: (b)

$$\text{Total Surface Area of cuboid} = 2 = 2(12 \times 9 + 9 \times 8 + 12 \times 8) = 552 \text{ cm}^2$$

Answer 3-: (b)

$$\begin{aligned} \text{Lateral Surface Area of Cuboid} &= [2(l + b) \times h] = [2(15 + 6) \times 0.5] = 21 \text{ m}^2 \\ &\quad \{h = 5 \text{ dm} = 0.5 \text{ m}\} \end{aligned}$$

Answer 4-: (c) length of beam (l)=9 m

$$\text{Height of beam (h)} = 20 \text{ cm} = 0.2 \text{ m}$$

$$\text{Width of beam (b)} = 40 \text{ cm} = 0.4 \text{ m}$$

$$\text{Weight of beam} = \text{Volume of beam} = (l \times b \times h) = 9 \times 0.2 \times 0.4 = 0.72 \text{ m}^3$$

$$1 \text{ m}^3 \text{ weight} = 50 \text{ kg}$$

$$\therefore 0.72 \text{ m}^3 \text{ weight} = 0.72 \times 50 = 36 \text{ kg}$$

Answer 5-: (c)

Length of longest rod placed in room = Diagonal of room

$$= \sqrt{(l^2 + b^2 + h^2)} = \sqrt{10^2 + 10^2 + 5^2} = 15 \text{ m}$$

Answer 6-(d)

Maximum Length of pencil placed in rectangular box = Diagonal of rectangular box =

$$\sqrt{(l^2 + b^2 + h^2)} = \sqrt{(8^2 + 6^2 + 5^2)} = 5 \times \sqrt{5} = 5 \times 2.24 = 11.2 \text{ cm}$$

Answer 7-: (b)

$$\text{Volume of pit} = l \times b \times h = 40 \times 12 \times 16 = 7680 \text{ m}^3$$

$$\text{Volume of one plank} = 4 \times 5 \times 2 = 40 \text{ m}^3$$

$$\text{Total no. of planks} = \frac{7680}{40} = 192$$

Answer 8-: (a)

$$\text{Volume of pit} = l \times b \times h = 20 \times 6 \times 0.5 = 60 \text{ m}^3$$

$$\text{Volume of one plank} = 5 \times 0.25 \times 0.1 = 0.125 \text{ m}^3$$

$$\text{Total no. of planks} = \frac{60}{0.125} = 480$$

Answer 9-: (c)

$$\text{Volume of wall} = 800\text{cm} \times 600\text{cm} \times 22.5\text{cm}$$

$$\text{Volume of one brick} = 25\text{cm} \times 11.25\text{cm} \times 6\text{cm}$$

$$\text{Total bricks required to make wall} = \frac{800\text{cm} \times 600\text{cm} \times 22.5\text{cm}}{25\text{cm} \times 11.25\text{cm} \times 6\text{cm}} = 6400$$

Answer 10-: (b)

$$\text{Volume of dining hall} = 20\text{m} \times 15\text{m} \times 4.5\text{m} = 1350 \text{ m}^3$$

$$\text{One person requires } 5 \text{ m}^3 \text{ air}$$

$$\text{No. of person in hall} = \frac{1350}{5} = 270$$

Answer 11-: (b)

$$\text{Volume of water runs into sea per hour} = 1.5 \times 30 \times 3000 = 135000 \frac{\text{m}^3}{\text{hour}}$$

$$\text{Volume of water runs into sea per min} = \frac{135000}{60} = 2250 \text{ m}^3$$

Answer 12-: (d)

$$\text{Lateral Surface area of cube} = 4a^2$$

$$4a^2 = 256 \text{ m}^2$$

$$a = 8\text{m}$$

$$\text{Volume of cube} = a^3 = 8^3 = 512 \text{ m}^3$$

Answer 13-: (c)

$$\text{Total Surface area of cube} = 6a^2$$

$$6a^2 = 96 \text{ m}^2$$

$$a = 4 \text{ m}$$

$$\text{Volume of cube} = a^3 = 4^3 = 64\text{m}^3$$

Answer 14-: (b)

Volume of cube = a^3

$$a^3 = 512 \text{ cm}^3$$

$a = 8 \text{ cm}$

$$\text{Total Surface area of cube} = 6a^2 = 6 \times 8^2 = 384 \text{ cm}^2$$

Answer 15-: (d)

