VOLUME AND SURFACE AREA OF SOLIDS - CHAPTER15

EXERCISE – 15A

Answer1.

(i) Given, $l = 12cm, b = 8cm, h = 4.5cm.$

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

$= 12cm \times 8cm \times 4.5cm$

$= 432cm^3$

Lateral surface area of cuboid

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

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

$= [2 \times 20 \times 4.5]\ cm^2$

$= 180\ cm^2$

Total surface area of cuboid

$= 2(lb + bh + hl)$ square units

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

$= 2(96cm^2 + 36cm^2 + 54cm^2)$

$=2 \times 186cm^2$

$= 372\ cm^2$

(ii) Given, $l = 26m, b= 14m, h= 6.5m$

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

$= 26m \times 14m \times 6.5m$

$= 2366m^3$

Lateral surface Area of cuboid

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

$= [2\ (26+14) \times 6.5]\ m^2$

$= [2 \times 40 \times 6.5]\ m^2$

$= 520\ m^2$.

Total surface Area of cuboid

$= 2(lb + bh + hl)$ square units

$= 2(26 \times 14 + 14 \times 6.5 + 6.5 \times 26)$

$= 2(364+91+169)$

$= 2 \times 624$

$= 1248 m^2$.

(iii)

Given, l= 15m, b= 6m,

h= 5dm

h= $5 \times 1/10$m [11Equation Section (Next) $\because$ 1dm = 1/10m]

h= 0.5m

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

$= (15 \times 6 \times 0.5)\ m^3$

$= 45 m^3$

Lateral surface Area of cuboid

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

$= [2(15+6) \times 0.5]\ m^2$

$= [2 \times 21 \times 0.5]\ m^2$

$= 21\ m^2$.

Total surface Area of cuboid

$=2(lb + bh + hl)$ square units

$=2(15\times6 + 6\times0.5 + 15\times0.5)\ m^2$

$=2(90+3+7.5)\ m^2$

$=2\times100.5\ m^2$

$=201 m^2$.

(iv) Given,

$l=24m$

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

$h=6m$,

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

$= (24\times.25\times6)\ m^3$

$= 36m^3$

Lateral surface area of cuboid

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

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

$= [2\times24.25\times6]$

$= 291\ m^2$.

Total surface area of cuboid

$=2(lb + bh + hl)$ square units

$=2(24\times0.25 + 0.25\times6 + 24\times6)\ m^2$

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

$= 2\times 151.2$

$= 303\ m^2$

Answer2. Given,

A match box measure = 4cm × 2.5cm × 1.5cm

Volume of 1 match box = 4cm × 2.5cm × 1.5cm

= $15cm^3$

∵ volume of one matchbox = $15cm^3$

∴ volume of 12 matchbox = 15 × 12 cm^3

= 180 cm^3.

Answer 3. Given,

Cuboid water tank

Length (l) =6m

Width(b)= 5m

Height(h)=4.5m

Volume of cuboid water tank = (l×b×h) = (6×5×4.5) m^3 = 135 m^3

Given, $1m^3$ = 1000litres

So, $135m^3$ = 135 × 1000litres

= 135000 litre

Litre of water hold by tank = 135000 litre.

Answer 4. Given,

Capacity of a cuboid tank = 50000 litre

Length(l) = 10m

Depth(h)=2.5m

Width(b)=?

Volume of tank = length × depth × width

Capacity = 50000 litre

∵ 1000 litre = $1m^3$ (given)

∴ 1 litre = $\frac{1}{1000}m^3$

$\therefore$ 50000 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

Answer5. Given,

Go down measures = 40m × 25m × 15m

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

Maximum no. of wooden crates $= \frac{volume of godown}{volume of one wooden crates}$

$= \frac{40m\times 25m\times 15m}{1.5m\times 1.25m\times 0.5m}$

$= \frac{15000m^3}{0.9375m^3}$

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

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

Volume of pit = l×b×h

$= 20\times6\times0.8 = 96m^3$

Volume of plank = l×b×h

$= 5\times0.25\times0.1 = 0.125m^3$

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

= 768.

Answer 7. Given,

Length of wall(l) = 8m = 800cm {∵ 1m = 100cm}

Height of wall(h) = 6m = 600cm

Thick of wall(b) = 22.5cm

Volume of wall = l×b×h

$= 800\times600\times22.5$

$= 10800000cm^3$

Dimension of each brick = 25cm×11.25cm×6cm

Volume of each brick = l×b×h

$= 1687.5cm^3$

Let total required bricks to construct wall = x

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

$= \frac{10800000}{1687.5}$

x= 6400

Answer 8. Given,

Length of cistern = 8m(l)

Breadth of cistern = 6m(b)

Depth of cistern = 2.5m

Let , capacity of closed rectangular cistern = x

$x = l\times b\times h$

$= 8\times6\times2.5$

$= 120m^3$

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

$= 2(8\times6+6\times2.5+2.5\times8)$

$= 2(48+15.0+20)$

$= 2 \times 83$

$= 166\ m^2$

Answer9. Given,

Room dimensions = $(9m\times8m\times6.5m)$

Room has one door , two windows

dimension of door = $2m\times1.5m$

dimensions of windows = $1.5m\times1m$

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

area of wall=lateral surface area of wall

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

let l= 9, b=8,h=6.5(given)

$= [2(9+8) \times 6.5]m^3$

$=2\times17\times6.5$

Area of wall = $221m^3$

Let area of wall which will be white wishing = x

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

area of door = 2×1.5 = $3m^2$

area of windows = 1.5×1 = $1.5m^2$

but there are two windows then

= 1.5 × 2

= $3m^2$

x = 221 – (3+3) = $215m^2$

∵ per square meter cost = 25

∴ 216 square meter cost = 25 × 215

= 5375

Answer 10. Given,

Length of the wall = 15m

Width of wall = 30cm = 0.3m

Height of wall = 4m

Volume of wall = l×b×h

= 15×.3×4 = $18.0m^3$

Brick dimension = 22cm×12.5cm×7.5cm

Volume of brick = 2062.5 cm^3

➔ 1/12 of the total volume of the wall consist mortar

So, volume of mortar = 1/12 × 18 = $1.5m^3$

Volume of wall which is made of brick = 18.15 = $16.5m^3$

Let total brick require = x

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

volume of brick = $2062.5cm^3$

$= \frac{2062.5}{100\times100\times100} m^3$

$x = 16.5/\frac{2062.5}{100\times100\times100} = 8000$

Answer11. Given,

External dimension of box = 36cm×25×16.5cm

Total dimension of box = (36-3)×(25-3)×(16.5-1.5)

=33×22×15

Because box is 1.5cm throughout

Volume of external box = 36×25×16.5

$= 14850cm^3$

Volume of internal box = 33×22×15

$= 10890cm^3$

Volume of iron in box = 14850 – 10890

$= 3960cm^3$

$\because$ 1 cm^3 of iron weighs = 15gm

$\therefore$ 3960 cm^3 of iron weighs is = 15 × 3960

= 59400gm

$\because$ 1kg = 1000gm

$\therefore$ 59400gm = 59400/1000 = 59.4kg

Answer 12. Given

Sheet metal costs=6480

Per square meter cost = 120

Area of sheet metal $= \frac{totalcost}{costpersquaremeter}$

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

Area of sheet metal = $54m^2$

Length(l) = 5m

Breadth(b)= 3m

Height(h)= ?

