Chapter - 13
Surface Area and Volume

Notes

Name of Solid	C.S.A / L.S.A	T.S.A
Cube	$4a^2$ Sq. units	$6a^2$ Sq. units
Cuboid	$2(l+b) \times h$	$2(lb + bh + hl)$
Cylinder	$2\pi rh$	$2\pi r \times (h+r)$
Cone	πrl $l = \sqrt{r^2 + h^2}$ $l \rightarrow$ Slant height	$\pi r(l+r)$

Cone	$\pi r l$ $l = \sqrt{r^2 + h^2}$ $l \rightarrow$ Slant height	$\pi r (l + r)$
Sphere	-	$4\pi r^2$
Hemisphere	$2\pi r^2$	$3\pi r^2$
Hollow Cylinder	$2\pi (R + r) h$	$2\pi (R+r)(h+R-r)$ (or) $2\pi [Rh + rh + (R^2 - r^2)]$

Diagonal of a cube = $\sqrt{3}a$ units

Length of 12 edges of cube = $12a$

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

Length of 12 edges of cuboid = $4(l + b + h)$

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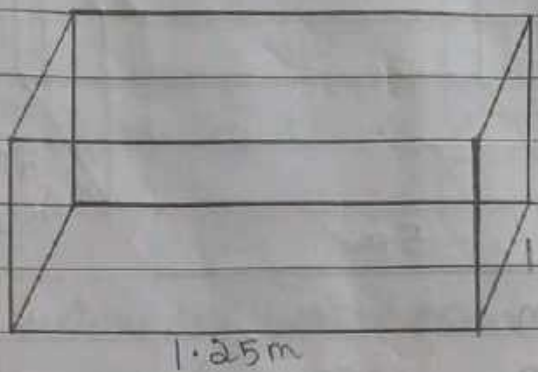
Ex: 13.1

1. Refer text book pg: 213



5.5750

given:

$l = 1.5\,m$

$b = 1.25\,m$

$h = 65\,cm$

$= 0.65\,m$

i) Area of sheet required = C.S.A of a cuboid + area of rectangular base

$= 2(l+b)h + l \times b$

$= (2 \times (1.5+1.25) \times 0.65) + (1.5 \times 1.25)$

$= (1.30 \times 2.75) + 1.875$

$= 3.5750\,m + 1.875$

$= 5.45\,m^2$

ii) Rate of sheet per m^2 = ₹20

Rate of sheet for $5.45\,m^2$ = 5.45×20

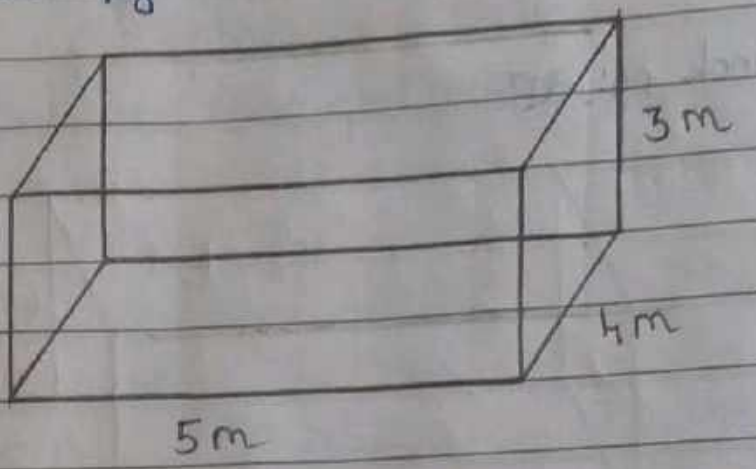
= ₹109

Ans ⇒ i) $5.45\,m^2$ ii) ₹109

✓

1 2 5
1 5
6 2 5
1 2 5
1.8 7 5

2. Refer text book pg : 213



given:

$l = 5m$

$b = 4m$

$h = 3m$

Total area to be whitewashed = area of 4 walls + area of ceiling

= (C.S.A of cuboid) + area of rectangle

$= (2(l+b)h) + l \times b$

$= (2(5+4)3) + (5 \times 4)$

$= (6 \times 9) + 20$

$= 54 + 20$

Area $= 74m^2$

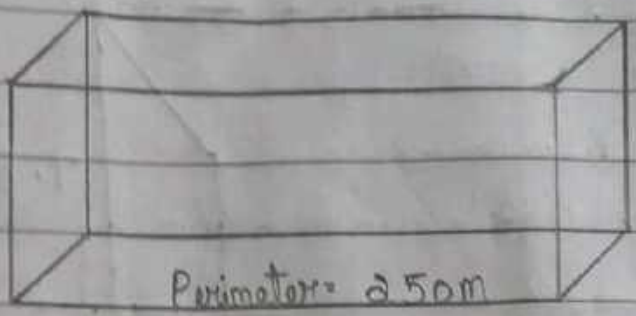
Cost of white washing per m^2 = ₹7.50

Cost of white washing $74m^2$ = ₹7.50 × 74

= ₹555

Ans = ₹555	✓

3. Refer text book pg: 213



given:

Perimeter of rectangular floor = 250 m

Cost of painting per m^2 = ₹ 10

Cost of painting 4 walls = ₹ 15000

Perimeter of 4 walls = 250 m

$\Rightarrow 2(l+b) = 250m$

∴ Cost of painting 4 walls = ₹ 15000,

Cost of painting per m^2 = ₹ 10

Area of 4 walls = $\frac{15000}{10}$

$= 1500 m^2$

$\Rightarrow 2(l+b)h = 1500 m^2$

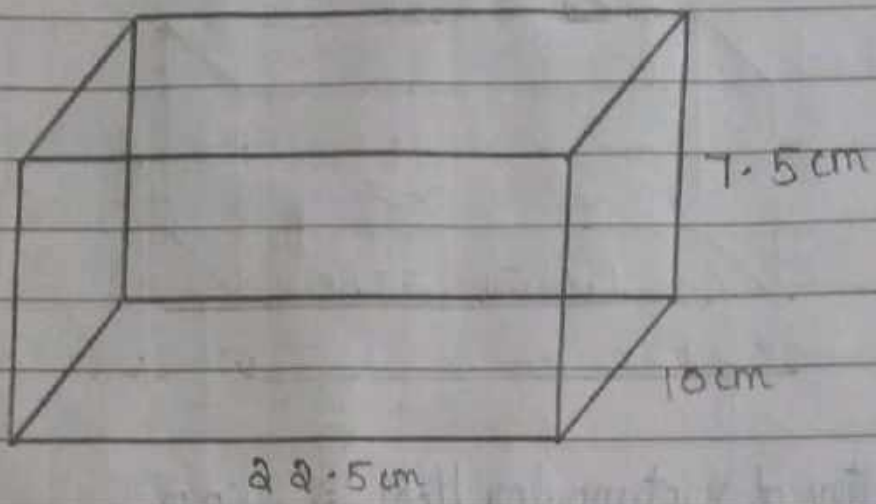
$\Rightarrow 250 \times h = 1500$

$\Rightarrow h = \frac{1500}{250}$

$h = 6m$

Ans ⇒ h = 6m	✓

4. Refer text book pg: 203



Soln:

$l = 22.5$ cm

$b = 10$ cm

$h = 7.5$ cm

T.S.A of a brick $= 2(lb + bh + hl)$

$= 2((22.5 \times 10) + (10 \times 7.5) + (22.5 \times 7.5))$

$= 2(225 + 75 + 168.75)$

$= 2(468.75)$

$= 937.5 \text{ cm}^2$

Sufficient paint available $= 9.375 \text{ m}^2$

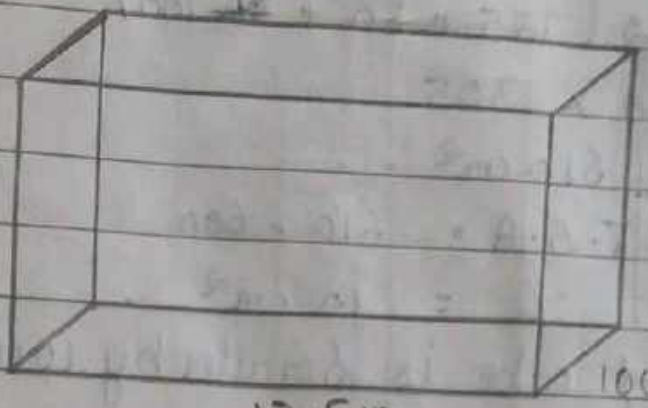
$= 93750 \text{ cm}^2$

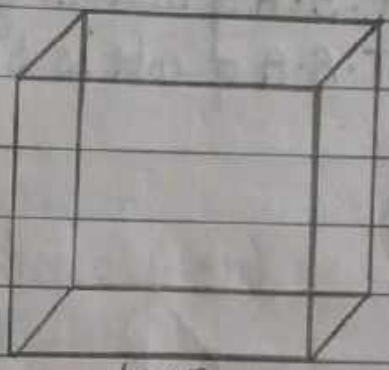
No. of bricks can be painted $= 93750 \div 937.5 \Rightarrow \frac{937500}{9375}$

