CBSE Test Paper 05

CH-13 Surface Areas and Volumes

1. To make a closed hollow cone of base radius 7 cm and height 24 cm, the area of metal sheet required is
   a. 704 cm^2.
   b. 825 cm^2.
   c. 1100 cm^2.
   d. 550 cm^2.
2. The diameter of the base of a cylinder of curved surface area 88 cm^2 and height 14 cm is
   a. 1.5 cm.
   b. 1 cm.
   c. 2 cm.
   d. 25 cm.
3. The ratio of the radii of two spheres whose volumes are in the ratio 64 : 27 is
   a. it is 4 : 3.
   b. it is 8 : 3.
   c. it is 10 : 7.
   d. it is 16 : 9.
4. The volume of a cube whose diagonal is $8\sqrt{3}\ cm$ is
   a. $512\ cm^3$
   b. $64\ cm^3$

c. $128\ cm^3$

d. $256\ cm^3$

5. The cost of digging a pit of dimensions $4.5\ m\ \times 2.5\ m \times 2.5\ m$ at the rate of Rs 20 per cubic metre is

   a. Rs 1687.50

   b. Rs 1125.

   c. Rs 281.25.

   d. Rs 562.50.

6. Fill in the blanks:

   The perimeter of one face of a cube is 40 cm. Then its volume is _____m^3.

7. Fill in the blanks:

   Volume of spherical shell is equal to _____ cubic units.

8. Assuming the earth to be a sphere of radius 6370 km, how many square kilometres is area of the land, if three-fourth of the earth's surface is covered by water?

9. Find the length of 13.2 kg of copper wire of diameter 4 mm, when 1 cubic cm of copper weighs 8.4 gm.

10. The height of a cone is 15 cm. If its volume is 1570 cm^3. Find the radius of the base.

11. A hemispherical bowl is made of steel, 0.25 cm thick. The inner radius of the bowl is 5 cm. Find the outer curved surface area of the bowl.

12. A well with 14 m diameter is dug 8 m deep. The earth taken out of it has been evenly spread all around it to a width of 21 m to form an embankment. Find the height of the embankment.

13. A wooden toy is in the form of a cone surmounted on a hemisphere. The diameter of the base of the cone is 6 cm and its height is 4 cm. Find the cost of painting the toy at

the rate of Rs. 5 per 1000 cm^2.

14. A hemispherical bowl made of brass has inner diameter 10.5 cm. Find the cost of tin-plating it on the inside at the rate of ₹ 16 per $100\ cm^2$

15. A conical tent is 9 m high and the radius of its base is 12 m.

    i. What is the cost of the canvas required to make it, if a square metre canvas costs ₹ 10?

    ii. How many persons can be accommodated in the tent, if each person requires 2 square metre on the ground and 15 m^3 of space to breathe in?

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Solution

1. (a) 704 cm^2.

   Explanation: given

   r= 7 cm, h= 24 cm

   so, slant height, l= $\sqrt{r^2+h^2}$

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

   =$\sqrt{49+576}$

   =$\sqrt{625}$

   =25 cm

   So, surface area of hollow cone = curved surface area +area of base

   =πrl +πr²

   =πr(l+r)

   = $\frac{22}{7}$ × 7 (25+7)

   = 22 × 32

   =704 cm²

2. (c) 2 cm.

   Explanation: CSA of cylinder = 2πrh

   88 = 2× $\frac{22}{7}$ × r × 14

   r= $\frac{88\times7}{2\times22\times14}$

   r = 1cm

Hence Diameter of base = 2 cm.

3. (a) it is 4 : 3.
   Explanation: volume of sphere 1 : volume of sphere2

   $4/3\pi r_1^3 : 4/3\pi r_2^3$

   $r_1^3 : r_2^3 = 64 : 27$

   $r_1 : r_{2 = 4 : 3}$

4. (a) $512\ cm^3$
   Explanation:

   Diagonal of cube = $\sqrt{3}$ × (edge or side)

   $8\sqrt{3} = \sqrt{3}\times$ edge

   edge = 8 cm

   Volume of cube = edge^3

   =8×8×8

   = 512 cm^3

5. (d) Rs 562.50.
   Explanation:

   Cost of digging would be =($4.5\ m\ \times 2.5\ m \times 2.5\ m$) × 20

   = Rs 562.50

6. 1000

7. $\frac{4}{3}\pi\left(R^3 - r^3\right)$

8. $\frac{3^{th}}{4}$ of earth surface is covered by water.
   $\therefore\ \frac{1}{4}$ earth surface is covered by land.

$\therefore$ Surface are covered by land = $\frac{1}{4} \times 4\pi r^2$

= $\frac{1}{4} \times 4 \times \frac{22}{7} \times (6370)^2$

= 127527400 km^2

9. Let the length of the wire be h metres.

   Then,

   Volume $\times$ 8.4 = 13.2 $\times$ 1000

   $\Rightarrow \frac{22}{7} \times \left(\frac{2}{10}\right)^2 \times$ h $\times$ 8.4 = 13.2 $\times$ 1000

   $\Rightarrow$ h = 12500 cm

   = 125 metres

10. Let the radius of the base of the cone be r cm.

    h = 15 cm, Volume = 1570 cm^3

    $\Rightarrow \frac{1}{3}\pi r^2 h$ = 1570

    $\Rightarrow \frac{1}{3} \times 3.14 \times r^2 \times 15 = 1570$

    $\Rightarrow r^2 = \frac{1570 \times 3}{3.14 \times 15} \Rightarrow r^2 = 100$

    $\Rightarrow r = \sqrt{100} \Rightarrow$ r = 10 cm.