Area of sheet metal = 2(lb+bh+hl)

$54m^2$= 2(5×3+3×h+5×h)

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

54=2(15+8h)

2×8h=24

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

Answer13. Given,

Volume of cuboid =$1596m^2$

Length = 16m

Ratio of breadth & height = 3:2

Let

Breadth = b

Height = h

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

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

volume = l×b×h

putting the values

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

$\Rightarrow 1536 = 8\times3\times h^2$

$\Rightarrow h^2 = \frac{1536}{8\times3} = 64$

$\Rightarrow h = \sqrt{64}$

$\Rightarrow h = 8m$

$\Rightarrow b = 3/2h$

$b = 1.5\times8$

$b = 12m$

breadth = 12m

height = 8m

Answer14. Given,

Dining hall of dimension = 20m ×16m × 4.5m

Volume of dining hall = $1440m^2$

One person require $5m^3$ of air

Total no. of person accommodate in hall = $\frac{volume of hall}{volume of a person}$

$= \frac{1440}{5} = 288$ persons

Answer15. Given,

Length of classroom(l)=10m

Width of classroom (b)=6.4m

Height of classroom(h)=5m

Area of classroom floor = 10×6.4

= $64m^2$

One student require area = $1.6m^2$

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

Volume of air = volume of classroom

= l×b×h

=10×6.4×5

=$320m^3$

Require cubic meters of air for each student

$= \frac{volume of air}{total students}$

$=\frac{320}{40}= 8m^3$

Answer16. Given,

Surface area of cuboid = $758cm^2$

Length of cuboid = 14cm

Breadth of cuboid = 11cm

Surface area of cuboid = 2(lb+bh+hl)

Let h be the height of cuboid

$\Rightarrow 758 = 2(14\times11+11\times h+14\times h)$

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

$\Rightarrow 154+25h=379$

$\Rightarrow 25h=379-154$

$\Rightarrow 25h=225$

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

Height of cuboid is 9cm

Answer17. Given,

Height of rain falls (h)= 5cm

Area of ground = 2 hectares

$\because$ 1 hectares = 10000m^2

$\therefore$ 2 hectares = 20000m^2

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 = 1000m^3

Answer 18. Given,

Edge measure of cube (a) = 9m

Volume of cube = a^3

Volume of cube = $9\times9\times9 = 729m^3$

Lateral surface area of cube = $4a^2$

$\Rightarrow 4\times9\times9$

$\Rightarrow 4\times81$

$\Rightarrow 324m^2$

Total surface area of cube = $6a^2$

$= 4\times9\times9$

$\Rightarrow 6\times81 \quad = 486m^2$

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

$= \sqrt{3} \times9$

$= 1.79\times9 = 15.57m.$

Answer 19. Given,

Total surface area of cube = $1176cm^3$

Total surface area of cube = $6a^2$

$6a^2=1176$

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

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

a = 14cm

volume of cube = a^3

$= 14\times14\times14$

$= 2744cm^3$

Answer 20. Given,

Lateral surface area of cube = $900cm^2$

Lateral surface area of cube = $4a^2$

$\Rightarrow 4a^2 = 900$

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

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

volume of cube $= a^3$

$\Rightarrow 15 \times 15 \times 15$

$\Rightarrow 3375cm^3$

Answer 21. Given,

Volume of cube $= 512\ cm^3$

$a^3 = 512$

$a = 8\ cm$

surface area of cube $= 6a^2$

$= 6 \times 8 \times 8$

$= 6 \times 64$

$= 384cm^2$

Answer 22. Given,

Size of cube $= 3cm \times 4cm \times 5cm$

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

$= 27 \times 64 \times 125$

$= 216cm^3$

Let side of new cube $= a$

volume = a^3

$216 = a^3$

$a = \sqrt{216} = 6cm$

lateral surface area of new cube = $4a^2$

$= 4\times6\times6$

$=144cm^2$

Answer 23. Given,

Longest side in a cuboid = diagonal of cuboid

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

Given, l=10 , b= 10 , h=5

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

$= \sqrt{225}$

$= 15$ m

Answer 24. Given,

$\Rightarrow l + b + h = 19cm$............(1)

length of diagonal = 11cm

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

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

$l^2+b^2+h^2 = 121$ --------(2)

do square of equation of (1)

⇒(l + b + h)2 = (19)2

l2 + b2 + h2 + 2(lb + bh + hl) = 361 ----------- (3)

put the values in equation (3)

⇒121 + 2(lb + bh + hl) =361

⇒2(lb + bh + hl) = 361 − 121

⇒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,

new edge a’ = a+$\frac{a\times50}{100}$

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

Surface area of new cube = 6×a^2

a’ = 6× $(\frac{3a}{2})^2$

a’ = $\frac{27}{2}$ a^2

percentage increase in surface are = $(\frac{a-a\prime}{a})\times100$

$= \frac{\left(\frac{27}{2}\right)a\times a-6\times a\times a}{6\times a\times a}\times100$

$= \frac{27a\times a+2a\times a}{6\times2\times a\times a}\times 100$

= 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

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

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

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

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

$= \frac{1}{abc}$

$= \frac{1}{V}$ 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 × time

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

Volume of water flown 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 $x\ m^2$

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

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

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

Volume = $144m^3$

Edge of cube = a^3

$= (2)^3$

$= 8m^3$

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

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

EXERCISE – 15B

Answer 1:

Given :

diameter = 28 cm

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

height (h) =40 cm

Find

(i) Curved surface area of cylinder = ?

Curved Surface area of cylinder = 2πrh sq. Unit

$= 2 \times \left(\frac{22}{7}\right) \times 14 \times 40$

$= 160 \times 22 cm^2$

$= 3520\ cm^2$

(ii) Total Surface area of cylinder = {2πr(r+h)} sq. Unit

$= 2 \times \left(\frac{22}{7}\right) \times 14 \times (14 + 40)$

$= 88 \times 54 cm^2$

$= 4752\ cm^2$

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

$= \left(\frac{22}{7}\right) \times 14^2 \times 40$

$= 44 \times 560 cm^3$

$= 24640\ cm^3$

Answer 2: Given :

diameter of bowl (d) = 7 cm

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

height (h) of bowl = 4 cm

Find

Amount of Soup in bowl = ?

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

$= \pi r^2 h$ cubic Unit

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

$= 154\ cm^3$

$= 0.154$ litre $(1\ cm^3 = 0.001$ litre$)$

so, for 250 patient = $250 \times Soup for 1 patient$

$= 250 \times 0.154$ litre

$= 38.5$ litre

Answer 3:

Given :

Radius of pillar (r) = 20 cm = 0.2 m (1cm = .1 m)

Height (h) = 10 m

Concrete required for one pillar = Volume of pillar

$= \pi r^2 h$ cubic Unit

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

$= 1.256\ m^3$

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

$= 14 \times 1.256 m^3$

$= 17.6\ m^3$

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

$= l \times b \times h$ cubic Unit

$= 5 \times 4 \times 15 cm^3$

$= 300\ cm^3$

(ii) Given:

dimeter (d) = 7 cm

so, radius (r) = 3.5 cm

height (h) = 10 cm

Capacity of plastic cylinder = volume of Cylinder

$= \pi r^2 h$ cubic Unit

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

$= 385\ cm^3$

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

Height (h) = 4 m

Cost of Cleaning = 14 rs per m^2

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

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

$= 6.28\ m^2$

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

$= 14 \times 6.28$

= Rs 87.92

Cost of Cleaning for 20 Pillar = 20×87.92 20 x 87.92

= Rs 1760 (approx)

Answer 6: Given:

Curved Surface area = 4.4 m^2

radius (r) = 0.7 m

height = ?