$= 100$

Ans = 100 bricks. ✓

5. Refer text book pg: 213





Soln:

i) Edge of a cube = 10 cm

L.S.A of a cube = $4a^2$

$= 4 \times (10)^2$

$= 4 \times 100$

$= 400 \text{ cm}^2$

In a cuboid,

$l = 12.5\text{cm}$, $b = 10\text{ cm}$, $h = $ [redacted] cm

L.S.A of a cuboid = $2(l+b)h$

$= 2 \times (12.5 + 10) \times 8$

$= 2 \times 22.5 \times 8$

$= 360 \text{ cm}^2$

Difference in L.S.As = $400 - 360 \text{ cm}^2$

$= 40 \text{ cm}^2$

∴ L.S.A of a cube is greater by 40 cm^2

ii) [redacted] T.S.A of a cube = $6a^2$

$= 6 \times (10)^2$

$= 6 \times 100$

$= 600\ cm^2$

T.S.A of a cuboid = $2(lb + bh + hl)$

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$= 2((12.5 \times 10) + (10 \times 8) + (12.5 \times 8))$

$= 2(125 + 80 + 100)$

$= 2 \times 305$

$= 610 \text{ cm}^2$

Difference in T.S.A = $610 - 600$

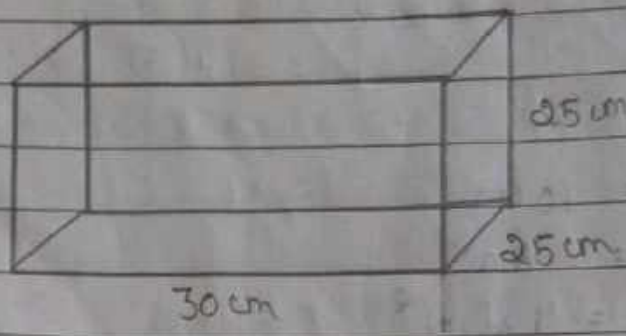
$= 10 \text{ cm}^2$

∴ T.S.A of cube is Smaller by 10 cm^2

Ans ⇒ i) C.S.A of cube is greater by 40 cm^2

ii) T.S.A of cube is Smaller by 10 cm^2

6. Refer text book pg: 213



Soln:

$l = 30\,cm$

$b = 25\,cm$

$h = 25\,cm$

i) Area of the glass $\Rightarrow$ T.S.A of a cuboid $= 2(lb + bh + hl)$

$= 2((30 \times 25) + (25 \times 25) + (25 \times 30))$

$= 2(750 + 625 + 750)$

$= 2 \times 2125$

$= 4250\,cm^2$

ii) Tape needed for 12 edges $= 4(l + b + h)$

$= 4(30 + 25 + 25)$

$= 4 \times 80$

$= 320\,cm^2$

Ans = i) $4250\,cm^2$
ii) $320\,cm^2$

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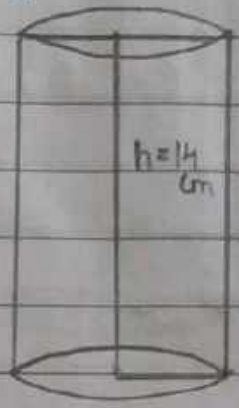
Ex: 13.2

1. Refer text book pg: 216



C.S.A = $88cm^2$

Soln:

given:

$h = 14\ cm$

Curved Surface Area = $88cm^2$

$2\pi rh = 88cm^2$

$\Rightarrow 2 \times \frac{22}{7} \times r \times 14 = 88cm^2$

$\Rightarrow r = \frac{88 \times 1}{44 \times 1}$

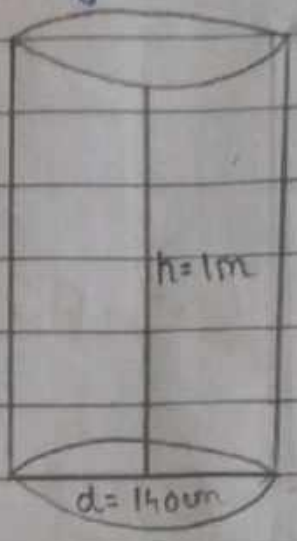
$r = 1\ cm$

$\therefore$ Diameter, $d = 2 \times 1$

$= 2\ cm$

Ans = 2 cm ✓

2. Refer text book pg: 216



Soln:

given:

$d = 140cm$

$r = \frac{140}{2}^{70}$

$r = 70cm$

$r = 0.7m$

$h = 1m$

T.S.A of a cylindrical tank $= 2\pi r(h+r)$

$= 2 \times \frac{22}{7} \times 0.7 (1+0.7)$

$= 4.4 \times 1.7$

$= 7.48m^2$

Ans = 7.48m²	✓

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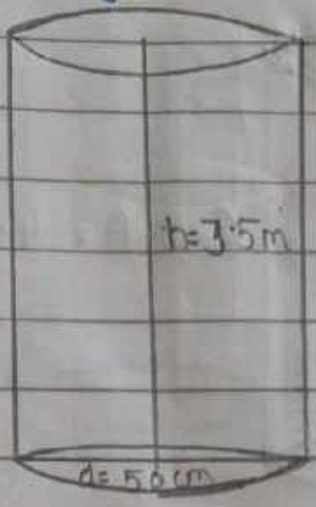
5. Refer text book pg: 217



Soln:

given:

$d = 50\,cm$

$r = \frac{50}{2}^{25}$

$r = 25\,cm$

$r = 0.25\,m$

$h = 3.5\,m$

C.S.A of a cylindrical pillar $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 2.5 \times \cancel{3.5}^{0.5}$

$= 5.5 \times 1$

$= 5.5\,m^2$

Cost of painting C.S.A of a pillar per m^2 = ₹12.50

Cost of painting C.S.A of a pillar for $5.5\,m^2$ = ₹12.50 × 5.5

= ₹68.750

Ans = ₹68.75 ✓

6. Refer text book pg: 217

Soln:

given:

$r = 0.7m$

C.S.A of a right circular cylinder = $4.4m^2$

$2\pi rh = 4.4m^2$

$\Rightarrow 2 \times \frac{22}{\cancel{7}} \times \overset{0.1}{\cancel{0.7}} \times h = 4.4m^2$

$\Rightarrow h = \frac{4.4}{44 \times 0.1}$

$h = \frac{4.4}{4.4}$

$h = \frac{\cancel{4.4}^{1}}{\cancel{4.4}}$

$h = 1m$

Ans $\Rightarrow h = 1m$	✓

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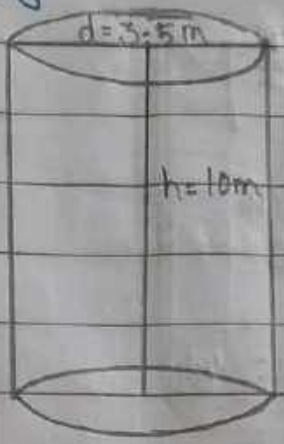
7. Refer text book pg: 217



Soln:

given:

Inner diameter = 3.5m

Inner radius, r = $\frac{3.5}{2}$ m

h = 10m

i) Inner curved surface area = $2\pi rh$

$= 2 \times \frac{22}{7} \times \frac{3.5}{2} \times 10$

$= 22 \times 5$

$= 110\ m^2$

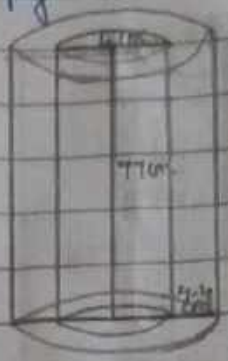
ii) Cost of plastering per m^2 = ₹40

Cost of plastering $110m^2$ = ₹40 × $110m^2$

= ₹4400

Ans ⇒ i) $110m^2$ ✓
ii) ₹4400

3. Refer text book pg: 216



Soln:

given:

i) C.S.A. of Inner cylinder:

$d = 4\,cm$

$\therefore r = 2\,cm$

$h = 77\,cm$

C.S.A of a cylinder $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 2 \times 77$

$= 968\,cm^2$ ✓

ii) C.S.A of outer cylinder:

$D = 4.4\,cm$

$R = 2.2\,cm$

$h = 77\,cm$

C.S.A of a cylinder $= 2\pi Rh$

$= 2 \times \frac{22}{7} \times 2.2 \times 77$

$= 1064.8\,cm^2$ ✓

iii) T.S.A of hollow cylinder $= 2\pi(R+r)(h+R-r)$

$= 2 \times \frac{22}{7}(2+2.2)(77+2.2-2)$

$= \frac{44}{7} \times 4.2 \times (79.2-2)$

$= \frac{44}{7} \times 0.6 \times 77.2$

$= 2038.08\,cm^2$ ✓

Ans ⇒ i) $968\,cm^2$, ii) $1064.8\,cm^2$, iii) $2038.08\,cm^2$ ✓

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Apple

4. Refer text book pg: 217

Soln:

given:

$d = 84\,cm$

$r = 42\,cm$

$h = 120\,cm$

C.S.A of a cylindrical roller $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 42 \times 120$

Area levelled in 1 revolution $= 31680\,cm^2$

No. of rounds to complete a playground $= 500$

Area of a playground $= 500 \times 31680$

$= 15840000\,cm^2$

$= \frac{15840000}{10000}$

$= 1584\,m^2$

Ans $= 1584\,m^2$ ✓

1440
22
2880
2880
31680

120
12
240
120
1440
31680
5
158400

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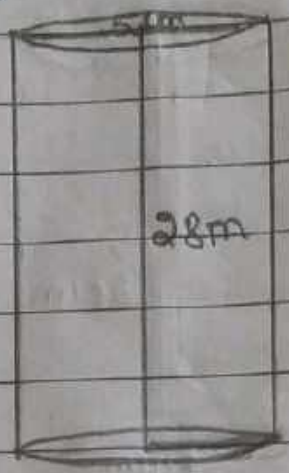
8. Refer text book pg: 217