Length of longest rod fit in a cubical vessel = Diagonal of cubical vessel

$$\text{Diagonal of a cube} = a\sqrt{3} = 10 \text{ cm} \times \sqrt{3} = 10\sqrt{3} \text{ cm}$$

Answer 16-(b)

Length of diagonal of cube = $8\sqrt{3} \text{ cm}$

$a = 8 \text{ cm}$

Answer 17-: (d)

Surface area of cube (A_1) = $6a_1^2$

$$\text{After increasing, edge of cube } a_2 = a_1 + a_1 \times \frac{50}{100} = 1.5a_1$$

$$\text{Surface area of new cube } (A_2) = 6a_2^2 = 6((1.5a_1)^2)$$

$$\begin{aligned} \text{Percentage increase in surface area} &= \frac{A_2 - A_1}{A_1} \times 100 = \frac{6 \times 2.25 \times a_1^2 - 6a_1^2}{6a_1^2} \times 100 = \\ &= 1.25 \times 100 = 125\% \end{aligned}$$

Answer 18-: (b)

Volume of new cube = Sum of volume of all cube = $3^3 + 4^3 + 5^3 = 216 \text{ cm}^3$

Let, side of new cube = a

$$a^3 = 216$$

$$a = 6 \text{ m}$$

$$\text{Lateral surface of new cube} = 4a^2 = 4 \times 6 \times 6 = 144 \text{ cm}^2$$

Answer 19-: (d)

1 hectare = 10000 m^2

Volume of water falls on ground = $2 \times 10000 \times 0.05 = 1000 \text{ m}^3$

Answer 20-: (c)

Let Volume of first cube = V_1 , Surface area = A , Side = a

Volume of second cube = V_2 , Surface area = B , Side = b

$$\frac{V_1}{V_2} = \frac{1}{27}$$

$$\frac{a^3}{b^3} = \frac{1}{27}$$

$$\frac{a}{b} = \frac{1}{3}$$

$$\frac{A}{B} = \frac{(6a^2)}{6b^2}$$

$$\frac{A}{B} = \frac{a^2}{b^2} = \frac{1}{9}$$

A:B=1:9

Answer 21-: (d) Let side of cube = a

Volume of cube = a^3

Volume of cube after each side doubled = $(2a)^3 = 8a^3$

8 times

Answer 22-: (b)

Base diameter of cylinder (d) = 6 cm

Base radius (r) = $\frac{d}{2} = \frac{6}{2} = 3 \text{ cm}$

Height (h) = 14 cm

Volume of cylinder = $\pi r^2 h = \frac{22}{7} \times 3 \times 3 \times 14 = 396 \text{ cm}^3$

Answer 23-: (b)

Base diameter of cylinder (d)=28 cm

$$\text{Base radius (r)} = \frac{d}{2} = \frac{28}{2} = 14 \text{ cm}$$

Height (h)=20 cm

$$\text{Curved Surface area of cylinder} = 2\pi rh = 2 \times \frac{22}{7} \times 14 \times 20 = 1760 \text{ cm}^2$$

Answer 24-: (c)

Curved Surface area of cylinder=1760 cm²

$$2\pi rh = 1760 \text{ cm}^2$$

$$2 \times \frac{22}{7} \times 14 \times h = 1760$$

$$H = 20 \text{ cm}$$

Answer 25-: (b)

Height of cylinder (h)=14 cm

Curved Surface area=264 cm²

$$2\pi rh = 264 \text{ cm}^2$$

$$2 \times \frac{22}{7} \times r \times 14 = 264$$

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

$$\text{Volume of cylinder} = \pi r^2 h = \frac{22}{7} \times 3 \times 3 \times 14 = 396 \text{ cm}^3$$

Answer 26-: (c)

