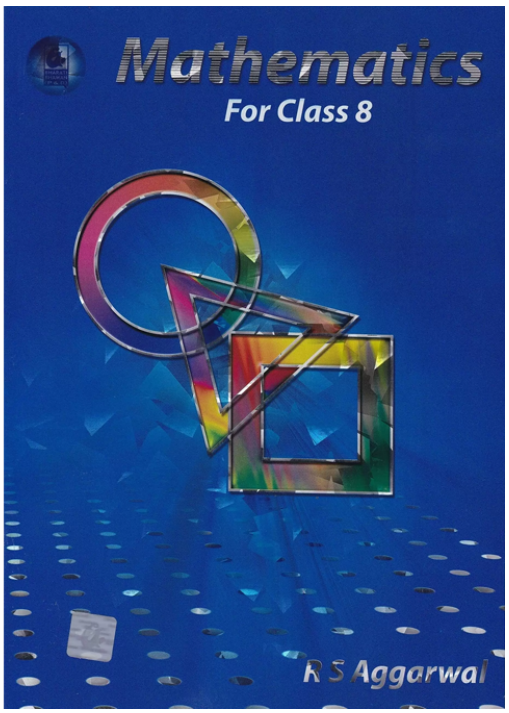
RS Aggarwal Solutions for Class 8 Maths Chapter 20–Volume and Surface Area of Solids

Class 8 - Chapter 20 Volume and Surface Area of Solids



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RS Aggarwal Solutions for Class 8 Maths Chapter 20–Volume and Surface Area of Solids

Class 8: Maths Chapter 20 solutions. Complete Class 8 Maths Chapter 20 Notes.

RS Aggarwal Solutions for Class 8 Maths Chapter 20–Volume and Surface Area of Solids

RS Aggarwal 8th Maths Chapter 20, Class 8 Maths Chapter 20 solutions

Ex 20A

Q1.

Answer :

Volume of a cuboid $= (Length \times Breadth \times Height)$ cubic units
Total surface area $= 2(lb + bh + lh)$ sq units
Lateral surface area $= [2(l + b) \times h]$ sq units

(i) Length = 22 cm, breadth = 12 cm, height = 7.5 cm
Volume $= (Length \times Breadth \times Height) = (22 \times 12 \times 7.5) = 1980\ cm^3$
Total surface area
$= 2(lb + bh + lh) = 2[(22 \times 12) + (22 \times 7.5) + (12 \times 7.5)] = 2[264 + 165 + 90] = 1038\ cm^2$
Lateral surface area $= [2(l + b) \times h] = 2(22 + 12) \times 7.5 = 510\ cm^2$

(ii) Length = 15 m, breadth = 6 m, height = 9 dm = 0.9 m
Volume $= (Length \times Breadth \times Height) = (15 \times 6 \times 0.9) = 81\ m^3$
Total surface area $= 2(lb + bh + lh)$
$= 2[(15 \times 6) + (15 \times 0.9) + (6 \times 0.9)] = 2[90 + 13.5 + 5.4] = 217.8\ m^2$
Lateral surface area $= [2(l + b) \times h] = 2(15 + 6) \times 0.9 = 37.8\ m^2$

(iii) Length = 24 m, breadth = 25 cm = 0.25 m, height = 6 m
Volume $= (Length \times Breadth \times Height) = (24 \times 0.25 \times 6) = 36\ m^3$
Total surface area $= 2(lb + bh + lh)$
$= 2[(24 \times 0.25) + (24 \times 6) + (0.25 \times 6)] = 2[6 + 144 + 1.5] = 303\ m^2$
Lateral surface area $= [2(l + b) \times h] = 2(24 + 0.25) \times 6 = 291\ m^2$

(iv) Length = 48 cm = 0.48 m, breadth = 6 dm = 0.6 m, height = 1 m
Volume $= (Length \times Breadth \times Height) = (0.48 \times 0.6 \times 1) = 0.288\ m^3$
Total surface area
$= 2(lb + bh + lh) = 2[(0.48 \times 0.6) + (0.48 \times 1) + (0.6 \times 1)] = 2[0.288 + 0.48 + 0.6] = 2.736$
Lateral surface area $= [2(l + b) \times h] = 2(0.48 + 0.6) \times 1 = 2.16\ m^2$

Q2.

