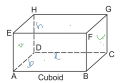
Any solid → 3D occupies solid

Find the volume, the total surface area and the lateral surface area of a cuboid which is 15 m long, 12 m wide and 4.5 m high.



Vol = l × b × h

Vol = l × b × h = a × a × a = a^3

Total Surface area : lb + lb + bh + bh + lh + lh

: 2lb + 2bh + 2lh

Total surface area = $a^2 + a^2$ (flan coil) + $a^2 + a^2 + a^2$ = $6a^2$

Lateral surface area = 2bh + 2lh

= (2b + 2l) × h

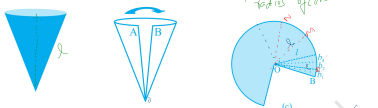
= (2(l + b)) × h

lateral surface area = ABEF + BFHC + CDGH + ADHG = $a^2 + a^2 + a^2 + a^2$ = $4a^2$

Area of four walls = [2(l + b) × h]

How many bricks will be required to construct a wall 13.5 m *long,* 6 m *high and* 22.5 cm *thick? It is being given that each brick measures* (27 cm × 12.5 cm × 9 cm)?

13.4 Surface Area of a Right Circular Cone



Area = $\frac{1}{2} \times b_1 \times l + \frac{1}{2} \times b_2 \times l + \frac{1}{2} b_3 l$

$= \frac{1}{2} \times l (b_1 + b_2 + b_3 + \ldots)$

$= \frac{1}{2} \times l (2\pi r)$

Curved surface area $A = \pi r l$

TSA = C.S.A of cone + Area of circle.

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

$= \pi r (l + r)$

T.S.A = $\pi r (r + l)$

1. Diameter of the base of a cone is 10.5 cm and its slant height is 10 cm. Find its curved surface area.

CSA = $\pi r l$

$= \frac{22}{7} \times \frac{10.5}{2} \times 10$

$= 165 \text{ cm}^2$

2. Find the total surface area of a cone, if its slant height is 21 m and diameter of its base is 24 m.

R = 12 m

TSA = $\pi R (R + l)$ = 1244.57 m^2

3. 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.

(i) CSA = 308 cm^2 l = 14 cm

$\pi r l = 308$

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

r = ____ cm

(ii) $\pi R (R + l)$

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

$= 22 \times 21$

$= 462 \text{ cm}^2$

4. A conical tent is 10 m high and the radius of its base is 24 m. Find
(i) slant height of the tent.
(ii) cost of the canvas required to make the tent, if the cost of 1 m^2 canvas is ₹ 70.

25 m

3 m^2 canvas is ₹ 140

$\pi R (R + l)$

(i) In $\triangle AOB$ by Pyt,

$l^2 = (10)^2 + (24)^2$

$= 100 + 576$

$l^2 = 676$ ⇒ $l = \sqrt{676} = 26$

(ii) CSA = $\pi r l$

$= \frac{22}{7} \times 24 \times 26$

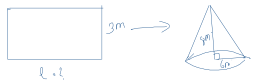
$= \frac{13728}{7} \text{ m}^2$

3 m^2 = ₹ 140

1 m^2 = $\frac{140}{3}$

$\frac{13728}{7} \text{ m}^2 = \frac{140}{3} \times \frac{13728}{7}$

5. What length of tarpaulin 3 m wide will be required to make conical tent of height 8 m and base radius 6 m? Assume that the extra length of material that will be required for stitching margins and wastage in cutting is approximately 20 cm (Use π = 3.14).



Area of tarpaulin = Area of cone

$l \times 3$ = $\pi r l$

$= \pi r \sqrt{(8)^2 + (6)^2}$

$= 3.14 \times 6 (64 + 36)$

$= 3.14 \times 6 \times 10$

$l \times 3$

$l = \frac{3.14 \times 6 \times 10}{3} = 62.8 \text{ m}$

$l = 62.8 \text{ m} + 0.2 \text{ m}$

$\therefore 63 \text{ m}$

8. A bus stop is barricaded from the remaining part of the road, by using 50 hollow cones made of recycled cardboard. Each cone has a base diameter of 40 cm and height 1 m. If the outer side of each of the cones is to be painted and the cost of painting is ₹ 12 per m^2, what will be the cost of painting all these cones? (Use π = 3.14 and take $\sqrt{1.04} = 1.02$)

CSA = $\pi r l$

$= 3.14 \times 0.2 \times 1.02$

$= \_\_\_\_ \text{ m}^2$

$l = \sqrt{(1)^2 + (0.2)^2}$

$= \sqrt{1 + 0.04}$

$= \sqrt{1.04}$

$= 1.02$

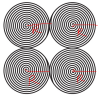
Cost of 1 cone = ₹ 12 × ____

Cost of painting 50 cones = 50 × ____

Circle and sphere

2D — 3D

Area = πR^2



Surface area of sphere = 4 × Area of Circle.
= $4 \times \pi R^2$

CSA of hemisphere = $\frac{1}{2}$ × (Surface area of Sphere)

= $\frac{1}{2} \times 4\pi R^2$

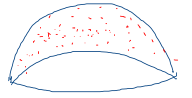
= $2\pi R^2$

TSA of hemisphere = CSA + Area of Base

= $2\pi R^2 + \pi R^2$

= $3\pi R^2$

5. 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.



D = 10.5 cm

$R = \frac{10.5}{2}$ cm

CSA of hemisphere

$= 2\pi R^2$

$= 2 \times \frac{22}{7} \times \left(\frac{10.5}{2}\right)^2$

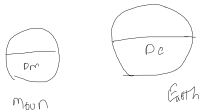
$= 173.25\ cm^2$

$100\ cm^2$ = Rs 16

$173.25\ cm^2$ = $\frac{16}{100} \times 173.25$ = Rs 27.72

Sum

7. The diameter of the moon is approximately one fourth of the diameter of the earth. Find the ratio of their surface areas.



$\frac{A_{moon}}{A_{earth}} = \frac{4\pi R_m^2}{4\pi R_e^2}$

$= \frac{(R_m)^2}{(R_e)^2}$

$D_m = \frac{1}{4} D_e$

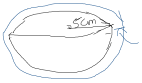
$2 \times R_m = \frac{1}{4} \times 2 \times R_e$

$R_m = \frac{1}{4} R_e$

$= \frac{\left(\frac{1}{4}R_e\right)^2}{R_e^2} = \frac{\frac{1}{16}R_e^2}{R_e^2}$

1 : 16

8. 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.



$R = 5 + 0.25$ cm

$= 5.25$ cm

Outer C.S.A = $2\pi R^2$

$= 2 \times \frac{22}{7} \times (5.25)^2$

$= 173.25\ cm^2$

Outer radius = Inner radius + thickness

$R = 5 + 0.25 = 5.25$ cm

9. A right circular cylinder just encloses a sphere of radius *r* (see Fig. 13.22). Find

(i) surface area of the sphere,

(ii) curved surface area of the cylinder,

(iii) ratio of the areas obtained in (i) and (ii).

Fig. 13.22

$2\pi rH$

$4\pi r^2$

(i) CSA of cylinder = $2\pi rH = 2\pi r(2r) = 4\pi r^2$

(ii) Ratio = $\frac{A_1}{A_2} = \frac{4\pi r^2}{4\pi r^2}$ = 1 : 1