Curved Surface area of cylinder= 264 m²

$$2\pi rh = 264 \text{ m}^2$$

Volume of cylinder= $\pi r^2 h = 924 \text{ m}^3$

$$2\pi rh \times \frac{r}{2} = 924$$

$$\Rightarrow 264 \times \frac{r}{2} = 924 \dots\dots\dots (r = 7 \text{ m})$$

$$2 \times \frac{22}{7} \times 7 \times h = 264 \text{ m}^2$$

$$h = 6 \text{ m}$$

Answer 27-(c)

let Radii=r & R

Heights=h & H

$$\frac{\text{Curved surface area of first}(A)}{\text{Curved surface area of second}(B)} = \frac{2\pi rh}{2\pi RH}$$

$$\frac{A}{B} = \frac{r}{R} \times \frac{h}{H} = \frac{2}{3} \times \frac{5}{3} = \frac{10}{9} \left\{ \frac{r}{H} = \frac{2}{3} \text{ and } \frac{h}{H} = \frac{5}{3} \right\}$$

$$A:B=10:9$$

Answer 28(b)-:

let Radii=r & R

Heights=h & H

$$\frac{\text{Volume of first}(A)}{\text{Volume of second}(B)} = \frac{\pi r^2 h}{\pi R^2 H}$$

$$\frac{A}{B} = \left(\frac{r}{R}\right)^2 \times \frac{h}{H} = \frac{4}{9} \times \frac{5}{3} = \frac{20}{27} \quad \left\{ \frac{r}{H} = \frac{2}{3} \text{ and } \frac{h}{H} = \frac{5}{3} \right\}$$

$$A:B=20:27$$

Answer 29(d)-:

let Radius=r and Height=h

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

$$\text{Volume of cylinder} = 1617 \text{ cm}^3$$

$$\pi r^2 h = 1617$$

$$\frac{22}{7} \times \left(\frac{2}{3}h\right)^2 \times h = 1617$$

$$\frac{4}{9}h^2 \times h = \frac{1617 \times 7}{22}$$

$$h^3 = \frac{(1617 \times 7)}{22} \times \frac{9}{4} = \frac{147 \times 7 \times 9}{8} = \frac{27 \times 49 \times 7}{8}$$

$$h = \frac{3 \times 7}{2} = \frac{21}{2} \text{ cm}$$

$$\text{Total surface area} = 2\pi rh + 2\pi r^2 = 2\pi r(h + r) = 2 \times \frac{22}{7} \times \frac{2}{3} \times \frac{21}{2} \times (h + \frac{2}{3}h)$$

$$= 2 \times \frac{22}{7} \times \frac{2}{3} \times \frac{21}{2} \times \frac{5}{3} \times \frac{21}{2} = 770 \text{ cm}^2$$

Answer 30-(b)

$$\frac{V_1}{V_2} = 1$$

$$\frac{h_1}{h_2} = \frac{1}{2}$$

$$\frac{V_1}{V_2} = \frac{\pi r_1^2 h_1}{\pi r_2^2 h_2}$$

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

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

$$r_1 : r_2 = \sqrt{2} : 1$$

Answer 31-(a)

$$\frac{\text{Curved Surface area of cylinder}}{\text{Total Surface area of cylinder}} = \frac{1}{2}$$

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

$$\frac{h}{r + h} = \frac{1}{2}$$

$$2h = r + h$$

$$h = r$$

$$2\pi r(h + r) = 616 \text{ cm}^2$$

$$2\pi r \times 2r = 616 \{r=h\}$$

$$4\pi r^2 = 616$$

$$r^2 = 7^2$$

$$r=7 \text{ cm}$$

$$\text{Volume of cylinder} = \pi r^2 h = \frac{22}{7} \times 7 \times 7 \times 7 = 1078 \text{ cm}^3$$

Answer 32(c)

$$\text{Volume of cylinder (V)} = \pi r^2 h$$

Where r=radius & h=height

$$R = \frac{r}{2} \text{ \& } H=2h$$

$$\text{Volume of new cylinder} = \pi R^2 H = \pi \times \left(\frac{r}{2}\right)^2 \times 2h = \frac{1}{2} \pi r^2 h = \frac{1}{2} V$$

The volume new Cylinder will be halved

Answer 33(b):

$$\text{Number of coins} = \frac{\text{Volume of Cylinder}}{\text{Volume of one coin}}$$

$$= (\pi R^2 H) / (\pi r^2 h) = \left(\left(\frac{4.5}{2}\right)^2 \times 10\right) / \left(\left(\frac{1.5}{2}\right)^2 \times 0.2\right) = 450$$

Answer 34-(d)

$$\text{Volume of wire (V)} = \pi r^2 h$$

Where r=radius & h=length of wire

$$\text{New radius } R = \frac{r}{3} \text{ and Height} = H$$

Volume of Wire remains same so,

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

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

$$H=9h$$

The length become 9 times

Answer 35-(b)