Answer :

$1\ m\ =\ 100\ cm$

Therefore, dimensions of the tank are:

$2\ m\ 75\ cm \times\ 1\ m\ 80\ cm \times\ 1\ m\ 40\ cm = 275\ cm\ \times\ 180\ cm\ \times\ 140\ cm$

$\therefore$ Volume = $\text{Length}\ \times\ \text{Breadth} \times\ \text{Height}\ =\ 275 \times 180 \times 140 = 6930000\ \text{cm}^3$

Also, $1000cm^3 = 1L$

$\therefore$ Volume $= \frac{6930000}{1000} = 6930\ L$

Q3.

Answer :

$1m = 100cm$

$\therefore$ Dimensions of the iron piece = $105\ \text{cm} \times 70\ \text{cm} \times 1.5\ \text{cm}$

Total volume of the piece of iron $= (105 \times 70 \times 1.5) = 11025\ cm^3$

1 cm^3 measures 8 gms.

$\therefore$Weight of the piece

$= 11025\ \times\ 8\ =\ 88200\ g\ =\ \frac{88200}{1000}\ =\ 88.2\ kg \qquad (because\ 1\ kg\ =\ 1000\ g)$

Q4.

Answer :

$1\ cm\ =\ 0.01\ m$

Volume of the gravel used $=\ \text{Area}\ \times\ Height\ =\ (3750\ \times\ 0.01) = 37.5\ \text{m}^3$

Cost of the gravel is Rs 6.40 per cubic meter.

$\therefore$ Total cost $= (37.5 \times 6.4) =$ Rs 240

Q5.

Answer :

Total volume of the hall$= (16 \times 12.5 \times 4.5) = 900\ m^3$

It is given that $3.6\ m^3$ of air is required for each person.
The total number of persons that can be accommodated in that hall
$= \frac{\text{Total volume}}{\text{Volume required by each person}} = \frac{900}{3.6}$
$= 250$ people

Q6.

Answer :

Volume of the cardboard box $= (120 \times 72 \times 54) = 466560\ cm^3$

Volume of each bar of soap$= (6 \times 4.5 \times 4) = 108\ cm^3$

Total number of bars of soap that can be accommodated in that box
$= \frac{\text{Volume of the box}}{\text{Volume of each soap}} = \frac{466560}{108} = 4320$ bars

Q7.

Answer :

Volume occupied by a single matchbox$= (4 \times 2.5 \times 1.5) = 15\ cm^3$

Volume of a packet containing 144 matchboxes $= (15 \times 144) = 2160\ cm^3$

Volume of the carton$= (150 \times 84 \times 60) = 756000\ cm^3$

Total number of packets is a carton$= \frac{\text{Volume of the carton}}{\text{Volume of a packet}} = \frac{75600}{2160} = 350$ packets

Q8.

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Answer :

Total volume of the block $= (500 \times 70 \times 32) = 1120000\ cm^3$

Total volume of each plank $= 200 \times 25 \times 8 = 40000\ cm^3 = 200 \times 25 \times 8 = 40000\ cm^3$

$\therefore$ Total number of planks that can be made $= \frac{\text{Total volume of the block}}{\text{Volume of each plank}} = \frac{1120000}{40000} = 28$ planks

Q9.

Answer :

Volume of the brick $= 25 \times 13.5 \times 6 = 2025\ cm^3$
Volume of the wall $= 800 \times 540 \times 33 = 14256000\ cm^3$

Total number of bricks $= \frac{\text{Volume of the wall}}{\text{Volume of each brick}} = \frac{14256000}{2025} = 7040$ bricks

Q10.

Answer :

Volume of the wall $= 1500 \times 30 \times 400 = 18000000\ cm^3$
Total quantity of mortar $= \frac{1}{12} \times 18000000 = 1500000\ cm^3$
$\therefore$ Volume of the bricks $= 18000000 - 1500000 = 16500000\ cm^3$

Volume of a single brick $= 22 \times 12.5 \times 7.5 = 2062.5\ cm^3$

$\therefore$ Total number of bricks $= \frac{\text{Total volume of the bricks}}{\text{Volume of a single brick}} = \frac{16500000}{2062.5} = 8000$ bricks

Q11.