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

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

$\Rightarrow$ h = 1 m

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

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

$= 1.54\ m^3$

Answer 7: Given:

Curved Surface area = 94.2 cm^2

height(h) = 5 cm

Find

(i) Radius of its base = ?

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

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

$\Rightarrow$ r = 3 cm

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

= $3.14 \times 3^2 \times 5$ cm^3

= 141.3 cm^3

Answer 8: Given:

Capacity of Closed Cylinder = 15.4 litre

= 15400 cm^3 (1 litre = 1000 cm^3)

height(h)= 1m = 100 cm

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

let's find radius of vessel

Volume of vessel = Capacity of vessel = 15400 cm^3

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

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

$r^2 = 49$

$\Rightarrow r = 7$ cm

Area of metal sheet = total surface are of cylindrical vessel

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

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

$= 4708 \text{ cm}^2$

Answer 9:

Given:

Inner diameter (d) = 24 cm

⇒ Inner radius (r) = 12 cm

Outer diameter (D) = 28 cm

⇒ Outer radius (R) = 14 cm

length = height(h) = 35 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

⇒ Mass of pipe

$= 5720 \times 0.6g$

= 3432 gm

= 3.432 kg (1000 gm = 1 kg)

Answer 10: Given:

diameter (d) = 5 cm

⇒ radius (r) =2.5 cm

length (h) = 28 m = 280 cm

Total radiating surface = curved surface area of pipe

= 2πrh sq. Unit

$= 2 \times \left(\frac{22}{7}\right) \times 2.5 \times 2800$

= 44,000 cm^2

Answer 11: Given:

radius (r) =10.5 cm

height (h)=60 cm

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

$= \frac{22}{7} \times (10.5)^2 \times 60\ cm^3$

= 20790 cm^3

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

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

= 103950 gm

= 103.95 kg (1 kg = 1000 gm)

Answer 12: Given:

Curved Surface area = 1210 cm^2

diameter (d) = 20 cm

⇒ radius (r) = 10 cm

height (h) =?

Curved Surface area = 2πrh sq. Unit = 1210 cm^2

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

h = 19.25 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:

Curved Surface area = 4400 cm^2

Circumference of base = 110 cm

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

Circumference of base = $2\pi r$ = 110 cm

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

r = 17.5 cm

Curved Surface area = $2\pi rh$ = 4400 cm^2

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

h = 40 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:

Volume of Cylinder = 1617 cm^3

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

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

Total surface area = ?

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

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

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

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

$h^3 = 1157.625$

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

h = 10.5 cm

thus, $r = \frac{2h}{3} = \frac{2x10.5}{3}$

r = 7 cm

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

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

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

$= 770\ cm^2$

Answer 15: Given:

Total Surface area = $462\ cm^2$

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

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

$= 154\ cm^2$

Total Surface area =

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

Curved surface area =

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

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

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

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

$r = 2h$ …………. eq.(iii)

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

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

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

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

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:

Total Surface area = 231 cm^2

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

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

$= 154 \text{ cm}^2$

Total Surface area =

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

Curved surface area =

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

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

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

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

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

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

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

$\Rightarrow \quad h^2 = 49$

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

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

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

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

Answer 17: Given:

total surface area = $616\ cm^2$

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

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

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

⇒ $2h = r+h$

$h = r$ ...... eq.(i)

total surface area = 616 cm^2

⇒ $2\pi r(r + h) = 616$

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

$r^2 = 49$

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

⇒ $r = h = 7$cm

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

$= \frac{22}{7} \times 72 \times 7$

$= 1078$ cm^3

Answer 18: Given:

diameter ofbucket =28 cm

⇒ radius (r) = 14 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

$= \frac{22}{7} \times 14^2 \times 72$ cm^3

$= 44352$ cm^3

Volume of rectngular tank = l . b . h

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

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

Volume of bucket = Volume of rectngular tank

$\Rightarrow$ $44352 = 1848h_t$

$h_t = 24$ cm

Answer 19: Given:

Height of barrel = 7 cm

diameter(d) = 5 mm

$\Rightarrow$ radius (r) = 2.5 mm = .25 cm (1 cm = 0.1 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

$= (330 \times \frac{1}{1.375} \times 200)$ = 48000 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

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

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

l = 12727.27 cm

= 127.27 m (1 m =100 cm)

Answer 21: Given:

Internal diameter = 3 cm

∴ radius (r) =1.5 cm

height (h) = 1m = 100 cm

thickness (t) = 1 cm

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

$\Rightarrow$ r + t = 1.5 + 1

= 2.5 cm

Volume of cast iron pipe = External volume – Internal Volume

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

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

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

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

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

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

= 26400 gm

= 26.4 kg

Answer 22: Given:

Internal diameter = 10.4 cm

$\Rightarrow$ Internal radius (r) =5.2 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

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

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

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

$= 704 \ cm^3$

Answer 23:

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

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

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

$= 74800 \ cm^2$

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

Answer 24:

Given:

radius of large vessel(R) = 15 cm

height (H) =32 cm

radius of glass (r) = 3 cm

height (h) = 8 cm

Price of one glass = 15 rs

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

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

$= \frac{15x15x32}{3x3x8}$

$= 100$

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

$= 15 \times 100$

$= 1500$ rs

Answer 25:

Given:

Insidediameter = 10 m

⇒ inner radius (r) = 5 m

height (h) = 8.4 m

width of embankment = 7.5 m

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

= 5 m + 7.5 m

= 12.5 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 m

Answer 26:

Given:

speed of water = 30 cm per sec

Area of cross section = 5 cm^2

time = 1 minute

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

= $5 \times 30 = 150$ cm^3

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

= 150×60

= 9000 cm^3

= 9 litre (1 cm^3 = 0.001 litre)

Answer 27:

Given: diameter of tank = 1.4 m

⇒ radius (R) = 0.7 m

height (H) = 2.1 m

diameter of pipe = 3.5 cm = 0.35 m

⇒ radius (r) = 0.175 m

rate of flow = 2 m per sec

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

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

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

volumeof water flow in 1 s = area of cross section x rate of flow per sec

$= \pi r^2 \times 2$

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

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

let the time required to fill the tank is t seconds

water flow in t sec by pipe = volume of tank

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

⇒ t = 1680 s

= 28 minutes

Answer 28:

Given:

diameter of container = 56 cm

⇒ radius (r) = 28 cm

dimension of rectangular solid = (32 cm x 22 cm x 14 cm)

Volume of Solid = l.b.h

$= 32 \times 22 \times 14$cm^3

$= 9856$ 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

$\Rightarrow \quad 9856 = 2474h$

$h = 4$ cm

Answer 29:

Given:

height (h) = 280 m

diameter = 3 m

$\Rightarrow$ radius (r) = 1.5 m

rate = 15 rs per m^3

rate of cementing =10 rs m^2

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

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

$= 1980 \ m^3$

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

so , for 1980 m^3 = 1980×15

= 29700 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 m^2 = 10 rs

so, for 2640 m^2 = 2640 × 10

= 26400 rs

Answer 30:

Given:

Weight of wire = 13.2 kg

diameter = 4 mm

⇒ radius (r) = 2 mm = 0.2 cm

let the length of wire is h cm

Thus, volume of wire x 8.4 g = (13.2 × 1000) g

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

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

⇒ h = 12500 cm = 125 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 = $\frac{totalcost}{rate}$

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

(ii) let inner radius = r metre

inner Curved Surface area = 2πrh =110 m^2

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

⇒ h =1.75 m

(iii) capacity of vessel = volume of vessel = πr^{2}h cubic unit

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

= 96.25 m^3

Answer 32:

Given:

height (h) = 14 cm

let inner radii = r cm

and outer radii = R cm

Difference between surfaces area = 88 cm^2

⇒ (2πRh – 2πrh) = 88

(R – r) $= \frac{88}{2\pi h}$= 1 cm ....eq(i)

Volume of the tube = πR^{2}h – πr^{2}h =176 cm^3

πh(R^2 - r^2) =176

$\Rightarrow \frac{22}{7} \times 14 \times (R+r) \times (R-r) = 176$ $\quad a^2 - b^2 = (a+b)(a-b)$

putting value of eq(i) we get

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

$\Rightarrow \quad (R+r) = 4 \quad \ldots\ldots\ldots\ldots$ eq.(ii)

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

R = 2.5 cm

r = 1.5 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 cm

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

$2\pi r = 30$ cm

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

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

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

(i) Rolling by breadth

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

h = 30 cm

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

$2\pi r = 18$ cm

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

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

$= \pi \times \left(\frac{9}{\pi}\right) \times \left(\frac{9}{\pi}\right) \times 30$ cm^3

$= \frac{2430}{\pi}$cm^3

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

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

$= 5 : 3$

EXERCISE-15C

Answer

1-: Base Radius (r) = 5.25 cm

Slant Height (l) = 10 cm

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

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

Diameter of Base (d) = 24 m

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

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

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

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

Height (h) = 24 cm

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

Area of Sheet required to make one Cap= Curved Surface Area of cone= πrl

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

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

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

Slant Height (l) = 14 cm

Let Radius of cone (r) = r cm

πrl = 308

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

r = 7 cm

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

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

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

Base Diameter (d) = 14m

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

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

Given 1 m^2 cost = ₹12

∴ $550\ m^2\ cost = 12 \times 550 =$ ₹6600

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

Base Radius (r) = 24 m

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

Area of Canvas required for Tent = Curved Surface Area of Cone = πrl

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

Given 1 m^2 cost = ₹70

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

Answer 7-: Total Numbers of Hollow Cones = 50

Base Diameter of Cone (d) = 40 cm

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

Height (h) = 1 m

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

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

Total Curved Surface Area = $50 \times 0.640565 = 32.028\ m^2$

Given 1 m^2 cost = ₹25

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

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

Height (h) = 12 cm

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

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

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

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

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

Answer 9-: Height (h) = 6 cm

Slant Height (l) = 10 cm

Let radius = r

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

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

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

$r\ = 8\ cm$

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

Curved Surface Area = $\pi rl = 3.14 \times 8 \times 10 = 251.2\ cm^2$

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

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

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

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

Height of pit (h) = 12 m

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

Given 1 m^3 capacity = 1 *kilolitre*

∴38.5 m^3 capacity = 38.5 kilolitres

Answer 11-: Diameter (d) = 9 m

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

Height (h) = 3.5 m

Given heap of wheat is conical

∴ Canvas Require for cover the heap = Curved Surface area of cone

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

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

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

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

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

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

$$l = 25\ m$$

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

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

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

Tent Height (h) = 24 m

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

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

Let total meters of cloth = l m

Width = 2.5 m

Area = $l \times 2.5$

$$550 = l \times 2.5$$

l = 220 m

Answer14-: let,Heights of cones h1 & h2, base radius r1 & r2

$$\frac{h1}{h2} = \frac{1}{3} \quad and \quad \frac{r1}{r2} = \frac{3}{1}$$

Volume of first cone V1 = $\frac{1}{3} \times \pi \times (r1)^2 \times h1$

Volume of first cone V2 = $\frac{1}{3} \times \pi \times (r2)^2 \times h2$

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

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

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

$$V1 : V2 = 3 : 1$$

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,

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

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

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

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

$$\frac{r^2}{h^2} = \frac{9}{16}$$

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

$$r : h = 3 : 4$$

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

Base Radius (r) = 1.6 cm

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

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) = $\frac{D}{2} = 52.5\ m$

Slant Height (l) = 53 m

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

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

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

Answer 18-: For Cylinder

Height (H) = 2.8 m

Diameter = 20 cm 0.2 m

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

For Cone

Height (h) $= 42\ cm = 0.42\ cm$

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)

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

$$= \frac{22}{7} \times 0.1 \times 0.1(\frac{1}{3} \times 0.42 + 2.8) = 0.092400\ cm^3$$

$1\ m^3 = 100000\ cm^3$

$\therefore 0.092400\ m^3 = 92400\ cm^3$

$1\ cm^3$ weight = 7.5 gm

$\therefore 92400\ cm^3 = 92400 \times 7.5 = 69300\ gm = 693\ kg$

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

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

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

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

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

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

Pipe is cylindrical

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

$$= \pi \times r^2 \times 10\ m$$

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

Radius of pipe (r) $= \frac{0.5}{2} = 2.5\ cm$

Diameter of cone = 40 cm

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

Height (h) = 24 cm

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

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

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

1 min = 60 sec

$\therefore$ 0.2 min = 60 × 0.2 = 12 sec

= 51 min 12 seconds

Answer 21-: Area of cloth = 165 m^2

Conical tent Radius = 5 m

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

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

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

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

Curved Surface Area of cone $= \pi r l$

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

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

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

EXERCISE 15D

Answer 1:

(i)

radius (r) = 3.5 cm

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

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

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

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

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

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

(ii)

radius (r) = 4.2 cm

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

$$= \frac{4}{3} \times \left(\frac{22}{7}\right) \times (4.2)^3 cm^3$$

$$= 310.464 \text{ cm}^3$$

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

$$= 4 \times \left(\frac{22}{7}\right) \times (4.2)^2 cm^2$$

$$= 221.76 \text{ cm}^2$$

(iii)

radius (r) = 5 cm

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

$$= \frac{4}{3} \times \left(\frac{22}{7}\right) \times (5)^3 cm^3$$

$$= 523.81\ cm^3$$

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

$$= 4 \times \left(\frac{22}{7}\right) \times (5)^2 cm^2$$

$$= 314.28\ cm^2$$

Answer 2:

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

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

$r^3 = 9261$

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

$r = 21$ cm

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

$$= 4 \times \left(\frac{22}{7}\right) \times (21)^2 cm^2$$

$$= 5544\ cm^2$$

Answer 3:

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

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

$r^3 = 144.703125$

$\Rightarrow \quad r = \sqrt[3]{144.703125}$

$r = 5.25$ m

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

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

$= 346.5\ m^2$

Answer 4:

let radius of sphere = r cm

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

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

$r^2 = \frac{49}{4}$

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

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

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

$\Rightarrow \quad = 179.67\ cm^3$

Answer 5:

let radius of sphere = r cm

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

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

$r^2 = 144$

$r = 12$ cm

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

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

Answer 6:

Given :

diameter of leadshot = 3 mm

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

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

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

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

$= \frac{(12\times11\times9)}{\left(\frac{4}{3}\right)\times\left(\frac{22}{7}\right)\times(0.15)^3}$

$= \frac{(12\times11\times9\times3\times7)}{4\times22\times(0.15)\times(0.15)\times(0.15)}$

$=$ 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

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

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

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

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

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

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

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

Answer 9:

Given :

radius (R) of sphere = 10.5 cm

radius (r) of cones = 3.5 cm

height of cone (h) $= 3$ cm

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

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

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

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

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

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

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

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

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 cm = 36 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

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

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

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

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

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

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

diameter of wire = 2 x radius of wire

= 2 x r = 2 x 0.3

= 0.6 cm

Answer 13:

Given :

Diameter of sphere = 15.6cm

⇒ radius of sphere (R) = 7.8 cm

length of cone (h) = 31.2cm

let the radius of base of cone is r cm

Volume of Cone = volume of Sphere

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

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

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

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

$r^2 = 60.84$

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

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

= 2 x r = 2 x 7.8

= 15.6 cm

Answer 14:

Given :

Diameter of sphere = 28 cm

⇒ radius of sphere (R) = 14 cm

Diameter of cone = 35cm

⇒ radius of cone (r) = 17.5cm

let the height of cone is h cm

Volume of Cone = Volume of Sphere

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

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

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

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

$= 35.84$ cm

Answer 15:

Given :

radius of big ball(R) = 3 cm

radius of first ball (r_1) = 1.5cm

radius of second ball (r_2) = 2cm

let radius of third ball is $r_3$cm

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

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

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

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

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

$27 = 3.375 + 8 + r_3^3$

$r_3^3 = 27 - 11.375$

$r_3^3 = 15.625$

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

$\Rightarrow \quad y = 2x$ .... eq.(i)

so , $\frac{S1}{S2} = \frac{x}{y}$

$= \frac{x^2}{y^2} = \frac{x^2}{(2x)^2}$ [From eq(i)]

$= \frac{1}{4}$

$\Rightarrow S_1 : S_2 = 1:4$

Answer 17:

let the radii of twosphere is r and R , Volume is V_1 and V_2respectively then,

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

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

$\Rightarrow \frac{r}{R} = \frac{1}{2}$ .... eq(i)

so , $\frac{V1}{V2} = \frac{\left(\frac{4}{3}\right)\times\pi\times r^3}{\left(\frac{4}{3}\right)\times\pi\times R^3}$

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

$= \left(\frac{1}{2}\right)^3$ [From eq(i)]

$= \frac{1}{8}$

$\Rightarrow V_1 : V_2 = 1:8$

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

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

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

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

$r^3 = 729$

$\Rightarrow \quad r = 9$ 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

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

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

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

$= \frac{2916}{675}$

x = 4.32 cm

Answer 20:

Given:

Outer Diameter of shell = 12 cm

⇒Outer radius of shell(R) = 6 cm

Inner Diameter of shell = 8cm

⇒Inner radius of shell (r) = 4cm

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

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

$= 905.15\ cm^3$

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

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

$= 268.20\ cm^3$

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

= (905.15) – (268.20) cm^3

$= 636.95\ cm^3$

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

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

$= 452.57\ cm^2$

Answer 21:

Given:

Externalradii of shell(R) = 9 cm

Internalradii of shell(r) = 8 cm

density of metal (d) = 4.5 gm per cm^3

Volume of hollow shell $= \frac{4}{3} \times \pi \times (R^3 - r^3)$

$= \frac{4}{3} \times \left(\frac{22}{7}\right) \times (9^3 - 8^3)\text{cm}^3$

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

$= \frac{4}{3} \times \left(\frac{22}{7}\right) \times 217 \text{ cm}^3$

$= 909.33 \text{ cm}^3$

Density $= \frac{Weight}{Volume}$

∴ Weight = Volume x Density

$= 909.33 \times 4.5$ g

= 4092 g

= 4.092 kg (1 kg = 1000 g)

Answer 22:

Given:

radius of hemisphere (R) = 9 cm

Height of cone (h) = 72 cm

let the base radius of cone is r.

Volume of Cone = volume of hemisphere

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

$\left(\frac{1}{3}\right) \times \pi \times r^2 \times 72 = \left(\frac{2}{3}\right) \times \pi \times 9^3$

$\Rightarrow r^2 = \frac{2\times9\times9\times9}{72}$

$= \frac{1458}{72}$

$r^2 = 20.25$

$\Rightarrow \quad r = 4.5$ 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

No. Of bottles $= \frac{Volume of bowl}{Volume of one bottle}$

$= \frac{\left(\frac{2}{3}\right)\times\pi\times(9)^3}{\pi\times(1.5)^2\times4}$

$= \left(\frac{2\times3\times81}{9}\right)$

$= 54$

Answer 24:

Given:

internalRadius of bowl (r) = 4 cm

thickness of bowl(t) = 0.5 cm

⇒ External radius of bowl (R) = Internal radius + thickness

=(r + t) cm

= (4+0.5) cm = 4.5 cm

Volume of steel used = Volume of outer hemisphere – Volume of Inner hemisphere

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

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

$= \left(\frac{2}{3}\right) \times \pi \times ((4.5)^3 - (4)^3)$

$= \left(\frac{2}{3}\right) \times \left(\frac{22}{7}\right) \times 27.125$

$= 56.83\ cm^3$

Answer 25:

Given:

innerRadius of bowl (r) = 5 cm

thickness of bowl(t) = 0.25 cm

⇒ Outer radius of bowl (R) = Internal radius + thickness

=(r + t) cm

= (5+0.25) cm = 5.25 cm

Outer Curved surface = $2\pi R^2$ sq. Unit

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

$= 173.25\ cm^2$

Answer 26:

Given:

innerdiameter of bowl $= 10.5$ cm

$\Rightarrow$ inner Radius of bowl (r) $= 5.25$ cm

Inner Curved surface area of bowl $= 2\pi r^2$

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

$= 173.25\ cm^2$

Cost of painting 100 cm^2 = Rs. 32

$\Rightarrow$ for 173.25 cm^2 = Rs. $\left(\frac{32\times173.25}{100}\right)$

= 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 $= \frac{d}{8}$

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

$$=\frac{\left(\frac{d^3}{8}\right)}{\left(\frac{d^3}{512}\right)} = \frac{d}{8}$$

$= 64$

$\Rightarrow Volumeofmoon = \frac{1}{64} \times VoulmeofEarth$

Answer 28:

Volume of Solid hemisphere = Surface area of solid hemisphere (Given)

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

$r = \frac{9}{2}$ unit

$\Rightarrow$ diameter $= 2 \times r = 2 \times \frac{9}{2} = 9$ unit

MULTIPLE CHOICE QUESTIONS

Answer 1-(c)

Volume of Cuboid= $l \times b \times h = 15 \times 12 \times 4.5 = 810\ cm^3$

Answer 2-: (b)

Total Surface Area of cuboid= $2 = 2(12 \times 9 + 9 \times 8 + 12 \times 8) = 552\ cm^2$

Answer 3-: (b)

Lateral Surface Area of Cuboid= $[2(l + b) \times h] = [2(15 + 6) \times 0.5] = 21\ m^2$