Diameter of Roller=84 cm

$$\text{Radius of Roller (r)} = \frac{84}{2} = 42 \text{ cm}$$

Length of Roller (h)=1 m=100 cm

$$\text{Area cover by Roller in 1 revolution} = 2\pi rh = 2 \times \frac{22}{7} \times 42 \times 100 = 26400 \text{ cm}^2$$

$$\text{Area cover by Roller in 500 revolution} = 500 \times 26400 = 13200000 \text{ cm}^2$$

$$1 \text{ cm}^2 = \frac{1}{100} \text{ m}^2$$

$$13200000 \text{ cm}^2 = 1320 \text{ m}^2$$

Answer 36-: (b)

The volume of lead= 2.2 dm³ = 0.0022 m³

Cylindrical wire diameter=0.50 cm

Cylindrical wire radius=0.25 cm=0.0025 m

Let length of wire=h

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

$$\pi r^2 h = 0.22$$

$$\frac{22}{7} \times 0.0025 \times 0.0025 \times h = 0.22$$

$$h = \frac{0.0022 \times 7}{22 \times 0.0025 \times 0.0025} = 112 \text{ m}$$

Answer 37-: (c)

The lateral surface of cylinder= $2\pi rh$

Answer 38-: (b)

Height of cone (h)=24 cm

Diameter of base=14 cm

Radius of base (r)=7 cm

$$\begin{aligned}\text{Curved Surface area of Cone} &= \pi r l = \pi r \sqrt{(h^2 + r^2)} \{l = \sqrt{(h^2 + r^2)}\} \\ &= \frac{22}{7} \times 7 \times \sqrt{24^2 + 7^2} = 22 \times 25 = 550 \text{ cm}^2\end{aligned}$$

Answer 39-: (d)

Height of cone (h)=12 cm

Base radius of cone (r)=6 cm

$$\text{Volume of Cone} = \frac{1}{3} \times \pi \times r \times r \times h = \frac{1}{3} \pi \times 6 \times 6 \times 12 = 144\pi \text{ cm}^3$$

Answer 40-: (c)

Base radius of conical tent (r)=7 m

Height of conical tent (h)=24 m

$$\begin{aligned}\text{Curved Surface area of cone} &= \pi r l = \pi r \sqrt{(h^2 + r^2)} \{l = \sqrt{(h^2 + r^2)}\} \\ &= \frac{22}{7} \times 7 \times \sqrt{24^2 + 7^2} = 22 \times 25 = 550 \text{ m}^2\end{aligned}$$

Let length of cloth=l

$$l \times \text{width} = 550 \text{ m}^2$$

$$l \times 2.5 = 550$$

$$l = \frac{550}{2.5} = 220 \text{ m}$$

Answer 41(a):-

$$\text{Volume of cone} = \frac{1}{3} \times \pi \times r^2 \times h = 1570 \text{ cm}^3$$

$$\frac{1}{3} \times (3.14) \times r^2 \times 14 = 1570 \quad (\text{h} = 14 \text{ cm and } \pi = 3.14)$$

$$r^2 = \frac{1570 \times 3}{(3.14) \times 14}$$

$$r^2 = 100$$

$$r = 10 \text{ cm}$$

Answer 42 (b):-

height (h) = 21 cm , slant height (l) = 28 cm

let r be the radius of cone

$$l^2 = h^2 + r^2$$

$$r^2 = l^2 - h^2$$

$$= 28^2 - 21^2$$

$$r^2 = 49 \times 7$$

$$\Rightarrow r = \sqrt{49 \times 7} = 7\sqrt{7} \text{ cm}$$

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

$$= \frac{1}{3} \times \left(\frac{22}{7}\right) \times (7\sqrt{7})^2 \times 21$$
$$= 7546 \text{ cm}^3$$

Answer 43:- (c)

height = 24 cm

Volume of Cone = $\frac{1}{3} \pi r^2 h = 1232 \text{ cm}^3$

$$\frac{1}{3} \times \left(\frac{22}{7}\right) \times r^2 \times 24 = 1232$$

$$r^2 = \frac{1232 \times 3 \times 7}{24 \times 22}$$

$$r^2 = 49$$

$$r = \sqrt{49} = 7 \text{ cm}$$

slant height (l) = $\sqrt{r^2 + h^2}$

$$= \sqrt{7^2 + 24^2} = \sqrt{625}$$

$$= 25$$

curved surface area = $\pi r l$

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

$$= 550 \text{ cm}^2$$

Answer 44 (d).