Answer :

Volume of the cistern $= 11.2 \times 6 \times 5.8 = 389.76\ m^3 = 389.76 \times 1000 = 389760$ litres

Area of the iron sheet required to make this cistern = Total surface area of the cistern
$= 2(11.2 \times 6 + 11.2 \times 5.8 + 6 \times 5.8) = 2(67.2 + 64.96 + 34.8) = 333.92\ cm^2$

Q12.

Answer :

Volume of the block $= 0.5\ m^3$
We know:
$1\ hectare = 10000\ m^2$
Thickness $= \frac{\text{Volume}}{\text{Area}} = \frac{0.5}{10000} = 0.00005\ \text{m} = 0.005\ \text{cm} = 0.05\ \text{mm}$

Q13.

Answer :

Rainfall recorded = 5 cm = 0.05 m
Area of the field = 2 hectare = $2 \times 10000\ \text{m}^2 = 20000\ \text{m}^2$
Total rain over the field =
$\text{Area of the field} \times \text{Height of the field} = 0.05 \times 20000 = 1000\ \text{m}^3$

Q14.

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Answer :

Area of the cross-section of river $= 45 \times 2 = 90\ m^2$

Rate of flow$= 3\ {}^{km}/_{hr} = \frac{3\times1000}{60} = 50\ \frac{m}{min}$

Volume of water flowing through the cross-section in one minute $= 90 \times 50 = 4500\ m^3$ per minute

Q15.

Answer :

Let the depth of the pit be *d* m.

$\text{Volume} = \text{Length} \times \text{width} \times \text{depth} = 5\ \text{m} \times 3.5\ \text{m} \times d\ m$

But,

Given volume = 14 m^3

$\therefore$ Depth $= d = \frac{\text{volume}}{\text{length} \times \text{width}} = \frac{14}{5\times3.5} = 0.8\ \text{m}$ = 80 cm

Q16.

Answer :

Capacity of the water tank $= 576\ \text{litres} = 0.576\ \text{m}^3$

Width = 90 cm = 0.9 m

Depth = 40 cm = 0.4 m

Length = $= \frac{\text{capacity}}{\text{width}\times\text{depth}} = \frac{0.576}{0.9\times0.4} = 1.600\ \text{m}$

Q17.

Answer :

Volume of the beam$= 1.35\ \mathrm{m}^3$

Length = 5 m

Thickness = 36 cm = 0.36 m

Width = $= \frac{\text{volume}}{\text{thickness} \times \text{length}} = \frac{1.35}{5 \times 0.36} = 0.75\ \mathrm{m} = 75\ \mathrm{cm}$

Q18.

Answer :

Volume $= \text{height} \times \text{area}$

Given:

Volume = 378 m^3

Area = 84 m^2

$\therefore$ Height $= \frac{\text{volume}}{\text{area}} = \frac{378}{84} = 4.5\ \mathrm{m}$

Q19.

Answer :

Length of the pool = 260 m

Width of the pool = 140 m

Volume of water in the pool = 54600 cubic metres

$\therefore$ Height of water $= \frac{\text{volume}}{\text{length} \times \text{width}} = \frac{54600}{260 \times 140} = 1.5$ metres

Q20.

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Answer :

External length = 60 cm
External width = 45 cm
External height = 32 cm

External volume of the box= $60 \times 45 \times 32 = 86400 \text{ cm}^3$

Thickness of wood = 2.5 cm

$\therefore$ Internal length $= 60 - (2.5 \times 2) = 55$ cm
Internal width $= 45 - (2.5 \times 2) = 40$ cm
Internal height $= 32 - (2.5 \times 2) = 27$ cm

Internal volume of the box= $55 \times 40 \times 27 = 59400 \text{ cm}^3$

Volume of wood = External volume - Internal volume= $86400 - 59400 = 27000 \text{ cm}^3$

Q21.