    $\therefore$ the radius of the base of the cone is 10 cm.

11. Inner radius of bowl (r) = 5 cm

    Thickness of steel (t) = 0.25 cm

    $\therefore$ Outer radius of bowl (R) = $r + t$ = 5 +0.25 = 5.25 cm

    $\therefore$ Outer curved surface area of bowl = $2\pi R^2 = 2 \times \frac{22}{7} \times 5.25 \times 5.25$

    = $2 \times \frac{22}{7} \times \frac{21}{4} \times \frac{21}{4}$

    = $\frac{693}{4}$

    $= 173.25\ cm^2$

12. We have,

    r = 7 m

    and h = 8 m

    let the height of the embankment be H metre. and radius of embankment + well = R = (21 + r) m = 28 m

    Then,

    the volume of the earth in embankment = volume of the earth dugout

$\frac{22}{7} \times (28^2 - 7^2) \times H = \frac{22}{7} \times 7^2 \times 8$

$\Rightarrow 35 \times 21 \times H = 7^2 \times 8$

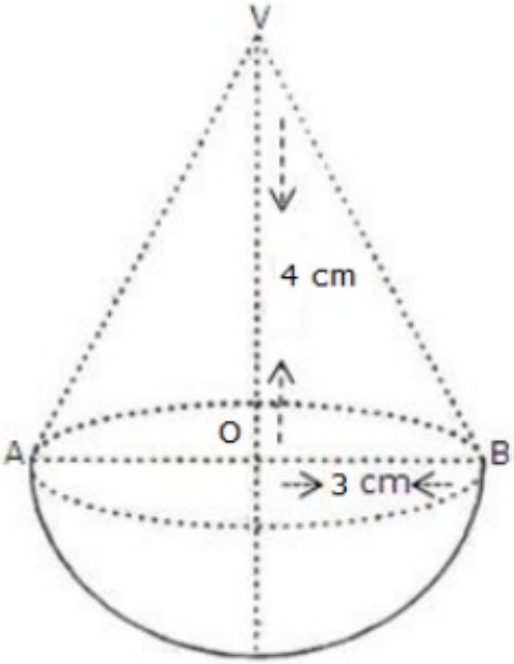
$\Rightarrow H = \frac{7 \times 7 \times 8}{35 \times 21}$ m

$= \frac{8}{15}$ m

$= \frac{800}{15}$ cm

= 53.3 cm

13. We have, radius of the base of the cone = 3 cm. Height of the cone = 4 cm



Let l be the slant height of the cone. Then,

$l = \sqrt{r^2 + h^2} = \sqrt{3^2 + 4^2}$ cm = 5 cm

∴ Lateral surface area of the cone = $\pi rl = \frac{22}{7} \times 3 \times 5$ cm^2 = $\frac{330}{7}$ cm^2

Surface area of the hemisphere = $2\pi r^2$ = $2 \times \frac{22}{7} \times 3 \times 3$ cm^2 = $\frac{396}{7}$ cm^2

∴ Total surface area of the toy = $\left(\frac{330}{7} + \frac{396}{7}\right)$ cm^2 = 103.71 cm^2

Rate of painting the toy = Rs. 5 per 1000 cm^2 = Rs. $\frac{5}{1000}$ per cm^2

∴ Cost of painting the toy = Rs. $(103.71 \times \frac{5}{1000})$ = Rs. 0.51 = 51 paise.

14. Inner diameter of bowl = 10.5 cm

∴ Inner radius of bowl $(r) = \frac{10.5}{2}$ = 5.25 cm

Now, Inner surface area of bowl = $2\pi r^2$

$= 2 \times \frac{22}{7} \times 5.25 \times 5.25$

$= 2 \times \frac{22}{7} \times \frac{21}{4} \times \frac{21}{4}$

= $\frac{693}{4} cm^2$

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

$\therefore$ Cost of tin-plating per $1\ cm^2 = \frac{16}{100}$

$\therefore$ Cost of tin-plating per $\frac{693}{4} cm^2 = \frac{16}{100} \times \frac{693}{4}$ = ₹27.72

15. We have,

r = Radius of the base of the conical tent = 12 m

h = Height of the conical tent = 9 m.

$\therefore$ l = Slant height of the conical tent = $\sqrt{r^2 + h^2}$

= $\sqrt{12^2 + 9^2}\text{m} = \sqrt{225}\text{m}$ = 15m

i. Area of lateral surface = πrl = $\frac{22}{7} \times 12 \times 15$ m^2 = 565.7 m^2

$\therefore$ Total cost of canvas = Rs. (565.2 $\times$ 10) = Rs. 5652

ii. Area of the base of the conical tent = πr^2 = $\frac{22}{7} \times 12 \times 12$ m^2 = 452.16 m^2

Since each person requires 2 sq. metres of floor area.

$\therefore$ Max. no. of persons who will have enough space on the ground = $\frac{452.16}{2}$ = 226

Again,

Volume of the conical tent = $\frac{1}{3}$ $\times$ Area of the base $\times$ Height

$\Rightarrow$ Volume of the conical tent = $\frac{1}{3} \times 452.16 \times 9$ m^3

We have, Air space required person = 15 m^3

$\therefore$ No. of persons who will have enough air space to breathe in = $\frac{1356.48}{15}$ = 90

Between 226 and 90, the smaller number is 90

Hence, 90 persons can be accommodated.