Given $r:R = 4:5$

let the height be h and H respectively.

$$V_1:V_2 = 1:4$$

$$\Rightarrow \frac{\left(\frac{1}{3} \times \pi \times r^2 \times h\right)}{\left(\frac{1}{3} \times \pi \times R^2 \times H\right)} = \frac{1}{4}$$

$$\Rightarrow \left(\frac{r}{R}\right)^2 \times \left(\frac{h}{H}\right) = \frac{1}{4}$$

$$\left(\frac{4}{5}\right)^2 \times \left(\frac{h}{H}\right) = \frac{1}{4}$$

$$\frac{h}{H} = \frac{25}{64}$$

$$\Rightarrow h:H = 25:64$$

Answer 45.(a)

let the original height of cone is h and radius is r .

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

when height is doubled i.e, $2h$

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

$$\text{Increase in Volume} = \frac{2}{3} \pi r^2 h - \frac{1}{3} \pi r^2 h = \frac{1}{3} \pi r^2 h$$

$$\text{percentage Increase} = \frac{(\text{increase volume})}{(\text{original volume})} \times 100$$

$$= \frac{\frac{1}{3}\pi r^2 h}{\frac{1}{3}\pi r^2 h} \times 100$$

$$= 100$$

Answer 46(b).

let the slant height be l and L

$$\Rightarrow l : L = 1 : 2 \quad (\text{given})$$

$$\Rightarrow L = 2l \quad \dots\dots \text{eq(i)}$$

and let radii be r and R

$$\Rightarrow \frac{\pi r l}{\pi R L} = \frac{2}{1} \quad (\text{Given})$$

$$\Rightarrow \frac{\pi r l}{\pi R (2l)} = \frac{2}{1} \quad \text{from eq(i)}$$

$$\Rightarrow \frac{r}{2R} = \frac{2}{1}$$

$$\Rightarrow \frac{r}{R} = \frac{4}{1}$$

Answer 47(b).

$$\text{Volume of Cylinder} = \pi r^2 h$$

$$\text{Volume of Cone} = \frac{1}{3}\pi r^2 h \quad (\text{same radius and same height})$$

$$\text{ratio of Volume} = \frac{\pi r^2 h}{\left(\frac{1}{3}\pi r^2 h\right)} = \frac{3}{1}$$

Answer 48 (d). let the height of cylinder and cone be h and H respectively .

It is given that volumes and radius is same.

Volume of Cylinder = Volume of Cone

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

$$\Rightarrow \frac{h}{H} = \frac{1}{3}$$

so, ratio of height will be 1:3 .

Answer 49(a).

let the height of cylinder and cone be h and H and raddi of bases is r and R respectively .

$$\Rightarrow h : H = 2:3$$

$$\Rightarrow r : R = 3:4 \quad (\text{Given})$$

$$\begin{aligned} \text{Ratio of Volume} &= \frac{\pi r^2 h}{\frac{1}{3} \pi R^2 H} = 3 \times \left(\frac{r}{R}\right)^2 \times \left(\frac{h}{H}\right) = 3 \times \left(\frac{3}{4}\right)^2 \times \left(\frac{2}{3}\right) \\ &= 3 \times \left(\frac{9}{16}\right) \times \left(\frac{2}{3}\right) = \frac{9}{8} \end{aligned}$$

$$\Rightarrow \text{ratio of Volume} = 9 : 8$$

Answer 50(d).

let the initial height and radius of cone be h and r.

$$\Rightarrow \text{Volume of Cone} = \frac{1}{3} \pi r^2 h = V$$

when both are doubled then new height and radius will be 2h and 2r.

$$\begin{aligned}
 \Rightarrow \text{New volume of Cone} &= \frac{1}{3}\pi(2r)^2(2h) \\
 &= \frac{1}{3}\pi \times 4(r)^2 \times 2(h) \\
 &= 8 \times \left(\frac{1}{3}\pi(r)^2(h)\right) \\
 &= 8 \times V
 \end{aligned}$$

Answer 51(d).

base radius of cylinder (R) = 3 cm

height (H) = 5 cm

radius of solid cones (r) = 1 mm = 0.1 cm

height (h) = 1 cm

$$\begin{aligned}
 \text{No. Of Cones} &= \frac{\text{Volume of Cylinder}}{\text{Volume of 1 Cone}} \\
 &= \frac{\pi R^2 H}{\left(\frac{1}{3}\pi r^2 h\right)} = \frac{3 \times 3^2 \times 5}{((0.1)^2 \times 1)} \\
 &= \frac{135}{0.01} = 13500
 \end{aligned}$$

Answer 52(b).

let the height of tent be h.

