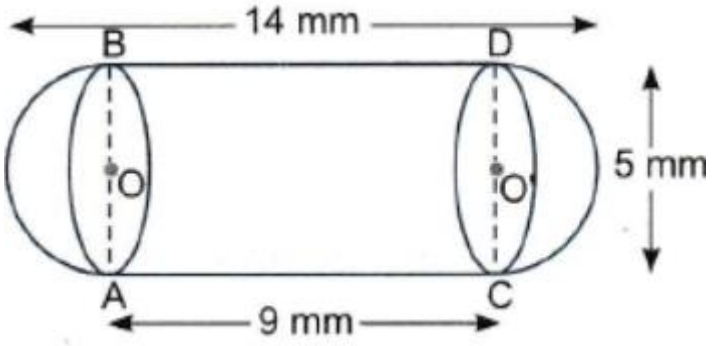
Let us consider some problems related to surface area of solids made up of combination of two or more basic solids.

Ex- 1. A solid is in the form of a cylinder with hemispherical ends. The total length of the solid is 14 mm and the diameter of the cylinder is 5 mm. Find the volume of the solid.



Cylinder

Radius, R = 2.5 mm

Height, H = 14 – (2.5 + 2.5)

= 14 – 5

= 9 mm

Hemisphere

Radius, R = 2.5 mm

Volume of the solid = Volume of cylinder + 2 x Volume of hemisphere

$$= \pi R^2 H + 2 \text{ x } \frac{2}{3}\pi R^3$$

$$= \pi R^2 (H + 2 \text{ x } \frac{2}{3} R)$$

$$= \frac{22}{7} \text{ x } (2.5)^2 (9 + \frac{4}{3} \text{ x } 2.5)$$

$$= \frac{22}{7} \text{ x } (2.5)^2 (9 + \frac{4}{3} \text{ x } 2.5)$$

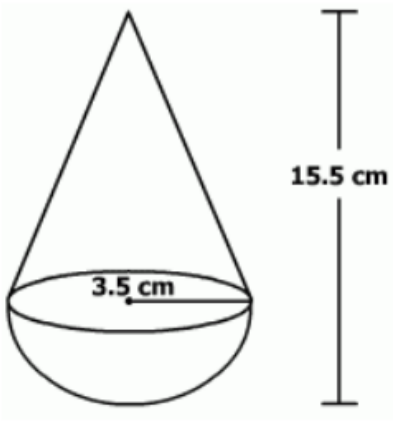
$$= \frac{22}{7} \text{ x } 6.25 \text{ x} (9 + \frac{10}{3})$$

$$= \frac{22}{7} \text{ x } 6.25 \text{ x } \frac{37}{3}$$

$$= \frac{5087.50}{21}$$

$$= 242.26 \text{ mm}^3$$

Ex- 2. 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 volume of the toy.



Cone
Radius, r = 3.5 cm
Height, h = (15.5 – 3.5) cm
h = 12 cm

Hemisphere
Radius, r = 3.5 cm

Volume of the toy = Volume of cone + Volume of hemisphere

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

$$= \frac{1}{3}\pi r^2 (h + 2r)$$

$$= \frac{1}{3} \times \frac{22}{7} \times (3.5)^2 \times (12 + 2 \times 3.5)$$

$$= \frac{1}{3} \times \frac{22}{7} \times 12.25 \times (12 + 7)$$

$$= \frac{1}{3} \times \frac{22}{7} \times 12.25 \times (12 + 7)$$

$$= \frac{1}{3} \times \frac{22}{7} \times 12.25 \times 19$$

$$= \frac{1}{3} \times 22 \times 1.75 \times 19$$

$$= \frac{731.50}{3}$$

$$= 243.833$$

$$= 243.84 \text{ cm}^3 \text{ (approx.)}$$