

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 $8\sqrt{3} \text{ cm}$ 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 $4.5 \text{ m} \times 2.5 \text{ m} \times 2.5 \text{ m}$ 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?

PE

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Solution

1. (a) 704 cm^2 .

Explanation: given

$$r = 7 \text{ cm}, h = 24 \text{ cm}$$

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

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

$$= \sqrt{49 + 576}$$

$$= \sqrt{625}$$

$$= 25 \text{ cm}$$

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

$$= \pi r l + \pi r^2$$

$$= \pi r(l+r)$$

$$= \frac{22}{7} \times 7(25+7)$$

$$= 22 \times 32$$

$$= 704 \text{ cm}^2$$

2. (c) 2 cm.

Explanation: CSA of cylinder = $2\pi rh$

$$88 = 2 \times \frac{22}{7} \times r \times 14$$

$$r = \frac{88 \times 7}{2 \times 22 \times 14}$$

$$r = 1 \text{ cm}$$

Hence Diameter of base = 2 cm.

3. (a) it is 4 : 3.

Explanation: volume of sphere 1 : volume of sphere 2

$$\frac{4}{3}\pi r_1^3 : \frac{4}{3}\pi r_2^3$$

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

$$r_1 : r_2 = 4 : 3$$

4. (a) 512 cm^3

Explanation:

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

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

$$\text{edge} = 8 \text{ cm}$$

Volume of cube = edge^3

$$= 8 \times 8 \times 8$$

$$= 512 \text{ cm}^3$$



5. (d) Rs 562.50.

Explanation:

Cost of digging would be = $(4.5 \text{ m} \times 2.5 \text{ m} \times 2.5 \text{ m}) \times 20$

$$= \text{Rs } 562.50$$

6. 1000

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

8. $\frac{3}{4}$ of earth surface is covered by water.

$\therefore \frac{1}{4}$ earth surface is covered by land.

$$\begin{aligned} \therefore \text{Surface area covered by land} &= \frac{1}{4} \times 4\pi r^2 \\ &= \frac{1}{4} \times 4 \times \frac{22}{7} \times (6370)^2 \\ &= 127527400 \text{ km}^2 \end{aligned}$$

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

Then,

$$\text{Volume} \times 8.4 = 13.2 \times 1000$$

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

$$\Rightarrow h = 12500 \text{ cm}$$

$$= 125 \text{ metres}$$

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

$$h = 15 \text{ cm, Volume} = 1570 \text{ cm}^3$$

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

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

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

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

\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

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

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

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

$$= \frac{693}{4}$$

$$= 173.25 \text{ cm}^2$$

12. We have,

$$r = 7 \text{ m}$$

$$\text{and } h = 8 \text{ m}$$

let the height of the embankment be H metre. and radius of embankment + well = $R =$

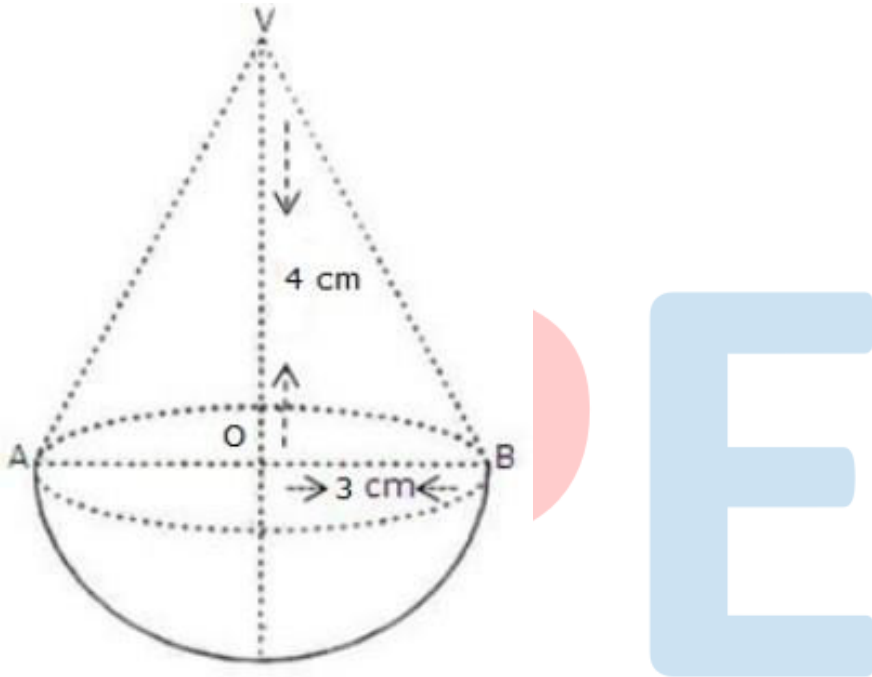
$$(21 + r) \text{ m} = 28 \text{ m}$$

Then,

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

$$\begin{aligned} \frac{22}{7} \times (28^2 - 7^2) \times H &= \frac{22}{7} \times 7^2 \times 8 \\ \Rightarrow 35 \times 21 \times H &= 7^2 \times 8 \\ \Rightarrow H &= \frac{7 \times 7 \times 8}{35 \times 21} \text{ m} \\ &= \frac{8}{15} \text{ m} \\ &= \frac{800}{15} \text{ cm} \\ &= 53.3 \text{ cm} \end{aligned}$$

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,

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

$$\therefore \text{Lateral surface area of the cone} = \pi r l = \frac{22}{7} \times 3 \times 5 \text{ cm}^2 = \frac{330}{7} \text{ cm}^2$$

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

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

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

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

14. Inner diameter of bowl = 10.5 cm

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

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

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

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

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

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

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

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

15. We have,

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

h = Height of the conical tent = 9 m.

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

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

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

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

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

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

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

Again,

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

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

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

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

Between 226 and 90, the smaller number is 90

Hence, 90 persons can be accommodated.