Answer :

External length = 36 cm
External width = 25 cm
External height = 16.5 cm

External volume of the box= $36 \times 25 \times 16.5 = 14850\ \text{cm}^3$

Thickness of iron = 1.5 cm

$\therefore$ Internal length $= 36 - (1.5 \times 2) = 33$ cm
Internal width $= 25 - (1.5 \times 2) = 22$ cm
Internal height $= 16.5 - 1.5 = 15$ cm (as the box is open)

Internal volume of the box= $33 \times 22 \times 15 = 10890\ \text{cm}^3$

Volume of iron = External volume – Internal volume= $14850 - 10890 = 3960\ \text{cm}^3$

Given:
$1\ \text{cm}^3$ of iron $= 8.5$ grams

Total weight of the box $= 3960 \times 8.5 = 33660$ grams $= 33.66$ kilograms

Q22.

Answer :

External length = 56 cm
External width = 39 cm
External height = 30 cm

External volume of the box= $56 \times 39 \times 30 = 65520 \text{ cm}^3$

Thickness of wood = 3 cm

$\therefore$ Internal length $= 56 - (3 \times 2) = 50$ cm
Internal width $= 39 - (3 \times 2) = 33$ cm
Internal height $= 30 - (3 \times 2) = 24$ cm

Capacity of the box = Internal volume of the box= $50 \times 33 \times 24 = 39600 \text{ cm}^3$

Volume of wood = External volume – Internal volume= $65520 - 39600 = 25920 \text{ cm}^3$

Q23.

Answer :

External length = 62 cm
External width = 30 cm
External height = 18 cm

$\therefore$ External volume of the box= $62 \times 30 \times 18 = 33480 \ cm^3$

Thickness of the wood = 2 cm

Now, internal length $= 62 - (2 \times 2) = 58$ cm
Internal width $= 30 - (2 \times 2) = 26$ cm
Internal height $= 18 - (2 \times 2) = 14$ cm

$\therefore$ Capacity of the box = internal volume of the box= $(58 \times 26 \times 14) \ cm^3 = 21112 \ cm^3$

Q24.

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Answer :

External length = 80 cm
External width = 65 cm
External height = 45 cm

∴ External volume of the box= $80 \times 65 \times 45 = 234000\ cm^3$

Thickness of the wood = 2.5 cm

Then internal length= $80 - (2.5 \times 2) = 75$ cm
Internal width $= 65 - (2.5 \times 2) = 60$ cm
Internal height $= 45 - (2.5 \times 2) = 40$ cm

Capacity of the box = internal volume of the box= $(75 \times 60 \times 40)\ cm^3 = 180000\ cm^3$

Volume of the wood = external volume − internal volume= $(234000 - 180000)\ cm^3 = 54000\ cm^3$

It is given that $100\ \text{cm}^3\ \text{of wood}\ \text{weighs}\ 8\ \text{g}.$

∴ Weight of the wood $= \frac{54000}{100} \times 8\ \text{g} = 4320\ \text{g} = 4.32\ \text{kg}$

Q25.

Answer :

(i) Length of the edge of the cube = *a* = 7 m
Now, we have the following:
Volume= $a^3 = 7^3 = 343\ m^3$
Lateral surface area $= 4a^2 = 4 \times 7 \times 7 = 196\ m^2$
Total Surface area= $6a^2 = 6 \times 7 \times 7 = 294\ m^2$

(ii) Length of the edge of the cube = a = 5.6 cm
Now, we have the following:
Volume= $a^3 = 5.6^3 = 175.616\ cm^3$
Lateral surface area $= 4a^2 = 4 \times 5.6 \times 5.6 = 125.44\ cm^2$
Total Surface area= $6a^2 = 6 \times 5.6 \times 5.6 = 188.16\ cm^2$

(iii) Length of the edge of the cube = a = 8 dm 5 cm = 85 cm
Now, we have the following:
Volume= $a^3 = 85^3 = 614125\ cm^3$
Lateral surface area $= 4a^2 = 4 \times 85 \times 85 = 28900\ cm^2$
Total Surface area= $6a^2 = 6 \times 85 \times 85 = 43350\ cm^2$

Q26.

