CBSE Test Paper 03 CH-13 Surface Areas and Volumes

- 1. The difference between the total surface area of a cube of side 4 cm and its lateral surface area is
 - a. $24 \ cm^2$.
 - b. $20 \ cm^2$.
 - c. $16 \ cm^2$.
 - d. $32 \ cm^2$.
- 2. The volume of a right circular cylinder is $2310\ cm^3$. If the radius of its base is 7 cm, then its height is
 - a. 7.5 cm.
 - b. 22.5 cm.
 - c. 15 cm.
 - d. 30 cm.
- 3. A conical vessel whose internal depth is 42 cm and internal diameter is 48 cm is full of water. If 1 cubic dm of water weight 1 kg wt, then the weight of water in the conical vessel is
 - a. 26.5 kg wt.
 - b. 25.65 kg wt.
 - c. 25.5 kg wt.
 - d. 25.344 kg wt.
- 4. If a conical glass is 35 cm in diameter and 12 cm deep, then its capacity in litres is

- a. 3.85 ltr.
- b. 7.7 ltr.
- c. 1.155 ltr.
- d. 0.5775 ltr.
- 5. The volume of a cylinder whose circumference of the base is 132 cm and height 25 cm is
 - a. 19800 *cm*³.
 - b. $34650 \ cm^3$.
 - c. 3300 *cm*³.
 - d. 9900 cm^3 .
- 6. Fill in the blanks:

If A₁, A₂, A₃ denote the areas of three adjacent faces of a cuboid, then its volume is

7. Fill in the blanks:

Diagonal of a cuboid is given by _____.

- 8. Find the volume in terms of π of a conical vessel with radius 7 cm and slant height 25 cm.
- In a hot water heating system, there is a cylindrical pipe of length 28 m and diameter
 5 cm. Find the radiating surface in the system.
- The base radii of the two right circular cones of the same height are in the ratio 3 : 5.
 Find the ratio of their volumes.
- 11. A conical vessel whose internal dimensions are 105 cm deep and 120 cm in diameter is full of water. If a cubic decimetre of water weights 1 k 500 g, find the weight of water contained in the vessel.

- 12. The paint in a certain container is sufficient to paint an area equal to 9.375 m². How many brick of dimensions 22.5 cm × 10 cm × 7.5 cm can be painted out of this container?
- 13. The inner diameter of a cylindrical wooden pipe is 24 cm. and its outer diameter is 28 cm. the length of wooden pipe is 35 cm. find the mass of the pipe, if 1 cubic cm of wood has a mass of 0.6 g.
- 14. Twenty-seven solid iron spheres, each of radius r and surface area S are melted to form a sphere with surface area S'. Find the
 - i. radius r' of the new sphere, and
 - ii. ratio of S and S'.
- 15. A hemispherical bowl of internal diameter 36 cm contains a liquid. This liquid is to be filled in clyindrical bottles of radius 3 cm and height 6 cm. How many bottles are required to empty the bowl?

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Solution

1. (d) $32 \ cm^2$.

Explanation: TSA of cube - LSA of cube

- $= 6a^2 4a^2$
- = 2a²
- = 2 ×4×4
- = 32 cm²
- 2. (c) 15 cm.

Explanation: Volume of cylinder= πr^2h

$$2310 = \frac{22}{7} \times 7 \times 7 \times h$$
$$h = \frac{2310}{22 \times 7}$$
$$h = 15 \text{ cm}$$
$$= 15 \text{ cm}$$

3. (d) 25.344 kg wt.

Explanation:

Volume of vessel cone = $\frac{1}{3} \times \pi \times r^2 \times h$ = $\frac{1}{3} \times \frac{22}{7} \times 24 \times 24 \times 42$ = 25344 cm³ = 25.344 dm³ (1dm³= 1000 cm³) = 25.344 kg.-wt. (1 kg- wt = 1dm³)

4. (a) 3.85 ltr.

Explanation: Since, diameter=35cm, so radius, r= 17.5 cm

Now, Volume of glass = $\frac{1}{3}\pi r^2h$

$$= \frac{1}{3} \times \frac{22}{7} \times (17.5)^2 \times 12$$
$$= \frac{80580}{21}$$

= 3850 cm³

Now, $1 \text{ cm}^3 = 0.001 \text{ litres}$

so. 3850 cm³ = 3.85 litres

5. (b) $34650 \ cm^3$.