Soln:

$h = 28\,m$

$h = 2800\,cm$

$d = 5\,cm$

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

Radiating Surface = Outer C.S.A of a cylindrical pipe

$= 2\pi rh$

$= 2 \times \frac{22}{7} \times \frac{5}{2} \times 2800$ (400)

$= 110 \times 400$

$= 44000\ cm^2$

Ans = 44000 cm^2 (or) $4.4\ m^2$	✓

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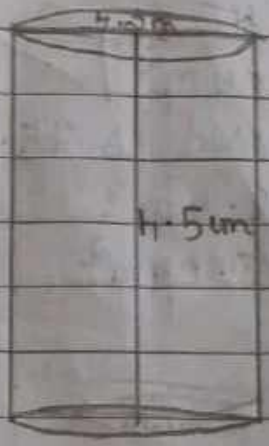
9. Refer text book pg: 217



Soln:

given:

i) C.S.A of a cylindrical petrol tank:

$d = 4.2m$

$r = 2.1m$

$h = 4.5m$

C.S.A of a cylinderical tank $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 2.1 \times 4.5$

$= 44 \times 1.35$

$= 59.40\ m^2$

$= 59.4\ m^2$ ✓

ii) T.S.A of a tank = $2\pi r(h+r)$

$= 2 \times \frac{22}{7} \times \frac{0.3}{2} (4.5 + 2.1)$

$= 44 \times 0.3 \times 6.6$

$= 87.12\ m^2$

Let area of sheet used be 'x' m^2

Amount of sheet wasted = $\frac{1}{12}x$

$\therefore$ Sheet used to make the tank = $x - \frac{x}{12}$

$= \frac{12x - x}{12}$

$= \frac{11x}{12}$

$\therefore \frac{11}{12}x = 87.12\ m^2$

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$$x = \frac{7 \cdot 92}{\cancel{87 \cdot 12} \times 12}{11}$$

$$= 95.04 m^2$$ ✓

The metal sheet used is $95.04 m^2$

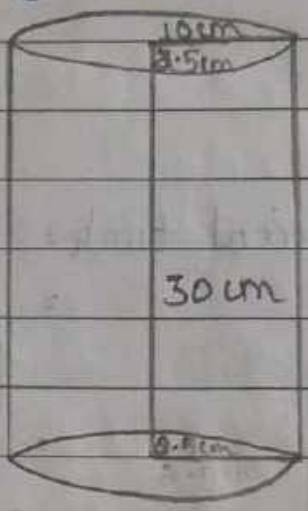
Ans ⇒ i) $59.4 m^2$

ii) $95.04 m^2$ ✓

11 | 8712 | 792
77
101
99
22
22
0

① 79
①① 1
158

10. Refer text book pg: 217



Soln:

given:

height of lampshade = 30 cm

radius of lamp shade = 10 cm

Margin for folding top and botton = 2.5 cm

Total height = 30 cm + 2.5 cm + 2.5 cm

= 35 cm

C.S.A of a cylindrical lampshade = $2\pi rh$

$= 2 \times \frac{22}{7} \times 10 \times 35^{5}$

$= 44 \times 5$

$= 2200\ cm^2$

Ans → 2200 cm^2 of cloth is used. ✓

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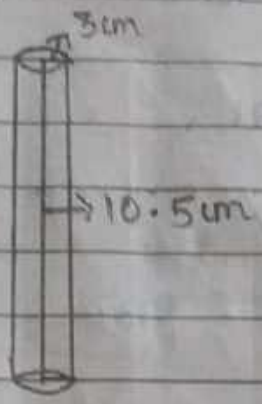
11. Refer text book pg: 217



Soln:

given:

height of pen stand = 10.5cm

Radius of base of a pen stand = 3cm

Area of cardboard required for 1 pen stand = C.S.A of a cylinder + area of base

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

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

$= (22 \times 9) + (\frac{22}{7} \times 9)$

$= 198 + (\frac{198}{7})$

$= \frac{1386 + 198}{7}$

$= \frac{1584}{7}\ cm^2$

Area of cardboard needed to make 35 pen stands = $\frac{5}{35} \times \frac{1584}{7}$

$= 7920\ cm^2$

Ans = 7920 cm^2 of cardboard is required ✓

(a) (b)

198
7
1386
1386
198
1584
9
198

H.W.

Ex: 13.3

1. Refer text book pg: 221

Soln:

$d = 10.5\ cm$

$r = \frac{10.5}{2}\ cm \Rightarrow \frac{105}{20}\ cm$

$l = 10\ cm$

C.S.A of a cone $= \pi rl$

$= \frac{22}{7} \times \frac{105}{20} \times 10$

$= 165\ cm^2$

Ans = 165 cm^2 ✓

15
11
15
15
165

2. Refer text book pg: 221

Soln:

$d = 24m$

$r = 12m$

$l = 21m$

T.S.A of a cone $= \pi r(l + r)$

$= \frac{22}{7} \times 12\ (21 + 12)$

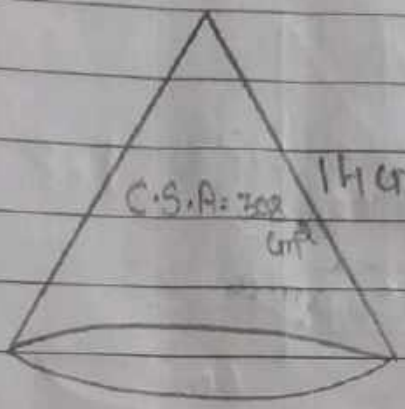
$= \frac{22}{7} \times 12 \times 33$

$= 1244.57m^2$

Ans = 1244.57 m^2 ✓

22
12
44
264
33
792

3. Refer text book pg: 221



Sdn:

i) Radius of the base:

$l = 14\ cm$

C.S.A of cone $= 308\ cm^2$

$\pi r l = 308\ cm^2$

$\frac{22}{7} \times r \times 14 = 308\ cm^2$

$\Rightarrow r = \frac{308 \times 7}{22 \times 14}$

$r = 7\ cm$

$\therefore r = 7\ cm$

ii) T.S.A of a cone $= \pi r(l + r)$

$= \frac{22}{7} \times 7\ (14 + 7)$

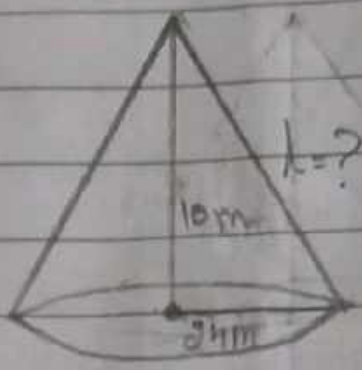
$= 22 \times 21$

$= 462\ cm^2$

$\therefore$ T.S.A $= 462\ cm^2$

Ans ⇒ i) 7 cm
ii) $462\ cm^2$ ✓

4. Refer text book pg: 221



Soln:

i) Slant height of tent:

$r = 24\ m$

$h = 10\ m$

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

$= \sqrt{(24)^2 + (10)^2}$

$= \sqrt{576 + 100}$

$= \sqrt{676}$

$= 26\ m$

ii) C.S.A of a cone $= \pi r l$

$= \frac{22}{7} \times 24 \times 26$

$= [illegible]\ m^2 \quad \frac{13728}{7}\ m^2$

Cost of canvas per m^2 = ₹70

$\therefore$ Cost of canvas for $\frac{13728}{7}$ m^2 = ₹$10 \times [illegible]\ m^2 \quad \frac{13728}{7}$

= ₹137280

Ans = ₹137280 ✓

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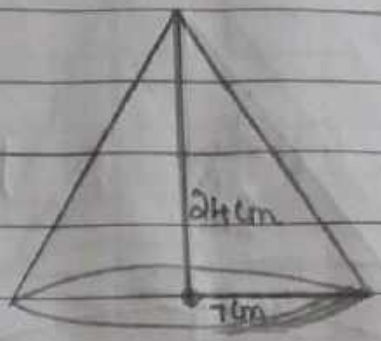
7. Refer text book pg: 221



Soln:

$r = 7\,cm$

$h = 24\,cm$

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

$= \sqrt{(7)^2 + (24)^2}$

$= \sqrt{49 + 576}$

$= \sqrt{625}$

$= 25\,cm$

C.S.A of a cone $= \pi r l$

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

$= 550\,cm^2$

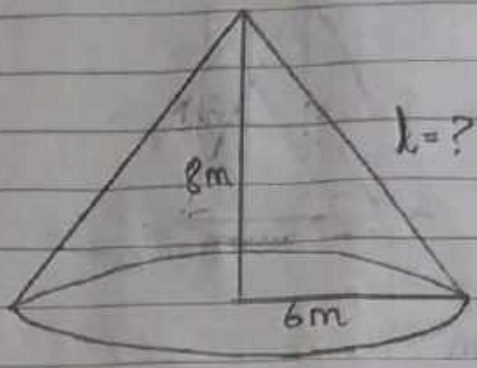
Area of sheet required for 1 cap $= 550\,cm^2$

Area of sheet required for 10 cap $= 10 \times 550$

$= 5500\,cm^2$

Ans $= 5500\,cm^2$	✓

5. Refer text book pg: 221



Soln:

For conical tent:

$h = 8m$

$r = 6m$

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

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

$= \sqrt{36+64}$

$= \sqrt{100}$

$= 10m$

Area of tarpaulin sheet = C.S.A of tent

$= \pi rl$

$= 3.14 \times 6 \times 10$

$= 188.4m^2$

Breadth of sheet = 3m

Length of sheet = l m

$\Rightarrow l \times b = 188.4m^2$

$\Rightarrow l \times 3m = 188.4m^2$

$\Rightarrow l = \frac{188.4}{3}$ (62.8)

$l = 62.8m$

Wastage = 20cm

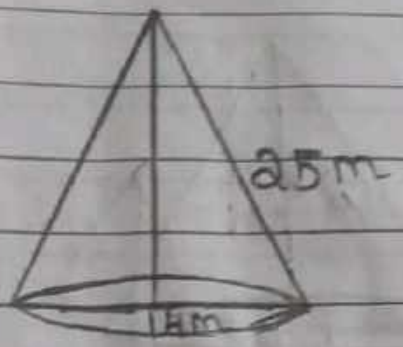
$= 0.2m$

Length of tarpaulin sheet = $62.8 + 0.2$

$= 63m$

Ans = 63m long tarpaulin. ✓

6. Refer text book pg: 221



Soln:

given:

$l = 25m$

$d = 14m$

$r = 7m$

C.S.A of conical tomb $= \pi rl$

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

$= 550m^2$

Cost of whitewashing per $100m^2 = ₹210$

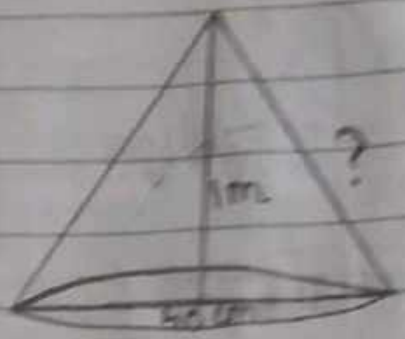
Cost of whitewashing per $550m^2 = 21\cancel{0} \times \frac{55\cancel{0}}{1\cancel{0}\cancel{0}}$

$= ₹1155$

Ans = ₹1155

✓

8. Refer text book pg: 221



given:

$d = 40\,cm$

$r = 20\,cm$

$= 0.2\,m$

$h = 1\,m$

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

$= \sqrt{(0.2)^2 + (1)^2}$

$= \sqrt{0.04 + 1}$

$= \sqrt{1.04}$

$l = 1.02\,m$

C.S.A of cone $= \pi r l$

$= 3.14 \times 0.2 \times 1.02$

$= 0.64056\,m^2$

C.S.A of 50 cone $= 50 \times 0.64056\,m^2$

$= 32.028\,m^2$

Cost of painting [redacted] per m^2 = ₹12

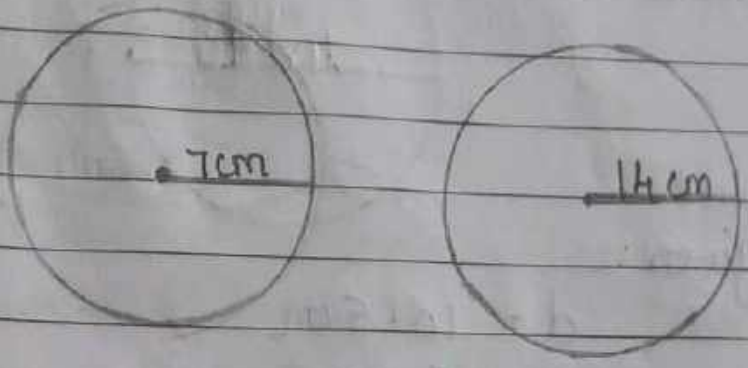
Cost of painting [redacted] for $32.028\,m^2$ $= ₹12 \times 32.028$

$= ₹384.33$ (approx)

Ans = ₹384.33 (approx) ✓

Ex: 13.4

4. Refer text book pg: 225



Soln:

given:

Case 1:

$r = 7\text{ cm}$

T.S.A of a ballon = $4\pi r^2$

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

$= 4 \pi \times 7 \times 7\ \text{cm}^2$

Case 2:

$r = 14\text{ cm}$

T.S.A of a ballon = $4\pi r^2$

$= 4 \pi \times 14 \times 14\ \text{cm}^2$

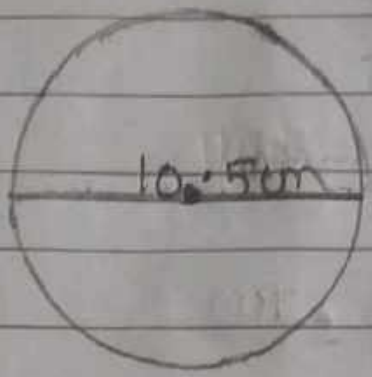
Required ratio = $\frac{4\pi \times 7 \times 7}{4\pi \times 14 \times 14}$

$= \frac{1}{4}$

$= 1:4$

Ans = 1:4	✓

5. Refer text book pg: 225



given:

$d = 10.5\ cm$

$r = 5.25\ cm$

C.S.A of hemispherical bowl $= 2\pi r^2$

$= \frac{1}{7} \times \frac{22}{7} \times \frac{525}{100} \times \frac{5}{2}$

$= \frac{693}{4}$

$= 173.25\ cm^2$

Cost of tin-plating per $100\ cm^2$ = ₹16

Cost of tin plating per $173.25\ cm^2$ = ₹16 $\times \frac{173.25}{100}$

$= \frac{₹27.72}{100}$

$= ₹27.72$

Ans = ₹27.72 ✓

1. Find the Surface area of a Sphere of radius:

i) 105 cm

Soln:

given:

$r = 10.5$ cm

T.S.A of Sphere $= 4\pi r^2$

$= 4 \times \frac{22}{7} \times 10.5 \times 10.5$

$= 6 \times 231$

$= 1386\ cm^2$

Ans = $1386\ cm^2$ ✓

ii) 5.6cm

Soln:

given:

$r = 5.6$ cm

T.S.A of Sphere $= 4\pi r^2$

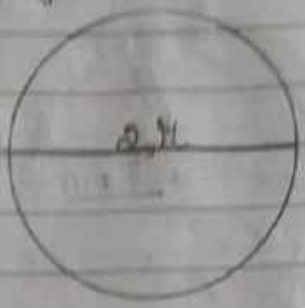
$= 4 \times \frac{22}{7} \times 5.6 \times 5.6$

$= 17.6 \times 22.4$

$= 394.24\ cm^2$

Ans = $394.24\ cm^2$ ✓

7. Refer text book pg: 225



Soln:

For Earth:

$D = 2R$

$R = R$

$\boxed{T.S.A = 4\pi R^2}$

For moon:

$D = \frac{1}{4}$ of (Diameter of Earth)

$= \frac{1}{4_2} \times \cancel{2}R$

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

$\therefore D = \frac{R}{2}$

$R = \frac{D}{2}$

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

$\therefore R = \frac{R}{4}$

T.S.A of moon $= 4\pi R^2$

$= 4\pi \times \left(\frac{R}{4}\right)^2 = \cancel{4}\pi \times \frac{R^2}{\cancel{16}_4}$

$\boxed{= \frac{\pi R^2}{4}}$

$\frac{\text{T.S.A of moon}}{\text{T.S.A of earth}} = \frac{\frac{\pi R^2}{4}}{4\pi R^2}$

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

$= \frac{1}{16}$

$= 1:16$

Required ratio = 1:16

Ans = 1:16 ✓

8. Refer text book pg: 225

Soln:

given:

Inner radius, $r = 5\,cm$

Thickness $= 0.25\,cm$

Outer radius, $R = 5 + 0.25$

$= 5.25\,cm$

Outer Curved Surface area $= 2\pi R^2$

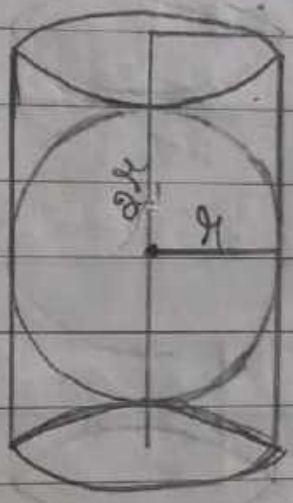
$= 2 \times \frac{22}{7} \times 5.25 \times 5.25$ (0.75)

$= 16.5 \times 10.5$

$= 173.25\,cm^2$

Ans = $173.25\,cm^2$	✓

9. Refer text book pg: 225



Soln:

given:

i) S.A. of Sphere:

radius, r (of Sphere) = r

S.A of Sphere = $4\pi r^2$

$= 4\pi r^2$

ii) C.S.A of a cylinder:

$r = r$

$h = 2r$

C.S.A of a cylinder $= 2\pi rh$

$= 2\pi r \times (2r)$

$= 4\pi r^2$

iii) Ratio of surface areas required $= \frac{4\pi r^2}{4\pi r^2}$

$= \frac{1}{1}$

$= 1 : 1$

Ans: i) $4\pi r^2$

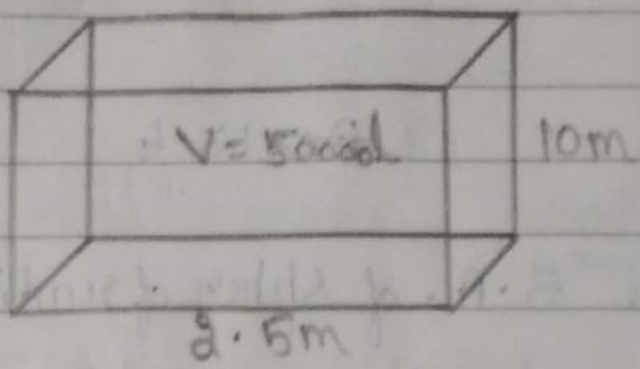
ii) $4\pi r^2$

iii) $1 : 1$

Name of Solid	Volume (cubic units)
Cube	a^3
Cuboid	lbh
Cylinder	$\pi r^2 h$
Cone	$\frac{1}{3}\pi r^2 h$
Sphere	$\frac{4}{3}\pi r^3$
Hemisphere	$\frac{2}{3}\pi r^3$
Hollow Cylinder:	$\pi(R^2 - r^2)h$