Answer :

Let *a* be the length of the edge of the cube.
Total surface area= $6a^2 = 1176\ cm^2$
$\Rightarrow a = \sqrt{\frac{1176}{6}} = \sqrt{196} = 14\ cm$
$\therefore$ Volume= $a^3 = 14^3 = 2744\ cm^3$

Q27.

Answer :

Let *a* be the length of the edge of the cube.

Then volume $= a^3 = 729\ cm^3$

Also, $a = \sqrt[3]{729} = 9\ cm$

$\therefore$ Surface area$= 6a^2 = 6 \times 9 \times 9 = 486\ cm^2$

Q28.

Answer :

1 m = 100 cm
Volume of the original block $= 225 \times 150 \times 27 = 911250\ cm^3$

Length of the edge of one cube = 45 cm
Then volume of one cube$= 45^3 = 91125\ cm^3$

$\therefore$ Total number of blocks that can be cast $= \frac{\text{volume of the block}}{\text{volume of one cube}} = \frac{911250}{91125} = 10$

Q29.

Answer :

Let *a* be the length of the edge of a cube.
Volume of the cube$= a^3$
Total surface area$= 6a^2$

If the length is doubled, then the new length becomes 2*a*.
Now, new volume $= (2a)^3 = 8a^3$
Also, new surface area$== 6(2a)^2 = 6 \times 4a^2 = 24a^2$
$\therefore$ The volume is increased by a factor of 8, while the surface area increases by a factor of 4.

Q30.

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Answer :

Cost of wood = Rs $500/\mathrm{m}^3$

Cost of the given block = Rs 256

$\therefore$ Volume of the given block $= \mathrm{a}^3 = \frac{256}{500} = 0.512\ \mathrm{m}^3 = 512000\ \mathrm{cm}^3$

Also, length of its edge = a $= \sqrt[3]{0.512} = 0.8\ m$ = 80 cm

Ex 20B

Q1.

Answer :

Volume of a cylinder = $\pi r^2 h$
Lateral surface= $2\pi rh$
Total surface area = $2\pi r(h+r)$

(i) Base radius = 7 cm; height = 50 cm
Now, we have the following:
Volume= $\frac{22}{7} \times 7 \times 7 \times 50 = 7700\ cm^3$
Lateral surface area= $2\pi rh = 2 \times \frac{22}{7} \times 7 \times 50 = 2200\ cm^2$
Total surface area = $2\pi r(h+r) = 2 \times \frac{22}{7} \times 7(50+7) = 2508\ cm^2$

(ii) Base radius = 5.6 m; height = 1.25 m
Now, we have the following:
Volume= $\frac{22}{7} \times 5.6 \times 5.6 \times 1.25 = 123.2\ m^3$
Lateral surface area= $2\pi rh = 2 \times \frac{22}{7} \times 5.6 \times 1.25 = 44\ m^2$
Total surface area = $2\pi r(h+r) = 2 \times \frac{22}{7} \times 5.6(1.25+5.6) = 241.12\ m^2$

(iii) Base radius = 14 dm = 1.4 m, height = 15 m
Now, we have the following:
Volume= $\frac{22}{7} \times 1.4 \times 1.4 \times 15 = 92.4\ m^3$
Lateral surface area= $2\pi rh = 2 \times \frac{22}{7} \times 1.4 \times 15 = 132\ m^2$
Total surface area = $2\pi r(h+r) = 2 \times \frac{22}{7} \times 1.4(15+1.4) = 144.32\ cm^2$

Q2.

Answer :

$r = 1.5\ \text{m}$
$h = 10.5\ \text{m}$
$\text{Capacity of the tank} = \text{volume of the tank} = \pi r^2 h = \frac{22}{7} \times 1.5 \times 1.5 \times 10.5 = 74.25\ \text{m}^3$
$\text{We know that } 1\ \text{m}^3 = 1000\ \text{L}$
$\therefore\ 74.25\ \text{m}^3 = 74250\ \text{L}$

Q3.

Answer :

Height = 7 m
Radius = 10 cm = 0.1 m
Volume= $\pi r^2 h = \frac{22}{7} \times 0.1 \times 0.1 \times 7 = 0.22\ m^3$
Weight of wood = 225 kg/m^3
∴ Weight of the pole= $0.22 \times 225 = 49.5\ kg$

Q4.

