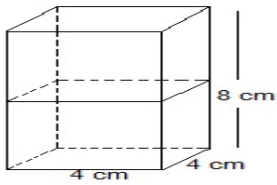
Mathematics

Surface Areas and Volumes

EXERCISE 12.1

1) 2 cubes each of volume 64 cm^3 are joined end to end. Find the surface area of the resulting cuboid.

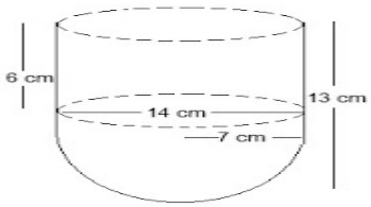
Ans: The diagram is given as:



Given,
The Volume (V) of each cube is = 64 cm^3
This implies that a^3 = 64 cm^3
∴ a = 4 cm
Now, the side of the cube = a = 4 cm
Also, the length and breadth of the resulting cuboid will be 4 cm each, while its height will be 8 cm.
So, the surface area of the cuboid = 2(lb+bh+lh)
= 2(8×4+4×4+4×8) cm^2
= 2(32+16+32) cm^2
= (2×80) cm^2 = 160 cm^2

2) A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm, and the total height of the vessel is 13 cm. Find the inner surface area of the vessel.

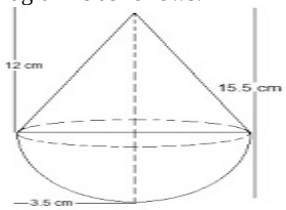
Ans: The diagram is as follows:



Now, the given parameters are:
The diameter of the hemisphere = D = 14 cm
The radius of the hemisphere = r = 7 cm
Also, the height of the cylinder = h = (13-7) = 6 cm
And the radius of the hollow hemisphere = 7 cm
Now, the inner surface area of the vessel = CSA of the cylindrical part + CSA of the hemispherical part
($2\pi rh+2\pi r^2$) cm^2 = $2\pi r(h+r)$ cm^2
2×(22/7)×7(6+7) cm^2 = 572 cm^2

3) A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of the same radius. The total height of the toy is 15.5 cm. Find the total surface area of the toy.

Ans: The diagram is as follows:



Given that the radius of the cone and the hemisphere (r) = 3.5 cm or 7/2 cm
The total height of the toy is given as 15.5 cm.
So, the height of the cone (h) = 15.5-3.5 = 12 cm

$$\text{Slant height of the cone}(l) = \sqrt{h^2 + r^2}$$

$$\Rightarrow l = \sqrt{12^2 + (3.5)^2}$$

$$\Rightarrow l = \sqrt{12^2 + (7/2)^2}$$

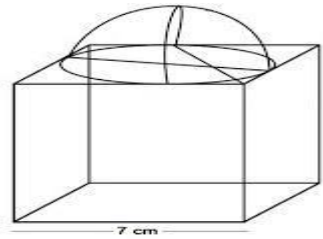
$$\Rightarrow l = \sqrt{144 + 49/4} = \sqrt{(576 + 49)/4} = \sqrt{625/4}$$

$$\Rightarrow l = 25/2$$

∴ The curved surface area of the cone = πrl
(22/7)×(7/2)×(25/2) = 275/2 cm^2
Also, the curved surface area of the hemisphere = $2\pi r^2$
= 2×(22/7)×$(7/2)^2$
= 77 cm^2
Now, the Total surface area of the toy = CSA of the cone + CSA of the hemisphere
= (275/2)+77 cm^2
= (275+154)/2 cm^2
= 429/2 cm^2 = 214.5cm^2
So, the total surface area (TSA) of the toy is 214.5cm^2

4) A cubical block of side 7 cm is surmounted by a hemisphere. What is the greatest diameter the hemisphere can have? Find the surface area of the solid.

Ans: It is given that each side of the cube is 7 cm.
So, the radius will be 7/2 cm.



We know,
The total surface area of solid (TSA) = surface area of the cubical block + CSA of the hemisphere – Area of the base of the hemisphere
∴ TSA of solid = 6×$(side)^2$+$2\pi r^2$-πr^2
= 6×$(side)^2$+πr^2
= 6×$(7)^2$+(22/7)×(7/2)×(7/2)
= (6×49)+(77/2)
= 294+38.5
= 332.5 cm^2
So, the surface area of the solid is 332.5 cm^2

5) A hemispherical depression is cut out from one face of a cubical wooden block such that the diameter l of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid.

Ans: The diagram is as follows: ***(Contd…)***