Area of ground = no of person x amount of area each person occupy

$$= 11 \times 4 = 44 \text{ m}^2$$

$$\Rightarrow \pi r^2 = 44 \text{ m}^2$$

Amount of air to breadth = volume of tent = 220 m³

$$\frac{1}{3}\pi r^2 h = 220$$

$$\Rightarrow \left(\frac{1}{3}\right) \times \pi r^2 \times h = 220$$

$$\Rightarrow h = \frac{220 \times 3 \times 7}{\pi r^2} = \frac{220 \times 3 \times 7}{44} \quad (\pi r^2 = 44)$$

$$\Rightarrow h = 15 \text{ m}$$

Answer 53(a).

radius of sphere = $2r$

Volume of Sphere = $\frac{4}{3}\pi R^3$

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

($R=2r$)

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

$$= \frac{32}{3} \pi r^3$$

Answer 54(b).

radius of sphere(R) = 10.5 cm

Volume of Sphere = $\frac{4}{3}\pi R^3$

$$= \frac{4}{3} \times \left(\frac{22}{7}\right) \times (10.5)^3 \text{ cm}^3$$

$$= 4851 \text{ cm}^3$$

Answer 55(d).

radius (r) = 21 cm

Surface area of sphere = $4\pi r^2 = 4 \times \left(\frac{22}{7}\right) \times 21^2 = 5544 \text{ cm}^2$

Answer 56 (c).

Surface area of a sphere = 1386 cm^2

$$\Rightarrow 4\pi r^2 = 1386$$

$$4 \times \left(\frac{22}{7}\right) \times r^2 = 1386$$

$$r^2 = \frac{1386 \times 7}{22 \times 4} = \frac{441}{4}$$

$$r = \sqrt{\frac{441}{4}} = \frac{21}{2} \text{ cm}$$

$$r = 10.5 \text{ cm}$$

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

$$= \frac{4}{3} \times \left(\frac{21}{2}\right)^3 \times (10.5)^3$$

$$= 4851 \text{ cm}^3$$

Answer 57(a).

$$\text{Surface area of a sphere} = 144\pi \text{ cm}^2$$

$$\Rightarrow 4\pi r^2 = 144\pi$$

$$4 \times r^2 = 144$$

$$r^2 = \frac{144}{4}$$

$$r = \sqrt{\frac{144}{4}} = \frac{12}{2} \text{ cm}$$

$$r = 6 \text{ cm}$$

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

$$= \frac{4}{3} \times \pi \times (6)^3$$

$$= 288 \pi \text{ cm}^3$$

Answer 58(a).

$$\text{Volume of Sphere} = 38808 \text{ cm}^3$$

$$\Rightarrow \frac{4}{3} \pi r^3 = 38808$$

$$\Rightarrow \frac{4}{3} \times \left(\frac{22}{7}\right) \times (r)^3 = 38808$$

$$r^3 = \frac{38808 \times 7 \times 3}{4 \times 22} = 441 \times 21$$

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$$= 9261$$

$$r^3 = (21)^3$$

$$\Rightarrow r = 21 \text{ cm}$$

Curved surface area of sphere = $4\pi r^2$ sq. Unit

$$= 4 \times \left(\frac{22}{7}\right) \times 21^2$$

$$= 5544 \text{ cm}^2$$

Answer 59(b).