$\{h = 5 \text{ dm} = 0.5 \text{ m}\}$

Answer 4-: (c) length of beam (l)=9 m

Height of beam (h)=20 cm=0.2 m

Width of beam (b)=40 cm=0.4 m

Weight of beam= Volume of beam $= (l \times b \times h) = 9 \times 0.2 \times 0.4 = 0.72\ m^3$

$1\ m^3\ weight = 50kg$

$\therefore 0.72\ m^3 weight = 0.72 \times 50 = 36kg$

Answer 5-: (c)

Length of longest rod placed in room=Diagonal of room

$$= \sqrt{(l^2 + b^2 + h^2)} = \sqrt{10^2 + 10^2 + 5^2)} = 15\ m$$

Answer 6-(d)

Maximum Length of pencil placed in rectangular box=Diagonal of rectangular box= $\sqrt{(l^2 + b^2 + h^2)} = \sqrt{(8^2 + 6^2 + 5^2)} = 5 \times \sqrt{5} = 5 \times 2.24 = 11.2\ cm$

Answer 7-: (b)

Volume of pit= $l \times b \times h = 40 \times 12 \times 16 = 7680\ m^3$

Volume of one plank= $4 \times 5 \times 2 = 40\ m^3$

Total no. of planks= $\frac{7680}{40} = 192$

Answer 8-: (a)

Volume of pit= $l \times b \times h = 20 \times 6 \times 0.5 = 60\ m^3$

Volume of one plank= $5 \times 0.25 \times 0.1 = 0.125\ m^3$

Total no. of planks= $\frac{60}{0.125} = 480$

Answer 9-: (c)

Volume of wall= $800cm \times 600cm \times 22.5cm$

Volume of one brick= $25cm \times 11.25cm \times 6cm$

Total bricks required to make wall= $\frac{800cm \times 600cm \times 22.5cm}{25cm \times 11.25cm \times 6cm} = 6400$

Answer 10-: (b)

Volume of dining hall= $20m \times 15m \times 4.5m = 1350\ m^3$

One person requires 5 m^3air

` No. of person in hall= $\frac{1350}{5} = 270$

Answer 11-: (b)

Volume of water runs into sea per hour= $1.5 \times 30 \times 3000 = 135000 \frac{m^3}{hour}$

Volume of water runs into sea per min= $\frac{135000}{60} = 2250\ m^3$

Answer 12-: (d)

Lateral Surface area of cube= $4a^2$

$$4a^2 = 256\ m^2$$

a=8m

Volume of cube= $a^3 = 8^3 = 512\ m$

Answer 13-: (c)

Total Surface area of cube= $6a^2$

$$6a^2 = 96\ m^2$$

a=4 m

Volume of cube= $a^3 = 4^3 = 64m^3$

Answer14-: (b)

Volume of cube= a^3

$$a^3 = 512\ cm^3$$

a=8 cm

Total Surface area of cube= $6a^2 = 6 \times 8^2 = 384\ cm^2$

Answer 15-: (d)

Length of longest rod fit in a cubical vessel=Diagonal of cubical vessel

Diagonal of a cube= $a\sqrt{3} = 10cm \times \sqrt{3} = 10\sqrt{3}\ cm$

Answer 16-(b)

Length of diagonal of cube= $8\sqrt{3}\ \ cm$

$$a\sqrt{3} = 8\sqrt{3}$$

a=8 cm

Answer 17-: (d)

Surface area of cube $(A_1) = 6{a_1}^2$

After increasing, edge of cube$a_2 = a_1 + a_1 \times \frac{50}{100} = 1.5a_1$

Surface area of new cube $(A_2) = 6a_2 = 6((1.5a_1)^2)$

Percentage increase in surface area= $\frac{A_2 - A_1}{A_1} \times 100 = \frac{6\times 2.25\times a_1^2 - 6a_1^2}{6a_1^2} \times 100 =$

$1.25 \times 100 = 125\%$

Answer 18-: (b)

Volume of new cube=Sum of volume of all cube= $3^3 + 4^3 + 5^3 = 216\ cm^3$

Let, side of new cube=a

$$a^3 = 216$$

a=6 m

Lateral surface of new cube= $4a^2 = 4 \times 6 \times 6 = 144\ cm^2$

Answer 19-: (d)

1 hectare=10000 m^2

Volume of water falls on ground= $2 \times 10000 \times 0.05 = 1000\ m^3$

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)= $\frac{d}{2} = \frac{6}{2} = 3\ cm$

Height (h)=14 cm

Volume of cylinder= $\pi r^2 h = \frac{22}{7} \times 3 \times 3 \times 14 = 396\ cm^3$

Answer 23-: (b)

Base diameter of cylinder (d)=28 cm

Base radius (r)= $\frac{d}{2} = \frac{28}{2} = 14\ cm$

Height (h)=20 cm

Curved Surface area of cylinder= $2\pi rh = 2 \times \frac{22}{7} \times 14 \times 20 = 1760\ cm^2$

Answer 24-: (c)

Curved Surface area of cylinder=1760 cm^2

2πrh=1760 cm^2

$2 \times \frac{22}{7} \times 14 \times h = 1760$

H=20 cm

Answer 25-: (b)

Height of cylinder (h)=14 cm

Curved Surface area=264 cm^2

2πrh=264 cm^2

$$2 \times \frac{22}{7} \times r \times 14 = 264$$

r =3 cm

Volume of cylinder= $\pi r^2 h = \frac{22}{7} \times 3 \times 3 \times 14 = 396\ cm^3$

Answer 26-: (c)

Curved Surface area of cylinder= $264\ m^2$

$$2\pi rh = 264\ m^2$$

Volume of cylinder= $\pi r^2 h = 924\ m^3$

$$2\pi rh \times \frac{r}{2} = 924$$

$\Rightarrow 264 \times \frac{r}{2} = 924$ ……………… (r =7 m)

$$2 \times \frac{22}{7} \times 7 \times h = 264\ m^2$$

h =6 m

Answer27-: (c)

let Radii=r & R

Heights=h & H

$$\frac{Curved\ surface\ area\ of\ first(A)}{Curved\ surface\ area\ of\ second(B)} = \frac{2\pi rh}{2\pi RH}$$

$\frac{A}{B} = \frac{r}{R} \times \frac{h}{H} = \frac{2}{3} \times \frac{5}{3} = \frac{10}{9} \{\frac{r}{H} = \frac{2}{3} \quad and \frac{h}{H} = \frac{5}{3}\}$

A:B=10:9

Answer 28(b)-:

let Radii=r & R

Heights=h & H

$$\frac{Volume\ of\ first(A)}{Volume\ of\ second(B)} = \frac{\pi r^2 h}{\pi R^2 H}$$

$\frac{A}{B} = \left(\frac{r}{R}\right)^2 \times \frac{h}{H} = \frac{4}{9} \times \frac{5}{3} = \frac{20}{27} \qquad \{\frac{r}{H} = \frac{2}{3} \quad and \frac{h}{H} = \frac{5}{3}\}$

A:B=20:27

Answer 29(d)-:

let Radius=r and Height=h

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

Volume of cylinder=1617 cm^3

$$\pi r^2 h = 1617$$

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

$$\frac{4}{9}h^2 \times h = \frac{1617 \times 7}{22}$$

$$h^3 = \frac{(1617 \times 7)}{22} \times \frac{9}{4} = \frac{147 \times 7 \times 9}{8} = \frac{27 \times 49 \times 7}{8}$$

$$h = \frac{3 \times 7}{2} = \frac{21}{2}\, cm$$

Total surface area$= 2\pi rh + 2\pi r^2 = 2\pi r(h+r) = 2 \times \frac{22}{7} \times \frac{2}{3}\ h \times (h + \frac{2}{3}\text{h})$

$$= 2 \times \frac{22}{7} \times \frac{2}{3} \times \frac{21}{2} \times \frac{5}{3} \times \frac{21}{2} = 770\ cm^2$$