Ex: 13.5

Refer text book pg: 228



Soln:

given:

$V = 50000\,l$

$l = \frac{1}{1000}\,m^3$

$50000l = \frac{50000}{1000}$

$V = 50\,m^3$

$l = 2.5\,m$

$h = 10\,m$

$b = ?$

Volume of cuboid = lbh

$\Rightarrow 50\,m^3 = 2.5 \times b \times 10$

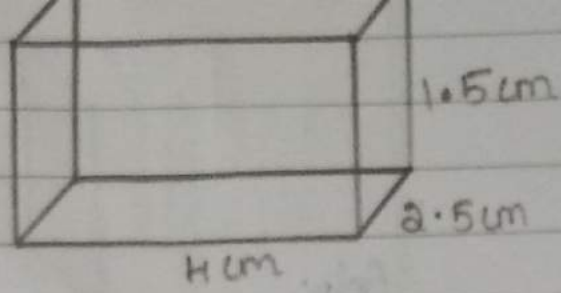
$\Rightarrow 50\,m^3 = 25b$

$\Rightarrow b = \frac{50}{25}\,2$

$b = 2\,m$

Ans = 2m ✓

Soln:



$l = 4\,cm$

$b = 2.5\,cm$

$h = 1.5\,cm$

Volume = lbh

$= 4 \times 2.5 \times 1.5$

$= 10 \times 1.5$

$= 15\,cm^3$

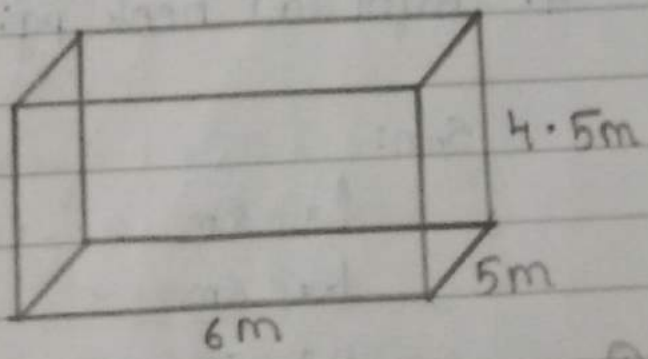
Volume of 12 boxes = 15×12

$= 180\,cm^3$

Ans = $180\,cm^3$ ✓

Refer text book pg: 228

Soln:



$l = 6\,m$

$b = 5\,m$

$h = 4.5\,m$

Volume of tank = lbh

$= 6 \times 5 \times 4.5$

$= 30 \times 4.5$

$= 135\,m^3$

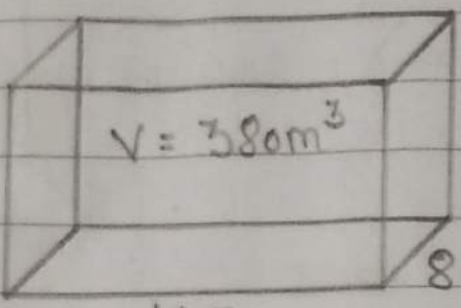
$1\,m^3 = 1000\,l$

$\therefore 135\,m^3 = 135 \times 1000\,l$

$= 135000\,l$

Ans = $135000\,l$ ✓

Refer text book pg: 228



Soln:

$l = 10m$

$b = 8m$

Volume of a vessel = $380m^3$

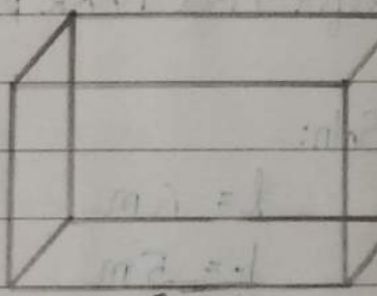
$lbh = 380m^3$

$10 \times 8 \times h = 380 m^3$

$h = \frac{380}{4 \cdot 80} = 4.75m$

Ans = 4.75m ✓

Refer text book pg: 228



Soln:

$l = 8m$

$b = 6m$

$h = 3m$

Volume of cuboidal pit = lbh

$= 8 \times 6 \times 3$

$= 144 m^3$

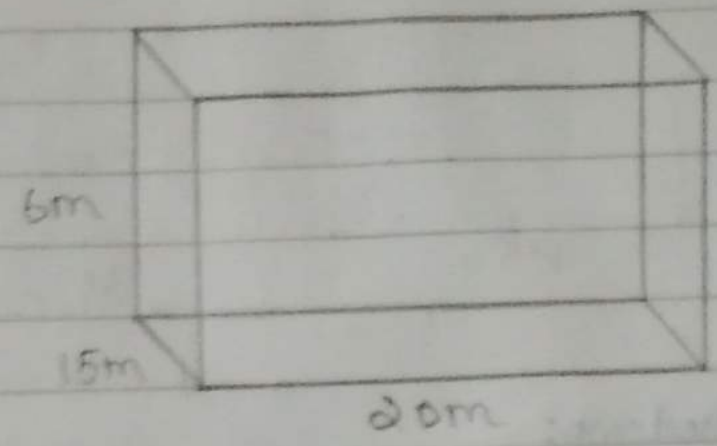
Cost of digging per m^3 = ₹30

Cost of digging per $144m^3$ = ₹30 × 144

= ₹4320

Ans = ₹4320 ✓

Refer text book pg: 228



Soln:

For tank:

$l = 20m$

$b = 15m$

$h = 6m$

Volume = lbh

$= 20 \times 15 \times 6$

$= 1800 m^3$

$= 1800 \times 1000 l$

$= 1800000 l$

Water required per head per day = $150 l$

Water required for 4000 heads = $150 \times 4000 l$

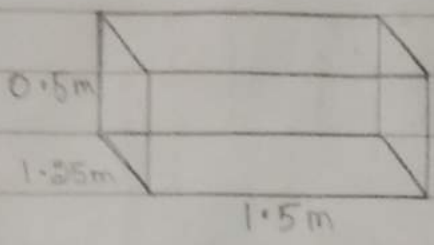
No. of days = $\frac{\text{Volume of tank}}{\text{Water required for 4000 people}}$

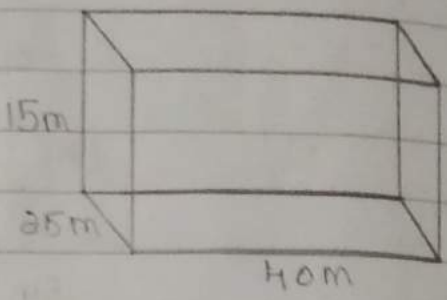
$= \frac{1800000}{150 \times 4000}$

$= 3$ days

Ans = 3 days ✓

Refer that book pg: 228





Soln:

For Godown:

$l = 40m$

$b = 25m$

$h = 15m$

Volume of Godown = lbh

$= 40 \times 25 \times 15\ m^3$

$= 15000m^3$

For Wooden Crate:

$l = 1.5\ m$

$b = 1.25\ m$

$h = 0.5\ m$

Volume of Wooden Crate = lbh

$= 1.5 \times 1.25 \times 0.5\ m^3$

$= 0.9375\ m^3$

No. of crates can be stored = $\frac{\text{Volume of Godown}}{\text{Volume of crate}}$

$= \frac{15000}{0.9375}$

$= \frac{15000 \times 10000}{9375}$

$= \frac{40 \times 25 \times 15 \times 2}{5 \times 15 \times 25 \times 5}$

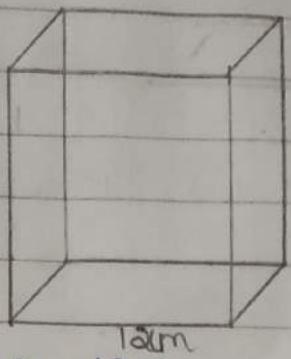
$= \frac{1200000}{75}$

$= 16000$ boxes

Ans = 16000 boxes ✓

Refer text book pg: 228

8.