Answer :

Diameter = 2*r* = 140 cm
i.e., radius, *r* = 70 cm = 0.7 m

Now, volume $= \pi r^2 h = 1.54\ m^3$

$\Rightarrow \frac{22}{7} \times 0.7 \times 0.7 \times h = 1.54$
$\therefore\ h = \frac{1.54 \times 7}{0.7 \times 0.7 \times 22} = \frac{154 \times 7}{154 \times 7} = 1\ m$

Q5.

Answer :

Volume= $\pi r^2 h = 3850\ cm^3$
Height = 1 m =100 cm

Now, radius, $r = \sqrt{\frac{3850}{\pi \times h}} = \sqrt{\frac{3850 \times 7}{22 \times 100}} = 1.75 \times 7 = 3.5\ cm$
∴ Diameter =2(radius) $= 2 \times 3.5 = 7\ cm$

https://www.youtube.com/embed/X2M84fZEPEs?feature=oembedQ6.

Answer :

Diameter = 14 m
Radius $= \frac{14}{2} = 7\ m$
Height = 5 m

∴ Area of the metal sheet required = total surface area

$$= 2\pi r\left(h + r\right)$$
$$= 2 \times \frac{22}{7} \times 7\left(5 + 7\right)\ m^2$$
$$= 44 \times 12\ m^2$$
$$= 528\ m^2$$

Q7.

Answer :

Circumference of the base = 88 cm
Height = 60 cm

Area of the curved surface $= circumference \times height = 88 \times 60 = 5280\ cm^2$
Circumference $= 2\pi r = 88\ cm$
Then radius$= r = \frac{88}{2\pi} = \frac{88 \times 7}{2 \times 22} = 14\ cm$
∴ Volume$= \pi r^2 h = \frac{22}{7} \times 14 \times 14 \times 60 = 36960\ cm^3$

Q8.

Answer :

Length = height = 14 m
Lateral surface area$= 2\pi rh = 220\ m^2$
Radius $= r = \frac{220}{2\pi h} = \frac{220 \times 7}{2 \times 22 \times 14} = \frac{10}{4} = 2.5\ m$
∴ Volume$= \pi r^2 h = \frac{22}{7} \times 2.5 \times 2.5 \times 14 = 275\ m^3$

Q9.

Answer :

Height = 8 cm

Volume $= \pi r^2 h = 1232\ cm^3$

Now, radius $= r = \sqrt{\frac{1232}{\pi h}} = \sqrt{\frac{1232 \times 7}{22 \times 8}} = \sqrt{49} = 7cm$

Also, curved surface area $= 2\pi rh = 2 \times \frac{22}{7} \times 7 \times 8 = 352\ cm^2$

∴ Total surface area

$= 2\pi r\left(h + r\right) = \left(2 \times \frac{22}{7} \times 7 \times 8\right) + \left(2 \times \frac{22}{7} \times (7)^2\right) = 352 + 308 = 660\ cm^2$

Q10.

Answer :

We have: $\frac{radius}{height} = \frac{7}{2}$

i.e., $r = \frac{7}{2}h$

Now, volume $= \pi r^2 h = \pi\left(\frac{7}{2}h\right)^2 h = 8316\ cm^3$

$\Rightarrow \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times h^3 = 8316$

$\Rightarrow h^3 = \frac{8316 \times 2}{11 \times 7} = 108 \times 2 = 216$

$\Rightarrow h = \sqrt[3]{216} = 6\ cm$

Then $r = \frac{7}{2}h = \frac{7}{2} \times 6 = 21\ cm$

∴ Total surface area $= 2\pi r\left(h + r\right) = 2 \times \frac{22}{7} \times 21 \times \left(6 + 21\right) = 3564\ cm^2$

Q11.