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)

$\frac{Curved\ Surface\ area\ of\ cylinder}{Total\ Surface\ area\ of\ cylinder} = \frac{1}{2}$

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

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

$$2h = r + h$$

h=r

$$2\pi r(h+r) = 616\ cm^2$$

$2\pi r \times 2r = 616$ {r=h}

$$4\pi r^2 = 616$$

$$r^2 = 7^2$$

r=7 cm

Volume of cylinder= $\pi r^2 h = \frac{22}{7} \times 7 \times 7 \times 7 = 1078\, cm^3$

Answer 32(c)

Volume of cylinder $(V) = \pi r^2\, h$

Where r=radius & h=height

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

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):

Number of coins= $\frac{Volume\ of\ Cylinder}{Volume\ of\ one\ coin}$

$= (\pi R^2 H)/(\pi r^2 h) = (\left(\frac{4.5}{2}\right)^2 \times 10)/(\left(\frac{1.5}{2}\right)^2 \times 0.2) = 450$

Answer 34-(d)

Volume of wire (V) $= \pi r^2 h$

Where r=radius & h=length of wire

New radius $R = \frac{r}{3}$ 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

Radius of Roller (r)= $\frac{84}{2} = 42\ cm$

Length of Roller (h)=1 m=100 cm

Area cover by Roller in 1 revolution= $2\pi rh = 2 \times \frac{22}{7} \times 42 \times 100 = 26400\ cm^2$

Area cover by Roller in 500 revolution= $500 \times 26400 = 13200000\ cm^2$

$$1\ cm^2 = \frac{1}{100} m^2$$

$$13200000\ cm^2 = 1320\ m^2$$

Answer 36-: (b)

The volume of lead= $2.2\ dm^3 = 0.0022\ m^3$

Cylindrical wire diameter=0.50 cm

Cylindrical wire radius=0.25 cm=0.0025 cm

Let length of wire=h

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

$$\pi r^2 h = 0.22$$

$$\frac{22}{7} \times 0.0025 \times 0.0025 \times h = 0.22$$

$$h = \frac{0.0022 \times 7}{22 \times 0.0025 \times 0.0025} = 112\ m$$

Answer 37-: (c)

The lateral surface of cylinder=2πrh

Answer 38-: (b)

Height of cone (h)=24 cm

Diameter of base=14 cm

Radius of base (r)=7 cm

Curved Surface area of Cone= $\pi r l = \pi r\sqrt{(h^2 + r^2)}\{l = \sqrt{(h^2 + r^2)}\}$

$$= \frac{22}{7} \times 7 \times \sqrt{24^2 + 7^2} = 22 \times 25 = 550\ cm^2$$

Answer 39-: (d)

Height of cone (h)=12 cm

Base radius of cone (r)=6 cm

Volume of Cone= $\frac{1}{3} \times \pi \times r \times r \times h = \frac{1}{3}\ \pi \times 6 \times 6 \times 12 = 144\pi\ cm^3$

Answer 40-: (c)

Base radius of conical tent (r)=7 m

Height of conical tent (h)=24 m

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

$$= \frac{22}{7} \times 7 \times \sqrt{24^2 + 7^2)} = 22 \times 25 = 550\ m^2$$

Let length of cloth=l

$$l \times width\ =\ 550\ m^2$$

$$l \times 2.5 = 550$$

$$l = \frac{550}{2.5} = 220\ m$$

Answer 41(a):-

Volume of cone = $\frac{1}{3} \times \pi \times r^2 \times h$= 1570 cm^3

$\frac{1}{3} \times (3.14) \times r^2 \times 14$= 1570 (h = 14 cm and π = 3.14)

$r^2 = \frac{1570 \times 3}{(3.14) \times 14}$

$r^2 = 100$

r = 10 cm

Answer42 (b):-

height (h) = 21 cm , slant height (l)= 28 cm

let r be the radius of cone

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

$$r^2 = l^2 - h^2$$

$=28^2 - 21^2$

$$r^2 = 49 \times 7$$

$\Rightarrow r = \sqrt{49 \times 7} = 7\sqrt{7}$cm

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

$$= \frac{1}{3} \times \left(\frac{22}{7}\right) \times \left(7\sqrt{7}\right)^2 \times 21$$

$$= 7546 \text{ cm}^3$$

Answer 43.:- (c)

height = 24 cm

Volume of Cone $= \frac{1}{3}\pi r^2 h = 1232$ cm^3

$\frac{1}{3} \times \left(\frac{22}{7}\right) \times r^2 \times 24 = 1232$

$r^2 = \frac{1232 \times 3 \times 7}{24 \times 22}$

$r^2 = 49$

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

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

$= \sqrt{7^2 + 24^2} = \sqrt{625}$

$= 25$

curved surface area $= \pi rl$

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

$= 550 \text{ cm}^2$

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.

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

when height is doubled i.e, 2h

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

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

percentage Increase $= \frac{(increasedvolume)}{(originalvolume)} \times 100$

$$=\frac{\frac{1}{3}\pi r^2 h}{\frac{1}{3}\pi r^2 h}\times 100$$

$$= 100$$

Answer 46(b).

let the slant height be l and L

$\Rightarrow$ l : L = 1 : 2 (given)

$\Rightarrow$ L= 2l …… eq(i)

and let radii be r and R

$\Rightarrow \frac{\pi rl}{\pi RL}=\frac{2}{1}$ (Given)

$\Rightarrow \frac{\pi rl}{\pi R(2l)}=\frac{2}{1}$ from eq(i)

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

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

Answer 47(b).

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

Volume of Cone $=\frac{1}{3}\pi r^2 h$ (same radius and same height)

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 rescpectively .

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 .

⇒h : H = 2:3

⇒ r : R = 3:4 (Given)

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

$= 3 \times \left(\frac{9}{16}\right) \times \left(\frac{2}{3}\right) = \frac{9}{8}$

⇒ ratio of Volume = 9 : 8

Answer 50(d).

let the initial height and radius of cone be h and r.

⇒ 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.

⇒ New volume of Cone $=\frac{1}{3}\pi(2r)^2(2h)$

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

$$= 8 \times \left(\frac{1}{3}\pi(r)^2(h)\right)$$

$$= 8 \times V$$

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

No. Of Cones $= \frac{Volume of Cylinder}{Volume of 1 Cone}$

$$= \frac{\pi R^2 H}{\left(\frac{1}{3}\pi r^2 h\right)} = \frac{3\times3^2\times5}{((0.1)^2\times1)}$$

$$= \frac{135}{0.01} = 13500$$

Answer 52(b).

let the height of tent be h.

