CBSE Test Paper 02

CH-13 Surface Areas and Volumes

1. The circumference of the base of a right circular cylinder is 44 cm. If its whole surface area is 968 cm^2 then the sum of its height and radius is
   a. 18 cm.
   b. 22 cm.
   c. 20 cm.
   d. 16 cm.
2. Surface area of sphere of diameter 14 cm is
   a. $616\ cm^2$
   b. 400 cm^2
   c. 516 cm^2
   d. 2244 cm^2
3. In a cylindrical drum of radius 4.2 m and height 3.5 m, the number of full bags of wheat can be emptied if the space required for wheat in each bag is 2.1 cu. M, is
   a. 92
   b. 90
   c. 100
   d. 91
4. If the curved surface area of a cylindrical pillar is 264 m^2 and its volume is 924 m^3 then its diameter is
   a. 7 m.

b. 14 m.

c. 21 m.

d. 10.5 m.

5. The volume of a sphere is numerically equal to its surface area, then its diameter is

   a. 2 units.

   b. 6 units.

   c. 3 units.

   d. 1 unit.

6. Fill in the blanks:

   The lateral surface area of a cuboid with dimensions l, b, and h, is _____.

7. Fill in the blanks:

   The radii of two cylinders are in the ratio of 2 : 3 and their heights are in the ratio of 5 : 3. The ratio of their volumes is _____.

8. The volume of a cube is 1,000 cm^3. Find its total surface area.

9. The volume of two hemispheres are in the ratio 8 : 27. What is the ratio of their radii?

10. The diameter of a right circular cone is 8 cm and its volume is 48 π cm^3. What is its height?

11. From a tap of inner radius 0.75 cm, water flows at the rate of 7 m per second. Find the volume in litres of water delivered by the pipe in one hour.

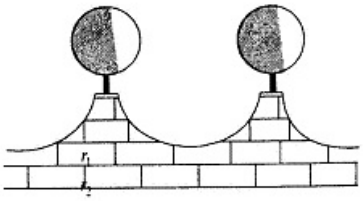
12. Find the ratio of the curved surface areas of two cones if their diameters of the bases are equal and slant heights are in the ratio 4 : 3.

13. Curved surface area of a cone is 308 cm^2 and its slant height is 14 cm. Find

i. radius of the base and
ii. total surface area of the cone.

14. A cylindrical tub of radius 16 cm contains water to a depth of 30 cm. A spherical iron ball is dropped into the tub and thus level of water is raised by 9 cm. What is the radius of the ball?

15. The front compound wall of a house is decorated by wooden spheres of diameter 21 cm, placed on small supports as shown in fig. Eight such spheres are used for this purpose, and are to be painted silver. Each support is a cylinder of radius 1.5 cm and height 7 cm and is to be painted black. Find the cost of paint required if silver paint costs 25 paise per cm^2 and black paint costs 5 paise per cm^2.



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Solution

1. (b) 22 cm.

   Explanation: Given,

   The circumference of the base of a right circular cylinder = 44 cm

   $2\pi r=44$

   $r=44\times7/(22\times2)$

   r= 7 cm

   whole surface area= $2\pi rh+2\pi r^2$

   $968=2\times22/7\times7(h+r)$

   h+r = 22 cm

2. (a) $616\ cm^2$

   Explanation: Surface area of sphere $=4\Pi r^2$

   Given that Diametre = 14 cm

   Radius = 14/2=7 cm

   Surface area of sphere $=4\Pi r^2$

   $=4\times22/7\times7^2$

   $=616\ cm^2$

3. (a) 92

   Explanation: Let number of bags be n

   Volume of drum = n(volume of each bag)

$\pi R^2h = n(2.1)$

$\frac{22}{7} \times (4.2)^2 \times 35 = n(2.1)$

$n = \frac{\frac{22}{7} \times (4.2)^2 \times 35}{2.1}$

$= 92$

4. (b) 14 m.
   Explanation: Given,

   CSA of cylinder= $2\pi rh = 264$

   $= \pi rh = 132\ m^2$

   volume of cylinder = $\pi r^2h = 924$

   Putting πrh here, $924 = 132 \times r$

   $r = \frac{924}{132}$

   $r = 7$ m

   so diameter is $2r = 14$ m

5. (b) 6 units.
   Explanation: Volume of sphere= surface area of sphere

   $4/3\pi r^3 = 4\pi r^2$

   r= 3 units

   so, diameter= 6 units

6. 2(l + b)h

7. 20 : 27

8. Let the length of each edge of the cube be a cm. Then,

   Volume = 1000 $cm^3 \Rightarrow a^3 = 1000 \Rightarrow a = 10$ cm

$\therefore$ Surface area = $6a^2 cm^2 = 6 \times 10$ cm = 600 cm

9. Let volume of two hemispheres be V_1 and V_2.

   Given, $V_1 : V_2 = 8 : 27 \Rightarrow \frac{2}{3}\pi r_1^3 : \frac{2}{3}\pi r_2^3 = 8 : 27$ [$\because$ volume of hemisphere = $\frac{2}{3}\pi r^3$]