Answer :

Curved surface area $= 2\pi rh = 4400\ cm^2$
Circumference $= 2\pi r = 110\ \text{cm}$
Now, height$= h = \frac{curved\ surface\ area}{circumference} = \frac{4400}{110} = 40\ cm$

Also, radius, $r = \frac{4400}{2\pi h} = \frac{4400\times7}{2\times22\times40} = \frac{35}{2}$

$\therefore$ Volume$= \pi r^2 h = \frac{22}{7} \times \frac{35}{2} \times \frac{35}{2} \times 40 = 22 \times 5 \times 35 \times 10 = 38500\ \text{cm}^3$

Q12.

Answer :

For the cubic pack:
Length of the side, a = 5 cm
Height = 14 cm
Volume$= a^2 h = 5 \times 5 \times 14 = 350\ cm^3$

For the cylindrical pack:
Base radius $= r = 3.5\ cm$
Height = 12 cm
Volume$= \pi r^2 h = \frac{22}{7} \times 3.5 \times 3.5 \times 12 = 462\ \text{cm}^3$

We can see that the pack with a circular base has a greater capacity than the pack with a square base.
Also, difference in volume$= 462 - 350 = 112\ cm^3$

Q13.

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Answer :

Diameter = 48 cm
Radius = 24 cm = 0.24 m
Height = 7 m

Now, we have:
Lateral surface area of one pillar= $\pi dh = \frac{22}{7} \times 0.48 \times 7 = 10.56\ m^2$
Surface area to be painted = total surface area of 15 pillars $= 10.56 \times 15 = 158.4\ m^2$
∴ Total cost= $Rs\ (158.4 \times 2.5) = Rs\ 396$

Q14.

Answer :

Volume of the rectangular vessel $= 22 \times 16 \times 14 = 4928\ cm^3$
Radius of the cylindrical vessel = 8 cm
Volume= $\pi r^2 h$

As the water is poured from the rectangular vessel to the cylindrical vessel, we have:
Volume of the rectangular vessel = volume of the cylindrical vessel

∴ Height of the water in the cylindrical vessel= $\frac{volume}{\pi r^2} = \frac{4928 \times 7}{22 \times 8 \times 8} = \frac{28 \times 7}{8} = \frac{49}{2} = 24.5\ cm$

Q15.

Answer :

Diameter of the given wire = 1 cm
Radius = 0.5 cm
Length = 11 cm
Now, volume $= \pi r^2 h = \frac{22}{7} \times 0.5 \times 0.5 \times 11 = 8.643\ cm^3$
The volumes of the two cylinders would be the same.
Now, diameter of the new wire = 1 mm = 0.1 cm
Radius = 0.05 cm
$\therefore$ New length $= \frac{\text{volume}}{\pi r^2} = \frac{8.643 \times 7}{22 \times 0.05 \times 0.05} = 1100.02\ cm \cong$ 11 m

Q16.

Answer :

Length of the edge, a = 2.2 cm
Volume of the cube $= a^3 = (2.2)^3 = 10.648\ cm^3$
Volume of the wire $= \pi r^2 h$
Radius = 1 mm = 0.1 cm
As volume of cube = volume of wire, we have:

$h = \frac{volume}{\pi r^2} = \frac{10.648 \times 7}{22 \times 0.1 \times 0.1} = 338.8\ cm$

Q17.

Answer :

Diameter = 7 m
Radius = 3.5 m
Depth = 20 m

Volume of the earth dug out $= \pi r^2 h = \frac{22}{7} \times 3.5 \times 3.5 \times 20 = 770\ m^3$
Volume of the earth piled upon the given plot $= 28 \times 11 \times h = 770\ m^3$

$\therefore\ h = \frac{770}{28 \times 11} = \frac{70}{28} = 2.5\ m$

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Q18.

Answer :

Inner diameter = 14 m

i.e., radius = 7 m

Depth = 12 m

Volume of the earth dug out $= \pi r^2 h = \frac{22}{7} \times 7 \times 7 \times 12 = 1848\ m^3$

Width of embankment = 7 m

Now, total radius $= 7 + 7 = 14\ m$

$$\text{Volume of the embankment} = \text{total volume} - \text{inner volume}$$
$$= \pi r_o{}^2 h - \pi r_i{}^2 h = \pi h\left(r_o{}^2 - r_i{}^2\right)$$
$$= \frac{22}{7} h\left(14^2 - 7^2\right) = \frac{22}{7} h(196 - 49)$$
$$= \frac{22}{7} h \times 147 = 21 \times 22h$$
$$= 462 \times h\ m^3$$

Since volume of embankment = volume of earth dug out, we have:

$1848 = 462\ h$

$\Rightarrow h = \frac{1848}{462} = 4\ m$

∴ Height of the embankment = 4 m

Q19.