Area of ground = no of person x amount of area each person occupy

= 11 x 4 = 44 m^2

⇒ $\pi r^2 = 44$ m^2

Amount of air to breadth = volume of tent = 220 m^3

$$\frac{1}{3}\pi r^2 h = 220$$

⇒ $\left(\frac{1}{3}\right) \times \pi r^2 \times h = 220$

$\Rightarrow$ $h = \frac{220\times3\times7}{\pi r^2} = \frac{220\times3\times7}{44}$ $(\pi r^2 = 44)$

$\Rightarrow$ $h = 15$ 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 $= \frac{4}{3}\pi R^3$

$= \frac{4}{3} \times \left(\frac{22}{7}\right) \times (10.5)^3$ cm^3

= 4851 cm^3

Answer 55(d).

radius (r) = 21 cm

Surface area of sphere $= 4\pi = 4 \times \left(\frac{22}{7}\right) \times 21^2 = 5544$ cm^2

Answer 56 (c).

Surface area of a sphere = 1386 cm^2

$\Rightarrow$ $4\pi r^2 = 1386$

$4 \times \left(\frac{22}{7}\right) \times r^2 = 1386$

$r^2 = \frac{1386 \times 7}{22 \times 4} = \frac{441}{4}$

$r = \sqrt{\frac{441}{4}} = \frac{21}{2}$ cm

$r = 10.5$ cm

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

$= \frac{4}{3} \times \left(\frac{22}{7}\right) \times (10.5)^3$

$= 4851 \text{ cm}^3$

Answer 57(a).

Surface area of a sphere $= 144\pi \text{ cm}^2$

$\Rightarrow 4\pi r^2 = 144\pi$

$4 \times r^2 = 144$

$r^2 = \frac{144}{4}$

$r = \sqrt{\frac{144}{4}} = \frac{12}{2}$ cm

$r = 6$ cm

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).

Volume of Sphere $= 38808 \text{ cm}^3$

$\Rightarrow \frac{4}{3}\pi r^3 = 38808$

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

$r^3 = \frac{38808 \times 7 \times 3}{4 \times 22} = 441 \times 21$

$= 9261$

$r^3 = (21)^3$

$\Rightarrow \quad r = 21$ 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

Ratio of Volumes $= \frac{\frac{4}{3}\pi r^3}{\frac{4}{3}\pi R^3} = \frac{1}{8}$

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

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

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

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

No of smaller balls $=\frac{Volume of metal ball}{volume of one samll ball}$

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

$$= \frac{R^3}{r^3} = \frac{8^3}{2^3} = \frac{512}{8} = 64$$

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

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

$\Rightarrow \frac{4}{3} \times \left(\frac{22}{7}\right) \times r^3 = \frac{1}{3} \times \left(\frac{22}{7}\right) \times (2.1)^2 \times 8.4$

$\Rightarrow \quad r^3 = \frac{2.1\times2.1\times8.4}{4} = (2.1)^3$

r = 2.1 cm

Answer62(b).

radius of ball (R) = 6 cm

diameter of wire = 0.2 cm

$\Rightarrow$ radius of wire (r) = 0.1 cm

let the length of wire be h.

Volume of wire = volume of ball

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

$\Rightarrow \qquad h = \frac{4\times R^3}{3\times r^2} = \frac{4\times 6^3}{3\times(0.1)^2} = \frac{288}{0.01}$

$h = 28800 \text{ cm} = 288 \text{ m} \qquad (1 \text{ m} = 100 \text{ cm})$

Answer 63(c).

radius of metallic sphere (R) = 10.5 cm

radius of cone (r) = 3.5 cm

height of cone (h) = 3 cm

No of cones $= \frac{Volume of metallic sphere}{volume of one small cone}$

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

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

$= 126$

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

No of lead shots $= \frac{Volume of cuboid}{volume of one lead shot}$

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

$$= \frac{(9\times11\times12)}{\left(\frac{4}{3}\times\left(\frac{22}{7}\right)\times(0.15)^3\right)}$$

$= 84000$

Answer 65(c).

diameter of sphere = 6 cm

$\Rightarrow$ radius of sphere (R) = 3 cm

diameter of wire = 2 mm

$\Rightarrow$ radius of wire (r) = 1 mm = 0.1 cm

let the length of wire be h.

Thus, Sphere is drawn into wire,

$\Rightarrow$ Volume of wire = volume of ball

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

$\Rightarrow \quad h = \frac{4\times R^3}{3\times r^2} = \frac{4\times3^3}{3\times(0.1)^2} = \frac{4\times3\times3\times3}{(3\times0.1\times0.1)}$

h = 3600 cm = 36 m (1 m = 100 cm)

Answer66(a).

daimeter of sphere = 12.6 cm

$\Rightarrow$ radius of sphere (R) = 6.3 cm

height of cone (h) = 25.2 cm

let the radius of Cone be r.

Volume of sphere = Volume of Cone

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

$\Rightarrow \quad \frac{4}{3} \times \left(\frac{22}{7}\right) \times (6.3)^3 = \frac{1}{3} \times \left(\frac{22}{7}\right) \times (r)^2 \times 25.2$

$\Rightarrow \quad r^2 = \frac{4 \times 6.3 \times 6.3 \times 6.3}{25.2} = 6.3 \times 6.3 = (6.3)^2$

r = 6.3 cm

Answer 67(c).

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

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

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

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

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

$27 = 3.375 + 8 + r_3^3$

$r_3^3 = 27 - 11.375$

$r_3^3 = 15.625$

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

radius of third ball = 2.5 cm

Answer 68(a).

initial radius (r) = 6 cm

final radius (R) = 12 cm

ratio of surface area $=\frac{(3\pi r^2)}{(3\pi R^2)} = \frac{(r^2)}{(R^2)}$

$= \frac{(6^2)}{(12^2)}$

$= \frac{(1)}{(2\times2)}$

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

Answer 69(d) .

let the radii be r and R of sphere.

r + R = 7 cm.

⇒ r = (7 – R) cm .... eq(i)

Ratio of Volume of sphere = 64 : 27

$\Rightarrow \frac{\frac{4}{3}\pi R^3}{\frac{4}{3}\pi r^3} = \frac{64}{27}$

$\Rightarrow \frac{R^3}{(7-R)^3} = \frac{64}{27}$ from eq(i)

$\Rightarrow \frac{R^3}{(7-R)^3} = \left(\frac{4}{3}\right)^3$

$\Rightarrow \frac{R}{(7-R)} = \left(\frac{4}{3}\right)$

⇒ R = 4 cm

⇒ r = (7 – R) cm = (7 – 4) cm = 3 cm

Difference of surface area = $4\pi R^2 - 4\pi r^2$

$= 4\pi(4)^2 - 4\pi(3)^2$

$= 4\pi(7)$

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

$= 88\ cm^2$

Answer 70(c) .

Given:

Radius of hemispherical bowl (R) = 9 cm

⇒ diameter of bottle = 3 cm

radius of bottle (r) = 1.5 cm

⇒ Height of bottle (h) = 4 cm

No. Of bottles $= \frac{Volume of bowl}{Volume of one bottle}$

$= \frac{\left(\frac{2}{3}\right)\times\pi\times(9)^3}{\pi\times(1.5)^2\times4}$

$= \left(\frac{2\times3\times81}{9}\right)$

= 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

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

$\Rightarrow \quad h = 2r$

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

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 cynlinder

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

$\Rightarrow \quad \frac{1}{3} : \frac{2}{3} : 1$

$\Rightarrow \quad 1 : 2 : 3$

Answer 73(c).

let the radius of sphere be R

Volume of Sphere = Surface area of sphere (given)

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

$\Rightarrow \quad R = 3$ unit.