   $\Rightarrow r_1^3 : r_2^3 = 8 : 27 \Rightarrow r_1 : r_2 = 2 : 3$

10. Let h cm be the height of the cone.

    Diameter of the cone, d = 8 cm

    $\therefore$ Radius of the cone, r = 4 cm

    Now, Volume of the cone = 48 π cm^3

    $\Rightarrow \frac{1}{3}\pi r^2 h = 48\pi$

    $\Rightarrow \frac{1}{3} \times \pi \times 4 \times 4 \times h = 48\pi$

    $\Rightarrow h = \frac{48\pi \times 3}{16\pi} = 9$ cm

    Hence, the height of the cone is 9 cm.

11. Clearly, the volume of water delivered by the tube in one second is equal to the volume of a cylinder of length 7 m.

    $\therefore$ The volume of water delivered in one second

    $= \frac{22}{7} \times (0.75)^2 \times 700\ cm^3$

    Hence, the volume of water delivered in one hour

    $= \frac{22}{7} \times \left(\frac{3}{4}\right)^2 \times 700 \times 60 \times 60\ cm^3$

    $= \frac{22 \times 9 \times 700 \times 3600}{7 \times 16 \times 1000}$ liters

    = 4455 litres

12. Since diameter of two cones are equal

    $\therefore$ Their radius are equal

    $\therefore r_1 = r_2 = r$ (say)

    Let ratio be x,

    $\therefore$ Slant height 'l_1' of 1st cone = 4x

    Similarly, slant height 'l_2' of 2nd cone = 3x

    $\therefore \frac{C.S.A_1}{C.S.A_2} = \frac{\pi r_1 l_1}{\pi r_2 l_2} = \frac{\pi \times r \times 4x}{\pi \times r \times 3x} = \frac{4}{3}$

13. (i) Slant height (l) = 14 cm

Curved surface area = 308 cm^2

$\Rightarrow \pi rl = 308$

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

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

$\Rightarrow$ r = 7 cm

The radius of the base is 7 cm

(ii) Total surface area of the cone =$\pi r(l + r)$

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

= $\frac{22}{7} \times 7 \times 21 = 462\ cm^2$

Hence, the total surface area of the cone is 462 cm^2

14. Let r be the radius of the iron ball.

Then, Volume of iron ball = volume of water raised in the tub

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

$\Rightarrow \frac{4}{3}r^3$ = $(16)^2 \times 9$

$\Rightarrow r^3 = 64 \times 9 \times 3$

$\Rightarrow r^3 = 1728$

$\Rightarrow$ r = 12 cm

Therefore, radius of the ball = 12 cm

15. For a wooden sphere : Diameter = 21 cm

$\therefore$ Radius (r) = $\frac{21}{2}$ cm

$\therefore$ Surface area of a wooden sphere = $4\pi r^2$

= $4 \times \frac{22}{7} \times (\frac{21}{2})^2 = 1386\ cm^2$

$\therefore$ Surface area of a wooden sphere to be painted = 1386 – $\pi(1.5)^2$

= 1386 – $\frac{22}{7}(1.5)^2$ = 1378.93

$\therefore$ Surface area of eight wooden spheres = 1378.93 $\times$ 8 = 11031.44 cm^2

$\therefore$ Cost of painting silver at 25 paise per cm^2 = 11031.44 $\times$ 25 paise

= Rs $\frac{11031.44 \times 25}{100}$ = Rs. 2757.86

For a cylindrical support

Radius (r) = 1.5 m

Height (h) = 7 cm

$\therefore$ Surface area of a cylindrical support = $2\pi rh$

= $2 \times \frac{22}{7} \times 1.5 \times 7 = 66$ cm^2

$\therefore$ Surface area of eight cylindrical supports = $66 \times 8 = 528$ cm^2

$\therefore$ Cost of painting black at 5 paise per cm^2 = 528×5 paise

= Rs $\frac{528 \times 5}{100}$ = Rs. 26.40

$\therefore$ Cost of paint required = 2757.86 + 26.40 = Rs. 2784.26