Soln:

Edge of a cube = 12cm

Volume = a^3

$= 12^3$

$= 1728 m^3$

No. of new cubes cut = 8

Volume of each new cube = $\frac{1728}{8} = 216$

$= 216 m^3$

Edge of each new cube = $\sqrt[3]{216}$

$= 6m$

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

$= 6 \times 12^2$

$= 864 m^2$

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

$= 6 \times (6)^2$

$= 216 m^2$

Ratio required = $\frac{\text{T.S.A of whole cube}}{\text{T.S.A of new cube}}$

$= \frac{864}{216}$

$= \frac{4}{1}$

$= 4:1$

Ans ⇒ Side of new cube = 6m

Ratio required = 4:1 ✓

$= 16h$

$= 40 \times 2000 \times 3 m^3$

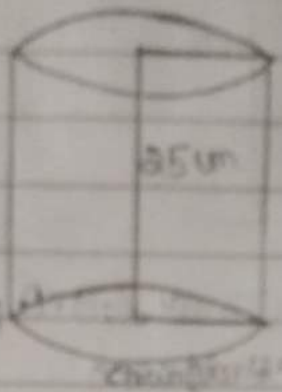
Volume of water flowing into the sea in 1 min $= \frac{40 \times 2000 \times 3}{120}$

$= 4000 m^3$

Ans $= 4000 m^3$ ✓

Ex: 13.6

Refer Text book pg: 230



Soln:

$h = 35\ cm$

Circumference $= 132\ cm$

$2\pi r = 132\ cm$

$2 \times \frac{22}{7} \times r = \frac{132}{1}\ cm$

$r = \frac{132 \times 7}{2 \times 22}$

$\therefore r = 21$ cm ✓

Volume of cylindrical tank $= \pi r^2 h$

$= \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} \times 35$

$= \frac{19845}{2} = 3$

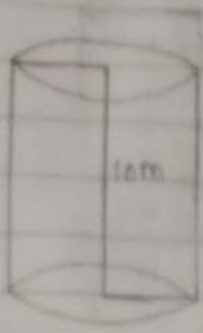
$1\ l = 9682.5\ cm$ 10

$34650\ cm^3 = \frac{34650}{1000}$ l

$= 34.65$ l

Ans = 34.65 l ✓

Refer text book pg: 231



Soln:

Cost of painting Inner C.S.A per m^2 = ₹20
Total cost = ₹2200
h = 10m

i) Inner C.S.A = $\frac{\text{Total cost}}{\text{Cost per } m^2}$

$= \frac{₹2200}{₹20}$

$= 110 m^2$

∴ Inner C.S.A = $110 m^2$ ✓

ii) Radius:

C.S.A = $110 m^2$

$2\pi rh = 110 m^2$

$2 \times \frac{22}{7} \times r \times 10 = 110 m^2$

$r = \frac{110 \times 7}{2 \times 22 \times 10} = \frac{7}{4} m$

$= 1.75 m$

∴ Radius of base = 1.75m ✓

iii) Capacity (Volume) = $\pi r^2 h$

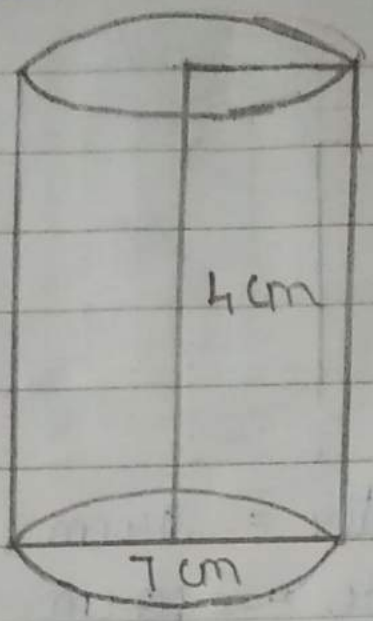
$= \frac{22}{7} \times \frac{7}{4} \times \frac{7}{4} \times 10^5 = 3$

$= 9$

∴ Volume = $96.25 m^3$ ✓

Ans ⇒ i) $110 m^2$, ii) 1.75m, iii) $96.25 m^3$ ✓

Refer text book pg: 231



Soln:

$h = 4\text{cm}$

$d = 7\text{cm}$

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

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

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

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

Capacity of Soup served to 1 person $= 154\ \text{cm}^3$

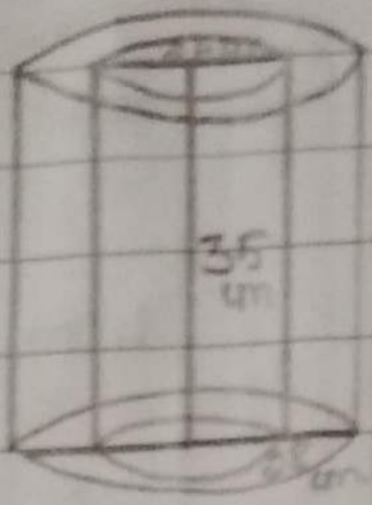
Soup prepared to serve 250 persons $= 154\text{cm}^3 \times 250$

$= 38500\ \text{cm}^3$

$= 38.5\text{l}$

Ans = 38.5l of Soup ✓

Refer text book pg: 250



Soln:

Inner diameter = 24 cm

r = 12 cm

outer diameter = 28 cm

R = 14 cm

h = 35 cm

Volume of hollow cylinder = $\pi (R^2 - r^2) h$

$= \frac{22}{7} (14^2 - 12^2) 35$

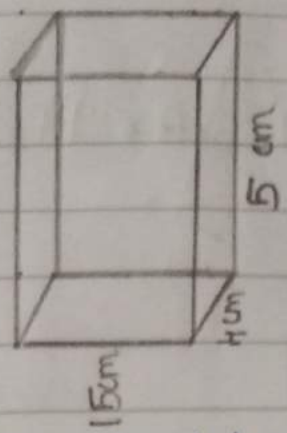
$= \frac{22}{7_1} (196 - 144) 35$

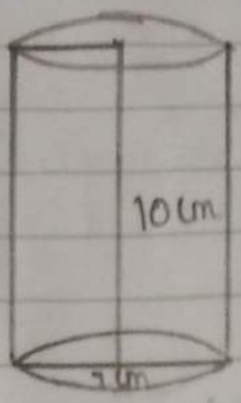
$= 110 \times 52$

$= 5720 \text{ cm}^3$

Mass per cm^3 = 0.6 g

Refer text book pg: 230





Soln:

i) For cuboidal tank:

$l = 5\text{ cm}$; $b = 4\text{cm}$; $h = 15\text{cm}$

Volume of cuboidal tank = lbh

$= 5 \times 4 \times 15$

$= 300\text{cm}^3$

② 15 × 5 = 75 × 4 = 300

ii) For cylindrical tank:

$h = 10\text{cm}$

$d = 7\text{cm}$

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

Volume of cylindrical tank = $\pi r^2 h$

$= \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 10$

$= 385\text{cm}^3$

③ 77 × 5 = 385

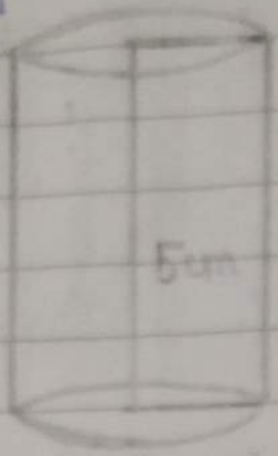
Difference in capacity of tanks = $385\text{cm}^3 - 300\text{cm}^3$

$= 85\text{cm}^3$

∴ Volume of cylindrical tank is greater by 85cm^3.

Ans → Volume of cylindrical tank is greater by 85cm^3. ✓

Refer text book pg: 230



L.S.A = 94.2 cm^2

Sdn:

$h = 5\ cm$

L.S.A of a cylinder = $94.2\ cm^2$

i) Radius:

$L.S.A = 94.2\ cm^2$

$2\pi rh = 94.2\ cm^2$

$2 \times 3.14 \times r \times 5 = 94.2\ cm^2$

$r = \frac{94.2 \times 7}{2 \times 22 \times 5} = \frac{329.7}{110}$

$r = \frac{94.2}{10 \times 3.14} \Rightarrow \frac{942}{314}$

$r = 3\ cm$

$\therefore r = 3\ cm$

ii) Volume = $\pi r^2 h$

$= 3.14 \times (3)^2 \times 5$

$= 15.7 \times 9$

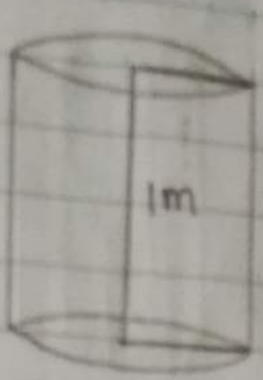
$= 141.3\ cm^3$

$\therefore$ Volume = $141.3\ cm^3$

Ans ⇒ i) 3cm

ii) $141.3\ cm^3$ ✓

Refer text book pg: 231



Vol = 15.4 l

Soln:

given:

Volume of cylinder = 15.4 l

$= 0.0154\ m^3$

$h = 1m$

$\pi r^2 h = 0.0154\ m^3$

$\frac{22}{7} \times r^2 \times 1 = 0.0154\ m^3$

$r^2 = \frac{0.0154 \times 7}{22} = 0.0049$

$r^2 = \sqrt{0.07 \times 0.07}$

$r = 0.07\ m = \frac{7}{100}\ m$

T.S.A of a cylinder $= 2\pi r(h+r)$

$= 2 \times \frac{22}{7} \times \frac{7}{100}\left(1 + \frac{7}{100}\right)$

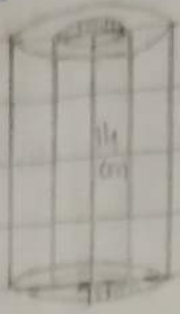
$= \frac{1}{2} \times \frac{22}{7_1} \times \frac{1}{100_{50}} \times \left(\frac{100+7}{100}\right)$

$= \frac{11}{25} \times \frac{107}{100}$

$= \frac{1177}{2500}\ m^2$

Ans = $\frac{1177}{2500}\ m^2$ ✓

Refer text book pg: 231



Soln:

given:

Cylinder of graphite:

$d = 1mm = \frac{1}{10} cm$

$r = \frac{1}{10} \times \frac{1}{2} = \frac{1}{20} cm$

$h = 14 cm$

Pencil:

$D = 7m = \frac{7}{10} cm$

$R = \frac{7}{20} cm$

Volume of Wood $\Rightarrow$ Volume of pencil - Volume of graphite

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

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

$\Rightarrow \frac{22}{7} \times \left(\left(\frac{7}{20}\right)^2 - \left(\frac{1}{20}\right)^2\right) 14$

$\Rightarrow \frac{22}{7} \left(\frac{49 - 1}{400}\right) \frac{2}{14} \Rightarrow \frac{11}{44} \times \frac{44}{80}$

$\Rightarrow 5.28 cm^3$

$\therefore$ Volume of Wood $= 5.28 cm^3$ ✓

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

$\Rightarrow \frac{22}{7} \times \frac{1}{20} \times \frac{1}{20} \times 14^2 \Rightarrow \frac{11}{100} cm^3$

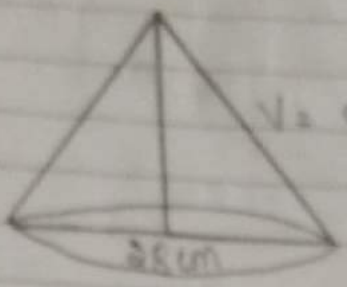
$\Rightarrow 0.11 cm^3$

$\therefore$ Volume of graphite $= 0.11 cm^3$ ✓

Ans $\Rightarrow$ Volume of Wood $= 5.28 cm^3$
Volume of graphite $= 0.11 cm^3$ ✓

Ex: 13.7

Refer text book pg: 853



Soln:

given:

$d = 28\ cm$

$r = 14\ cm$

$V = 9856\ cm^3$

$\frac{1}{3} \times \pi r^2 h = 9856\ cm^3$

$\frac{1}{3} \times \frac{22}{7} \times (14)^2 \times h = 9856$

$\Rightarrow h = \frac{9856 \times 7 \times 3}{22 \times 196}$

$= 16 \times 3$

i) $h = 48\ cm$

$\therefore h = 48 cm$

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

$= \sqrt{(14)^2 + (48)^2}$

$= \sqrt{196 + 2304}$

$= \sqrt{2500}$

$= \sqrt{50 \times 50}$

$l = 50\ cm$

$\therefore l = 50 cm$

iii) C.S.A of cone $= \pi r l$

$= \frac{22}{7} \times 14 \times 50$

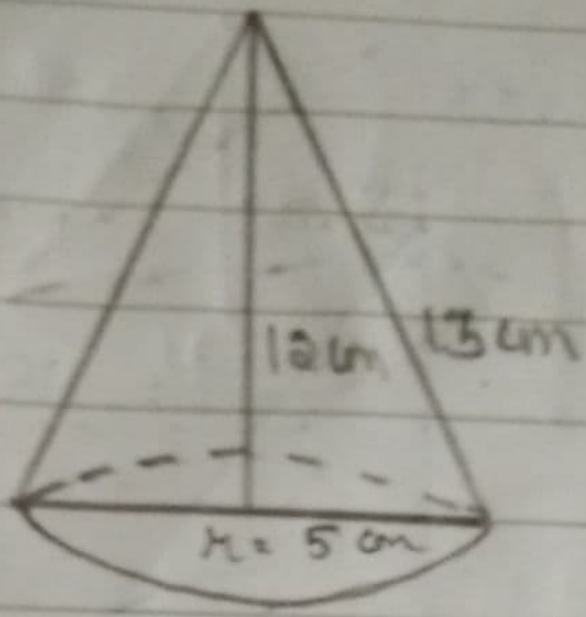
$= 22 \times 100$

$= 2200\ cm^2$

C.S.A $= 2200\ cm^2$

Ans = i) 48cm, ii) 50cm, iii) $2200\ cm^2$

Refer text book pg: 233



Soln:

given:

$r = 5\text{cm}$

$h = 12\text{cm}$

$l = 13\text{cm}$

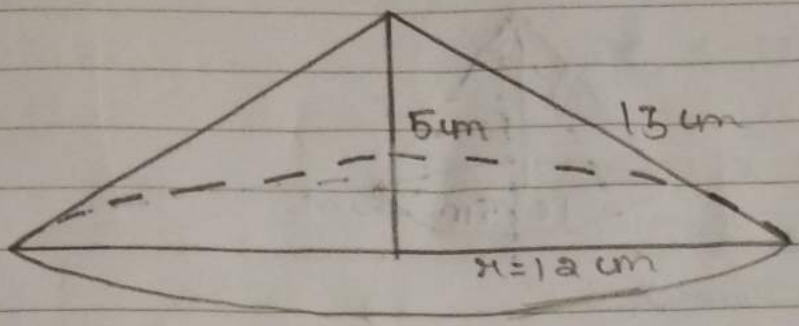
Volume of cone $= \frac{1}{3}\pi r^2 h$

$= \frac{1}{3}\pi \times 5 \times 5 \times 12^{4}$

$= 100\pi\ \text{cm}^3$

Ans $= 100\pi\ \text{cm}^3$ ✓

Refer text book pg: 233



Soln:

$h = 5\ cm$

$r = 12\ cm$

$l = 13\ cm$

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

$= \frac{1}{3} \times \pi \times 12 \times 12 \times 5$

$= 240\ cm^3$

Volume 2 $= 240\ cm^3$

Ratio $= \frac{\text{Volume 1}}{\text{Volume 2}}$

$= \frac{100\pi}{240\pi}$

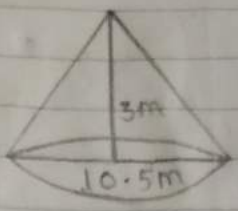
$= \frac{5}{12}$

$= 5 : 12$

Ans = i) $240\ cm^3$

ii) $5 : 12$

Refer text book pg: 233



Soln:

given:

$h = 3m$

$d = 10.5m$

$r = \frac{10.5\ m}{2}$

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

$$= \frac{1}{3} \times \frac{22}{7} \times \frac{10.5}{2} \times \frac{10.5}{2} \times 3$$

$$= \frac{115.5 \times 1.5}{2}$$

$$= \frac{173.25}{2}$$

$$= 86.625\ m^3$$

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

$$= \sqrt{\left(\frac{105}{20}\right)^2 + (3)^2}$$

$$= \sqrt{\left(\frac{21}{4}\right)^2 + 9}$$

$$= \sqrt{\frac{441}{16} + 9}$$

$$= \sqrt{\frac{441 + 144}{16}} \Rightarrow \sqrt{\frac{585}{16}}$$

$$= \frac{24.1}{4}$$

$$l = 6.02\ m$$

Area of canvas used = C.S.A of cone

$= \pi rl$

$= \frac{11}{\cancel{22}} \times \frac{1.5}{\cancel{10.5}} \times 6.02$

$= 11 \times 9.03$

$= 99.33 \text{ m}^2$ (approx)

(approx)

Ans ⇒ 99.33 m^2 of canvas is used

Soln:

For Earth:

$$d = 2R$$

$$R = R$$

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

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

For Moon:

$$d = \frac{1}{4} \times \text{diameter of Earth}$$

$$= \frac{1}{4} \times 2R$$

$$= \frac{R}{2}$$

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

$$= \frac{R}{4}$$

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

$$= \frac{4}{3}\pi \times \frac{r^3}{16}$$

$$= \frac{\pi r^3}{16 \times 3}$$

$$= \frac{\pi r^3}{48} \text{ cm}^3$$

Ratio required = $\frac{\text{V of Earth}}{\text{V of Moon}}$

$$= \frac{4}{3}\pi r^3 \div \frac{\pi r^3}{48}$$

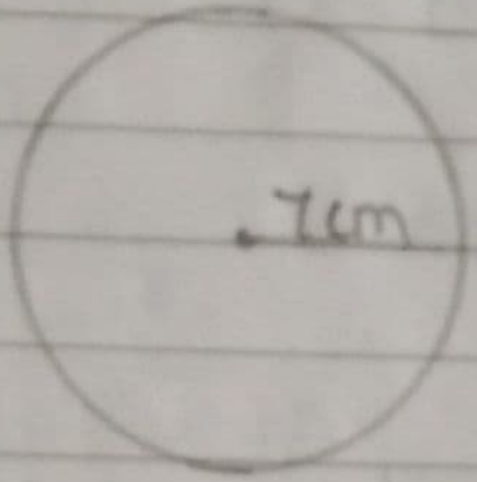
$$= \frac{4}{3}\pi r^3 \times \frac{48}{\pi r^3} \Rightarrow \frac{64}{1}$$

$$= 64:1$$

Ans = Volume of moon is $\frac{1}{64}$ the Volume of Earth ✓

Find the volume of a sphere whose radius is:

) 7cm



Soln:

$r = 7cm$

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

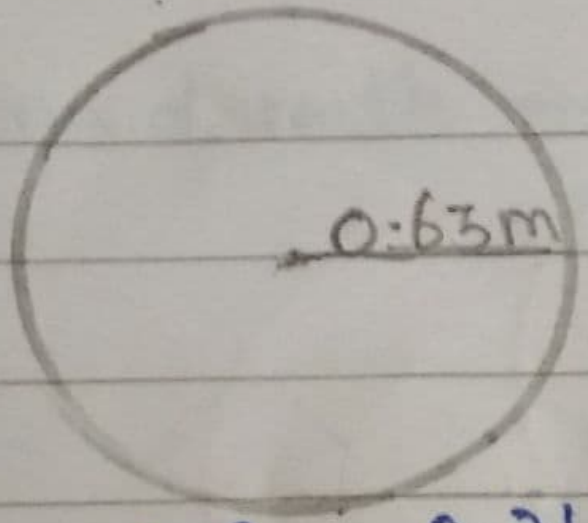
$= \frac{4}{3} \times \frac{22}{7_1} \times \overset{1}{7} \times 7 \times 7 \Rightarrow \frac{88 \times 49}{3}$