Let the radius of spheres are r and R respectively

$$\text{Ratio of Volumes} = \frac{\frac{4}{3}\pi r^3}{\frac{4}{3}\pi R^3} = \frac{1}{8}$$

$$\frac{r^3}{R^3} = \frac{1}{8}$$

$$\Rightarrow \frac{r}{R} = \frac{1}{2}$$

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$$\left(\frac{r}{R}\right)^3 = \left(\frac{1}{2}\right)^3$$

..... eq.(i)

$$\text{Ratio of Surface area} = \frac{4\pi r^2}{4\pi R^2}$$

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

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

$$= \left(\frac{1}{2}\right)^2$$

..... from eq.(i)

$$= \frac{1}{4}$$

Answer 60(d).

radius of metal ball(R) = 8 cm

radius of small ball (r) = 2 cm

$$\begin{aligned}\text{No of smaller balls} &= \frac{\text{Volume of metal ball}}{\text{volume of small ball}} \\ &= \frac{\frac{4}{3}\pi R^3}{\frac{4}{3}\pi r^3} \\ &= \frac{R^3}{r^3} = \frac{8^3}{2^3} = \frac{512}{8} = 64\end{aligned}$$

Answer 61(b).

radius of cone (R) = 2.1 cm

height of cone (h) = 8.4 cm

let the radius of sphere be r.

Volume of sphere = Volume of Cone

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

$$\Rightarrow \frac{4}{3} \times \left(\frac{22}{7}\right) \times r^3 = \frac{1}{3} \times \left(\frac{22}{7}\right) \times (2.1)^2 \times 8.4$$

$$\Rightarrow r^3 = \frac{2.1 \times 2.1 \times 8.4}{4} = (2.1)^3$$

$$r = 2.1 \text{ cm}$$

Answer 62(b).

radius of ball (R) = 6 cm

diameter of wire = 0.2 cm

$$\Rightarrow \text{radius of wire (r)} = 0.1 \text{ cm}$$

let the length of wire be h.

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Volume of wire = volume of ball

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

$$\Rightarrow h = \frac{4 \times R^3}{3 \times r^2} = \frac{4 \times 6^3}{3 \times (0.1)^2} = \frac{288}{0.01}$$

$$h = 28800 \text{ cm} = 288 \text{ m} \quad (1 \text{ m} = 100 \text{ cm})$$

Answer 63(c).

radius of metallic sphere (R) = 10.5 cm

radius of cone (r) = 3.5 cm

height of cone (h) = 3 cm

$$\text{No of cones} = \frac{\text{Volume of metallic sphere}}{\text{volume of small cone}}$$

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

$$= \frac{(4R^3)}{(r^2 h)} = \frac{(4 \times (10.5)^3)}{((3.5)^2 \times 3)} = \frac{(4 \times 3 \times 3 \times 3)}{(3)}$$

$$= 126$$

Answer 64(d).

diameter of lead shots = 0.3 cm

radius of shots (r) = 0.15 cm

dimension of cuboid = 9 cm x 11 cm x 12 cm

$$\text{No of lead shots} = \frac{\text{Volume of cuboid}}{\text{volume of one lead shot}}$$

$$= \frac{(lwh)}{\left(\frac{4}{3} \pi R^3\right)}$$

$$= \frac{(9 \times 11 \times 12)}{\left(\frac{4}{3} \times \left(\frac{22}{7}\right) \times (0.15)^3\right)}$$

$$= 84000$$

Answer 65(c).

diameter of sphere = 6 cm

$$\Rightarrow \text{radius of sphere (R)} = 3 \text{ cm}$$

diameter of wire = 2 mm

$$\Rightarrow \text{radius of wire (r)} = 1 \text{ mm} = 0.1 \text{ cm}$$

let the length of wire be h.

Thus, Sphere is drawn into wire,

\Rightarrow Volume of wire = volume of ball

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

$$\Rightarrow h = \frac{4 \times R^3}{3 \times r^2} = \frac{4 \times 3^3}{3 \times (0.1)^2} = \frac{4 \times 3 \times 3 \times 3}{(3 \times 0.1 \times 0.1)}$$

$$h = 3600 \text{ cm} = 36 \text{ m}$$

$$(1 \text{ m} = 100 \text{ cm})$$

Answer 66(a).

diameter of sphere = 12.6 cm

$$\Rightarrow \text{radius of sphere (R)} = 6.3 \text{ cm}$$

height of cone (h) = 25.2 cm

let the radius of Cone be r.

