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 A_1, A_2, A_3 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.

9. 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.

10. 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 m^2. 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?

CBSE Test Paper 03

CH-13 Surface Areas and Volumes

Solution

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

   Explanation: TSA of cube - LSA of cube

   $= 6a^2 - 4a^2$

   $= 2a^2$

   $= 2 \times 4 \times 4$

   $= 32\ cm^2$

2. (c) 15 cm.

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

   $2310 = \frac{22}{7} \times 7 \times 7 \times h$

   $h = \frac{2310}{22 \times 7}$

   $h = 15$ cm

   $= 15$ cm

3. (d) 25.344 kg wt.

   Explanation:

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

   $= \frac{1}{3} \times \frac{22}{7} \times 24 \times 24 \times 42$

   $= 25344 cm^3$

   $= 25.344\ dm^3$ ($1dm^3 = 1000\ cm^3$)

   $= 25.344$ kg.-wt. (1 kg- wt = $1dm^3$)

4. (a) 3.85 ltr.

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

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

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

$= \frac{80580}{21}$

$= 3850\ cm^3$

Now, $1\ cm^3 = 0.001$ litres

so. $3850\ cm^3 = 3.85$ litres

5. (b) 34650 cm^3.

Explanation:

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

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

$= \pi \left(\frac{132}{2\pi}\right)^2 \times 25$

$= \frac{66 \times 66 \times 7}{22} \times 25$

$= 34650\ cm^3$

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

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

$\Rightarrow (25)^2 = 7^2 + h^2$

$\Rightarrow h^2 = 625 - 49$

$\Rightarrow h = \sqrt{576} = 24$ cm

Volume of the vessel $= \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \pi \times 7^2 \times 24$

$= \frac{1}{3}\pi \times 49 \times 24 = \pi \times 49 \times 8$

= $392\pi cm^3$

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

$\therefore r = \frac{5}{2}\ cm = \frac{5}{2\times100}\ m = \frac{5}{200}\ m = \frac{1}{40}\ m$

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

$= 2 \times \frac{22}{7} \times \frac{1}{40} \times 28$ = 4.4 m^2

10. 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 (v_1) = $\frac{1}{3}\pi r^2 h$

$= \frac{1}{3}\pi(3x)^2 h$

and, volume of the second cone (v_2) = $\frac{1}{3}\pi r^2 h$

$= \frac{1}{3}\pi(5x)^2 h$

$\therefore$ Ratio of their volumes = $\frac{v_1}{v_2} = \frac{\frac{1}{3}\pi(3x)^2 h}{\frac{1}{3}\pi(5x)^2 h}$

$= \frac{9}{25}$ = 9 : 25

11. For conical vessel

Diameter = 120 cm

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

$= \frac{1}{3} \times \frac{22}{7} \times (6)^2 \times (10.5)\ dm^3$ = 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 × 10 + 10 × 7.5 + 7.5 × 22.5)

= 2(225 + 75 + 168.75)

= 2(468.75) = 937.5 cm^2 = .09375 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 = 28cm

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

$= \pi \times 35\left(14^2 - 12^2\right)\ cubic\ cm$

$= \frac{22}{7} \times 35\,(14+12)\,(14-12)$ cubic cm

= 5720 cubic cm

Mass of 1cubic cm = 0.6g

$\therefore$ Mass of the pipe = $(0.6 \times 5720)\,g$

= 3432g

= 3.432kg

14. Volume of 27 solid sphere, each of radius, $r = 27 \times \frac{4}{3}\pi r^3 = 36\pi r^3$

According to the question,

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

$\Rightarrow \frac{4}{3}\pi(r')^3 = 36\,\pi r^3$

$\Rightarrow (r')^3 = 27r^3 = (3r)^3 \ \Rightarrow r' = 3r$ 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 = $\frac{2}{3}\pi \times (18)^3\ cm^3$

Radius of a cylindrical bottle = 3 cm

Height of a cylindrical bottle = 6 cm

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

Suppose x bottles are required to empty the bowl

Volume of x cylindrical bottles = $(\pi \times 9 \times 6 \times \pi)\ cm^3$

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.