Answer :

Diameter = 84 cm

i.e., radius = 42 cm

Length = 1 m = 100 cm

Now, lateral surface area $= 2\pi rh = 2 \times \frac{22}{7} \times 42 \times 100 = 26400\ cm^2$

∴ Area of the road

$$= \text{lateral surface area} \times \text{no. of rotations} = 26400 \times 750 = 19800000\ cm^2 = 1980\ m^2$$

Q20.

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Answer :

Thickness of the cylinder = 1.5 cm
External diameter = 12 cm
i.e., radius = 6 cm
also, internal radius = 4.5 cm
Height = 84 cm

Now, we have the following:
Total volume $= \pi r^2 h = \frac{22}{7} \times 6 \times 6 \times 84 = 9504 \text{ cm}^3$
Inner volume $= \pi r^2 h = \frac{22}{7} \times 4.5 \times 4.5 \times 84 = 5346 \text{ cm}^3$
Now, volume of the metal = total volume − inner volume $= 9504 - 5346 = 4158\ cm^3$
∴ Weight of iron $= 4158 \times 7.5 = 31185 \text{ g} = 31.185 \text{ kg}$ [Given: $1\ cm^3 = 7.5g$]

Q21.

Answer :

Length = 1 m = 100 cm
Inner diameter = 12 cm
Radius = 6 cm
Now, inner volume $= \pi r^2 h = \frac{22}{7} \times 6 \times 6 \times 100 = 11314.286 \text{ cm}^3$
Thickness = 1 cm
Total radius = 7 cm

Now, we have the following:
Total volume $= \pi r^2 h = \frac{22}{7} \times 7 \times 7 \times 100 = 15400 \text{ cm}^3$
Volume of the tube $= \text{total volume} - \text{inner volume} = 15400 - 11314.286 = 4085.714\ cm^3$
Density of the tube = 7.7 g/cm^3
∴ Weight of the tube $= \text{volume} \times \text{density} = 4085.714 \times 7.7 = 31459.9978 \text{ g} = 31.459 \text{ kg}$

Ex 20C

Q1.

Answer :

(b) 17

Length of the diagonal of a cuboid $= \sqrt{l^2 + b^2 + h^2}$

$\therefore \sqrt{l^2 + b^2 + h^2} = \sqrt{12^2 + 9^2 + 8^2} = \sqrt{144 + 81 + 64} = \sqrt{289} = 17\ cm$

Q2.

Answer :

(b) $125\ cm^3$

Total surface area $= 6a^2 = 150\ cm^2$, where a is the length of the edge of the cube.
$\Rightarrow 6a^2 = 150$
$\Rightarrow a = \sqrt{\frac{150}{6}} = \sqrt{25} = 5\ cm$
$\therefore$ Volume$= a^3 = 5^3 = 125\ cm^3$

Q3.

Answer :

(c) $294\ cm^2$

Volume$= a^3 = 343\ cm^3$
$\Rightarrow a = \sqrt[3]{343} = 7\ cm$
$\therefore$ Total surface area$= 6a^2 = 6 \times 7 \times 7 = 294\ cm^2$

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He was born on January 2, 1946 in a village of Delhi. He graduated from Kirori Mal College, University of Delhi. After completing his M.Sc. in Mathematics in 1969, he joined N.A.S. College, Meerut, as a lecturer. In 1976, he was awarded a fellowship for 3 years and joined the University of Delhi for his Ph.D. Thereafter, he was promoted as a reader in N.A.S. College, Meerut. In 1999, he joined M.M.H. College, Ghaziabad, as a reader and took voluntary retirement in 2003. He has authored more than 75 titles ranging from Nursery to M. Sc. He has also written books for competitive examinations right from the clerical grade to the I.A.S. level.

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