Volume of sphere = Volume of Cone

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

$$\Rightarrow \frac{4}{3} \times \left(\frac{22}{7}\right) \times (6.3)^3 = \frac{1}{3} \times \left(\frac{22}{7}\right) \times (r)^2 \times 25.2$$

$$\Rightarrow r^2 = \frac{4 \times 6.3 \times 6.3 \times 6.3}{25.2} = 6.3 \times 6.3 = (6.3)^2$$

$$r = 6.3 \text{ cm}$$

Answer 67(c).

$$\text{radius of big ball (R)} = 3 \text{ cm}$$

$$\text{radius of first ball (r}_1\text{)} = 1.5 \text{ cm}$$

$$\text{radius of second ball (r}_2\text{)} = 2 \text{ cm}$$

let radius of third ball is r_3 cm

Volume of Big Ball = Volume of first ball + Volume of Second ball
+ Volume of third ball

$$\frac{4}{3}\pi R^3 = \frac{4}{3}\pi r_1^3 + \frac{4}{3}\pi r_2^3 + \frac{4}{3}\pi r_3^3$$

$$\frac{4}{3}\pi R^3 = \frac{4}{3}\pi(r_1^3 + r_2^3 + r_3^3)$$

$$R^3 = (r_1^3 + r_2^3 + r_3^3)$$

$$3^3 = \{(1.5)^3 + (2)^3 + r_3^3\}$$

$$27 = 3.375 + 8 + r_3^3$$

$$r_3^3 = 27 - 11.375$$

$$r_3^3 = 15.625$$

$$r_3 = \sqrt[3]{15.625} = 2.5 \text{ cm}$$

$$\text{radius of third ball} = 2.5 \text{ cm}$$

Answer 68(a).

initial radius (r) = 6 cm

final radius (R) = 12 cm

$$\begin{aligned}\text{ratio of surface area} &= \frac{(3\pi r^2)}{(3\pi R^2)} = \frac{(r^2)}{(R^2)} \\ &= \frac{(6^2)}{(12^2)} \\ &= \frac{(1)}{(2 \times 2)} \\ &= \frac{(1)}{(4)}\end{aligned}$$

Answer 69(d).

let the radii be r and R of sphere.

$$r + R = 7 \text{ cm.}$$

$$\Rightarrow r = (7 - R) \text{ cm}$$

Ratio of Volume of sphere = 64 : 27

$$\Rightarrow \frac{\frac{4}{3}\pi R^3}{\frac{4}{3}\pi r^3} = \frac{64}{27}$$

$$\Rightarrow \frac{R^3}{(7-R)^3} = \frac{64}{27} \quad \text{from eq(i)}$$

$$\Rightarrow \frac{R^3}{(7-R)^3} = \left(\frac{4}{3}\right)^3$$

$$\Rightarrow \frac{R}{(7-R)} = \left(\frac{4}{3}\right)$$

$$\Rightarrow R = 4 \text{ cm}$$

$$\Rightarrow r = (7 - R) \text{ cm} = (7 - 4) \text{ cm} = 3 \text{ cm}$$

$$\text{Difference of surface area} = 4\pi R^2 - 4\pi r^2$$

$$= 4\pi(4)^2 - 4\pi(3)^2$$

$$= 4\pi(7)$$

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

$$= 88 \text{ cm}^2$$

Answer 70(c).

Given:

$$\text{Radius of hemispherical bowl (R)} = 9 \text{ cm}$$

⇒

$$\text{diameter of bottle} = 3 \text{ cm}$$

$$\text{radius of bottle (r)} = 1.5 \text{ cm}$$

⇒

$$\text{Height of bottle (h)} = 4 \text{ cm}$$

$$\text{No. Of bottles} = \frac{\text{Volume of bowl}}{\text{Volume of one bottle}}$$

$$= \frac{\left(\frac{2}{3}\right) \times \pi \times (9)^3}{\pi \times (1.5)^2 \times 4}$$

$$= \left(\frac{2 \times 3 \times 81}{9}\right)$$

$$= 54$$

Answer 71(b).

let the height of cone be h.

And radius of cone be r .

height of hemisphere = radius of hemisphere = r

Volume of cone = Volume of hemisphere

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

$$\Rightarrow h = 2r$$

$$\frac{h}{r} = \frac{2}{1}$$

hence ratio of height = 2:1

Answer 72(a).

let the radius of each base is r cm.

height of hemisphere = radius of hemisphere = r cm

so, height of each is r cm.

Volume of Cone : Volume of hemisphere : Volume of cylinder

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

$$\Rightarrow \frac{1}{3} : \frac{2}{3} : 1$$

$$\Rightarrow 1 : 2 : 3$$

Answer 73(c).

let the radius of sphere be R

Volume of Sphere = Surface area of sphere (given)

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

$$\Rightarrow R = 3 \text{ unit.}$$