$\Rightarrow \frac{4312}{3}$

$= 1437.3 cm^3$

3
4
88
49
4312
352
431 2
1437.3
3 | 4312
3
13
12
11
9
22
21
10
9
10

ii) 0.63 m



Soln:

$r = 0.63m$

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

$= \frac{4}{3} \times \frac{22}{7} \times \overset{0.9}{\cancel{0.63}} \times \overset{0.21}{\cancel{0.63}} \times 0.63$

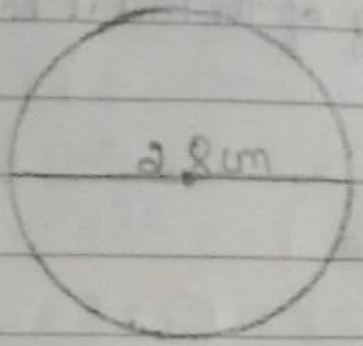
$= 10.47816$

$= 1.05 m^3$ (approx)

Ans = $1.05 m^3$ ✓

2. Find the amount of water displaced by a solid spherical ball of diameter.

i) 28 cm



Soln:

$d = 28\ cm$

$r = 14\ cm$

Volume of water displaced = Volume of Sphere

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

$$= \frac{4}{3} \times \frac{22}{7} \times 14 \times 14 \times 14$$

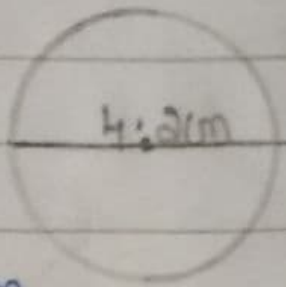
$$= \frac{176 \times 196}{3}$$

$$= \frac{34496}{3}$$

$$= 11498.66\ cm^3$$

Ans = $11498.66\ cm^3$ ✓

The diameter of a metallic ball is 4·2 cm. What is the mass of the ball, if the density of the metal is 8·9 g per cm^3?



Soln:

$d = 4 \cdot 2\ cm$

$r = 2 \cdot 1\ cm$

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

$= \frac{4}{\cancel{3}_1} \times \frac{22}{\cancel{7}_1} \times 2 \cdot 1 \times 2 \cdot 1 \times 2 \cdot 1$

$= 8 \cdot 8 \times 4 \cdot 41$

$= 38 \cdot 808\ cm^3$

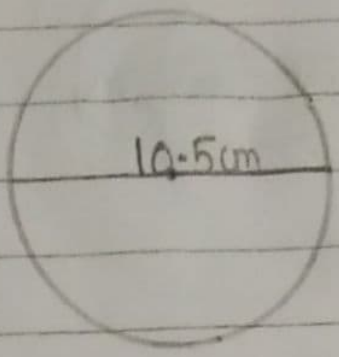
Density per cm^3 = 8·9 g

Mass per $38 \cdot 808\ cm^3$ = $38 \cdot 808 \times 8 \cdot 9$

$= 345 \cdot 3912\ g$

$= 345 \cdot 39\ g$ (approx)

many litres of milk can a hemispherical bowl of
cm hold?



:

$d = 10.5\ cm$.

$r = \frac{105}{20}\ cm$

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

$= \frac{2}{3} \times \frac{22}{7} \times \frac{105}{20} \times \frac{105}{20} \times \frac{105}{20}$

$= \frac{55 \times 1025}{400}$ 2205 441

80 16

$= \frac{4851}{16}$

$= 303.1875\ cm^3$

$= 303.19\ cm^3$

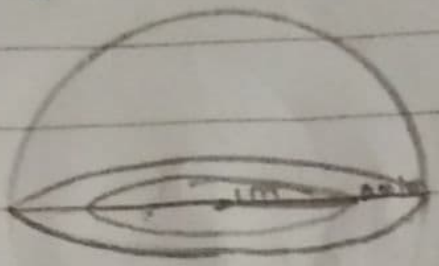
$1000\ cm^3 = 1\ l$

$303.19\ cm^3 = \frac{303.19}{1000}$

$= 0.30319\ l$

Ans = 0.30319 l ✓

Refer text BOOK pg: 236



Soln:

Inner radius, $r = 1m$

Thickness $= 1cm$

$= 0.01m$

Outer radius, $R = 1 + 0.01$

$= 1.01m$

Amount of iron used = Volume of hemispherical shell

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

$= \frac{2}{3} \times \frac{22}{7}((1.01)^3 - 1^3)$

$= \frac{44}{21} \times (1.030301 - 1)$

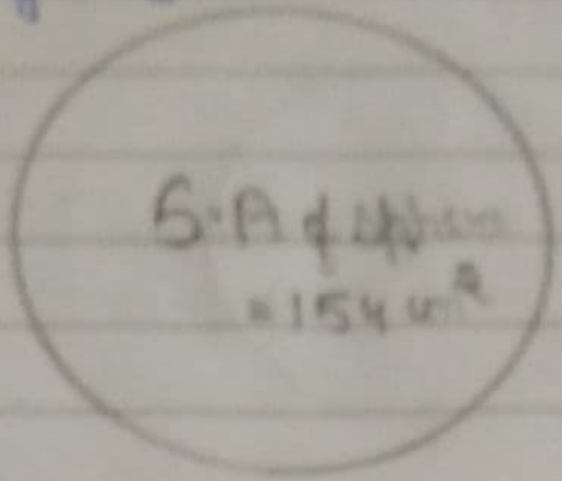
$= \frac{44}{21} \times 0.030301$

$= \frac{1.333244}{21}$

$= 0.063487 m^3$ (approx)

Ans = $0.063487 m^3$ (approx) ✓

Refer text book pg: 236



Soln:

S.A of sphere = $154 cm^2$

$4\pi r^2 = 154 cm^2$

$4 \times \frac{22}{7} \times r^2 = \frac{154}{7} cm^2$

$r^2 = \frac{154 \times 7}{4 \times 22}$

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

$r = \sqrt{\frac{49}{4}} = \frac{7}{2}$ cm

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

Volume of full sphere = Volume of $\frac{1}{2}$ sphere

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

$$= \frac{1}{2} \times \frac{22}{7} \times \frac{5}{2} \times \frac{5}{2} \times \frac{35}{10} \times r$$

$$= \frac{5.5 \times 13.35}{3}$$

$$= \frac{67.375}{3}$$

$$= 22.458 \text{ mm}^3$$

Ans = 22.458 mm^3 ✓

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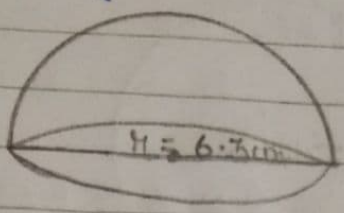


Soln:

given:

Total cost of white washing = ₹ 4989.60

Cost of white washing per m^2 = ₹ 20

$\therefore$ Inner C.S.A = $\frac{₹ 4989.60}{₹ 20}$

C.S.A = $249.48\ m^2$

$\Rightarrow$ C.S.A of hemisphere = $249.48 m^2$

$2\pi r^2 = 249.48 m^2$

$\Rightarrow 2 \times \frac{22}{7} \times r^2 = 249.48 m^2$

$\Rightarrow r^2 = \frac{249.48 \times 7}{2 \times 22}$

$= 5.67 \times 7$

$r = \sqrt{39.69}$

$r = 6.3\ cm$

Volume of air inside dome = Volume of hemisphere

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

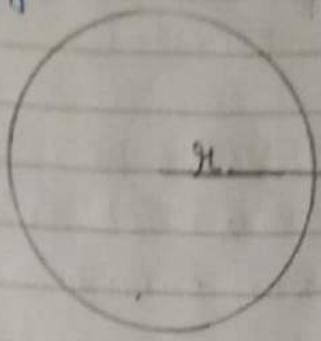
$= \frac{2}{3} \times \frac{22}{7} \times 6.3 \times 6.3 \times 6.3$

$= 13.2 \times 39.69$

$= 523.908\ m^3$

Ans = $523.908\ m^3$ (or) $523.9\ m^3$

Refer text book pg: 236



Soln:

given:

No. of Spheres = 27

radius, R = R

Volume of 1 Sphere = $\frac{4}{3}\pi R^3$

Volume of 27 Sphere = $\frac{9}{27} \times \frac{4}{3_1} \pi R^3$

$= 36\pi R^3$ ___ ①

Let the radius of new Sphere be R'.

Volume of new Sphere = $\frac{4}{3}\pi R'^3$ ___ ②

given:

Volume of new Sphere = Volume of 27 Sphere

∴ From ① and ②

$\frac{4}{3}\pi R'^3 = 36\pi R^3$

$R'^3 = \frac{3 \times \overset{9}{36} R^3}{R_1}$

$R'^3 = 27R^3$

$R'^3 = (3R)^3$

i) $R' = 3R$

ii) Surface area of small Sphere, $S = 4\pi R^2$

Surface area of new Sphere, $S' = 4\pi(3R)^2$

$= 4\pi \times 9R^2$

$= 36\pi R^2$

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

$$= \frac{1}{9}$$

$= 1 : 9$

ii) Ratio $= 1 : 9$

Ans ⇒ i) $3r$

ii) $1 : 9$