NCERT Solutions for Class 10 Maths Chapter 13 Surface Areas and Volumes Exercise 13.1

Exercise 13.1

Unless stated otherwise, take $\pi = \frac{22}{7}$.

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

Ans. Volume of cube = $(Side)^3$

According to question, $(Side)^3 = 64$

$\Rightarrow (Side)^3 = 4^3$

$\Rightarrow$ Side = 4 cm

For the resulting cubiod, length (l) = 4 + 4 = 8 cm, breadth (b) = 4 cm and height (h) = 4 cm

Surface area of resulting cuboid = $2(lb+bh+hl)$

$= 2(8\times4+4\times4+4\times8)$

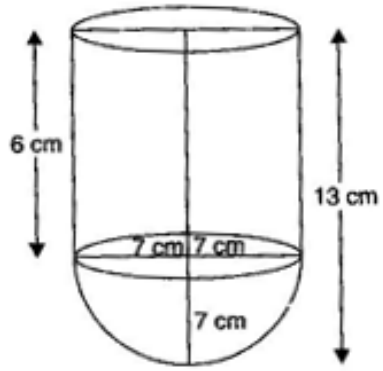
$= 2\,(32 + 16 + 32)$

$= 2\times80 = 160\ cm^2$

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. ∵ Diameter of the hollow hemisphere = 14 cm

∴ Radius of the hollow hemisphere = $\frac{14}{2} = 7$ cm



Total height of the vessel = 13 cm

∴ Height of the hollow cylinder = 13 – 7 = 6 cm

∴ Inner surface area of the vessel

= Inner surface area of the hollow hemisphere + Inner surface area of the hollow cylinder

$= 2\pi(7)^2 + 2\pi(7)(6)$

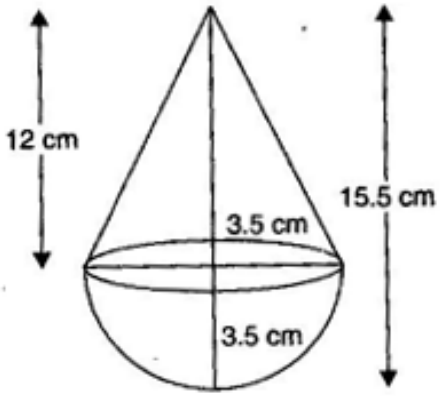
$= 98\pi + 84\pi = 182\pi$

$= 182 \times \frac{22}{7} = 26 \times 22 = 572\ cm^2$

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

Ans. Radius of the cone = 3.5 cm

$\therefore$ Radius of the hemisphere = 3.5 cm



Total height of the toy = 15.5 cm

$\therefore$ Height of the cone = 15.5 – 3.5 = 12 cm

Slant height of the cone = $\sqrt{(3.5)^2+(12)^2}$

$= \sqrt{12.25+144}$

$= \sqrt{156.25} = 12.5$ cm

$\therefore$ TSA of the toy = CSA of hemisphere + CSA of cone

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

$= 2\pi(3.5)^2 + \pi(3.5)(12.5)$

$= 24.5\pi + 43.75\pi = 68.25\pi$

$= 68.25 \times \frac{22}{7} = 214.5\ cm^2$

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. Greatest diameter of the hemisphere = Side of the cubical block = 7 cm

$\therefore$ TSA of the solid = External surface area of the cubical block + CSA of hemisphere

$$= \left\{6(7)^2 - \pi\left(\frac{7}{2}\right)^2\right\} + 2\pi\left(\frac{7}{2}\right)^2$$

$$= \left\{294 + \frac{49}{4}\pi\right\} + \frac{49}{2}\pi$$

$$= 294 + \frac{49}{4}\pi = 294 + \frac{49}{2} \times \frac{22}{7}$$

$$= 294 + \frac{77}{2} = 294 + 38.5 = 332.5\ cm^2$$

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. $\because$ Diameter of the hemisphere = l, therefore radius of the hemisphere = $\frac{l}{2}$

Also, length of the edge of the cube = l

$\therefore$ Surface area of the remaining solid

$$= 2\pi\left(\frac{l}{2}\right)^2 + 6l^2 - \pi\left(\frac{l}{2}\right)^2$$

$$= \pi\left(\frac{l}{2}\right)^2 + 6l^2$$

$$= \frac{\pi l^2}{4} + 6l^2$$

$$= \frac{1}{4}l^2(\pi + 24)$$

********** END **********