Explanation:

Given, $2\pi r = 132$, $r = \frac{132}{2\pi}$

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

$$=\pi \left(\frac{132}{2\pi}\right)^2 \times 25$$
$$=\frac{66 \times 66 \times 7}{22} \times 25$$
$$= 34650 \text{ cm}^3$$

- 6. $\sqrt[3]{A_1 A_2 A_3}$
- 7. $\sqrt{l^2 + b^2 + h^2}$
- 8. Radius of conical vessel = 7 cm and slant height = 25 cm and perpendicular height = h $\therefore l^2 = r^2 + h^2$ $\Rightarrow (25)^2 = 7^2 + h^2$ $\Rightarrow h^2 = 625 - 49$ $\Rightarrow h = \sqrt{576} = 24$ cm Volume of the vessel $= \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \pi \times 7^2 \times 24$ $= \frac{1}{3}\pi \times 49 \times 24 = \pi \times 49 \times 8$

 $= 392\pi \text{cm}^3$

9. h = 28 m, 2r = 5 cm

$$\therefore r = rac{5}{2} \ cm = rac{5}{2 imes 100} \ m = rac{5}{200} \ m = rac{1}{40} \ m$$

 \therefore Total radiating surface in the system $=2\pi rh$

$$=2 imesrac{22}{7} imesrac{1}{40} imes2$$
8 = 4.4 m 2

 Let the base radii of two right circular cones be 3x and 5x respectively. Let their common height be h.

Then, volume of the first cone (v₁) = $\frac{1}{3}\pi r^2 h$ $=rac{1}{3}\pi(3x)^2h$ and, volume of the second cone (v₂) = $\frac{1}{3}\pi r^2 h$ $= \frac{1}{3}\pi(5x)^2h$ \therefore Ratio of their volumes = $\frac{v_1}{v_2} = \frac{\frac{1}{3}\pi(3x)^2h}{\frac{1}{2}\pi(5x)^2h}$ $=\frac{9}{25}=9:25$ 11. For conical vessel Diameter = 120 cm :.Radius (r) = $\frac{120}{2}$ cm = 60 cm = 6 dm Depth (h) = 105 cm = 10.5 dm \therefore Volume of water contained in the vessel = $\frac{1}{3}\pi r^2 h$ $=rac{1}{3} imesrac{22}{7} imes(6)^2 imes(10.5)~dm^3$ = 396 dm 3 \therefore Weight of water contained in the vessel = 396 × 1.5 kg = 594 kg. 12. l = 22.5 m, b = 10 cm, h = 7.5 cm. \therefore Total surface area of brick = 2(lb + bh + hl) $= 2(22.5 \times 10 + 10 \times 7.5 + 7.5 \times 22.5)$ = 2(225 + 75 + 168.75) $= 2(468.75) = 937.5 \text{ cm}^2 = .09375 \text{ m}^2$ The no.of brick that can be painted out = $\frac{9.375}{09375}$ = 100 Brick. 13. Inside diameter of the pipe = 24cm

Outside diameter of the pipe = 24cm Length of the pipe = 35cm = (h say) Outside radius of the pipe = 28/2=14=R(say) Inside radius of the pipe=24/2=12=r(say) Volume of the wood = External volume - Internal volume

 $=\pi imes 35\left(14^2-12^2
ight) cubic\ cm$ $=rac{22}{7} imes 35\left(14+12
ight)(14-12)$ cubic cm = 5720 cubic cm

Mass of 1cubic cm = 0.6g

 \therefore Mass of the pipe = $(0.6 imes5720)\,g$

= 3432g

= 3.432kg

14. Volume of 27 solid sphere, each of radius, $r=27 imesrac{4}{3}\,\pi r^3=36\pi r^3$ According to the question,

Volume of sphere of radius r' = Volume of 27 solid spheres

$$\Rightarrow \frac{4}{3}\pi(r')^3 = 36\pi r^3 \Rightarrow (r')^3 = 27r^3 = (3r)^3 \Rightarrow r' = 3r \text{ We have,} S' = 4\pi r'^2 = 4\pi (3r)^2 = 36\pi r^2 \therefore \frac{S}{S'} = \frac{4\pi r^2}{36\pi r^2} = \frac{1}{9} \Rightarrow S: S' = 1:9.$$

15. We have,

Radius of hemispherical bowl = 18 cm

Volume of hemispherical bowl = $\frac{2}{3}\pi \times (18)^3$ cm³ Radius of a cylindrical bottle = 3 cm

Height of a cylindrical bottle = 6 cm

Volume of a cylindrical bottle = ($\pi imes 3^2 imes 6$) cm 3

Suppose x bottles are required to empty the bowl

Volume of x cylindrical bottles = $(\pi \times 9 \times 6 \times \pi)$ cm³ Clearly, Volume of liquid in x bottles = Volume of bowl

$$\Rightarrow \pi \times 9 \times 6 \times x = \frac{2\pi}{3} \times (18)^3$$
$$\Rightarrow x = \frac{2\pi \times 18^3}{3 \times \pi \times 9 \times 6} = 72$$

Hence, 72 bottles are required to empty the bowl.